

AOS-CX 10.14 Multicast Guide

6200, 6300, 6400, 8xxx, 9300, 10000 Switch Series

a Hewlett Packard Enterprise company

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Contents 3

About this document 18
- Applicable products 18
- Latest version available online 18
- Command syntax notation conventions 18
- About the examples 19
- Identifying switch ports and interfaces 20
- Identifying modular switch components 21

Multicast overview 22
- Multicast protocols 22
- Multicast addresses 23
- Sub-interface recommendations and limitations 23
- Important considerations 24
- MLD snooping 26
  - MLD snooping global configuration commands 26
    - ipv6 mld snooping 26
    - mgmd delayed-refresh timer 27
    - mgmd querier-offload 28
  - MLD snooping VLAN configuration commands 28
    - ipv6 mld snooping 28
    - ipv6 mld snooping apply access-list 29
    - ipv6 mld snooping auto vlan 30
    - ipv6 mld snooping blocked vlan 31
    - ipv6 mld snooping fastlearn 32
    - ipv6 mld snooping fastleave vlan 33
    - ipv6 mld snooping forced fastleave vlan 34
    - ipv6 mld snooping forward vlan 35
    - ipv6 mld snooping preprogram-starg-flow 36
    - ipv6 mld snooping version 37
    - ipv6 mld snooping static-group 38
  - MLD snooping show commands 38
    - show ipv6 mld snooping 38
    - show mgmd debug-counters 42
  - MLD configuration commands for interface VLAN 42
    - ipv6 mld 42
    - ipv6 mld apply access-list 43
    - no ipv6 mld 44
    - ipv6 mld querier 45
    - ipv6 mld querier interval 45
    - ipv6 mld last-member-query-interval 46
    - ipv6 mld querier query-max-response-time 46
    - ipv6 mld querier-wait-time 47
    - ipv6 mld robustness 48
    - ipv6 mld static-group 48
    - ipv6 mld version 49

ipv6 mld version strict 50
MLD show commands for interface VLAN 50
show ipv6 mld 50
MLD configuration commands for interface 54
ipv6 mld 54
ipv6 mld apply access-list 55
no ipv6 mld 56
ipv6 mld querier 57
ipv6 mld querier interval 57
ipv6 mld last-member-query-interval 58
ipv6 mld querier query-max-response-time 59
ipv6 mld robustness 60
ipv6 mld static-group 60
ipv6 mld snooping filter-unknown-mcast 61
ipv6 mld version 62
ipv6 mld version strict 63

Internet Group Management Protocol (IGMP) 64

IGMP defaults, protocols, and supported configuration 64
How the IGMP protocol works 64
Considerations when configuring IGMP 65
IGMP configuration task list 66
Enabling or disabling IGMP 66
Specifying the IGMP version 66
Configuring IGMP static groups 67
Configuring IGMP query and response parameters 67
Disabling IGMP 68
Viewing IGMP information 68
IGMP configuration example 69
IGMP commands 70
ip igmp 70
ip igmp apply access-list 72
ip igmp last-member-query-interval 73
ip igmp querier 74
ip igmp querier interval 75
ip igmp querier query-max-response-time 76
ip igmp querier-wait-time 77
ip igmp robustness 78
ip igmp router-alert-check 78
ip igmp static-group 79
ip igmp version 80
ip igmp version strict 81
no ip igmp 82
show ip igmp 83
show ip igmp counters 85
show ip igmp group 87
show ip igmp groups 89
show ip igmp interface 93
show ip igmp interface counters 94
show ip igmp interface group 96
show ip igmp interface groups 98
show ip igmp interface statistics 100
show ip igmp static-groups 101
show ip igmp statistics 103

IGMP snooping 105

IGMP snooping defaults, protocols, and supported configuration 105
How IGMP snooping works 106
IGMP snooping configuration task list 107
Enabling or disabling IGMP snooping 107
Specifying the IGMP snooping version 107
Configuring IGMP snooping static groups 108
Enabling drop-unknown filters 108
Configuring IGMP snooping fast learn ports globally 109
Configuring IGMP snooping per port filtering 109
Disabling IGMP snooping 109
Viewing IGMP snooping information 110
IGMP snooping commands 110
ip igmp snooping apply access list 110
ip igmp snooping (config mode) 111
ip igmp snooping (interface mode) 113
ip igmp snooping (vlan mode) 115
ip igmp snooping filter unknown mcast 117
ip igmp snooping preprogram-starg-flow 118
ip igmp snooping static group 119
show ip igmp snooping 120

MLD snooping 124

MLD snooping global configuration commands 124
ipv6 mld snooping 124
mgmd delayed-refresh timer 125
mgmd querier-offload 126
MLD snooping VLAN configuration commands 127
ipv6 mld snooping 127
ipv6 mld snooping apply access-list 127
ipv6 mld snooping auto vlan 129
ipv6 mld snooping blocked vlan 129
ipv6 mld snooping fastlearn 130
ipv6 mld snooping fastleave vlan 131
ipv6 mld snooping forced fastleave vlan 132
ipv6 mld snooping forward vlan 133
ipv6 mld snooping preprogram-starg-flow 134
ipv6 mld snooping version 135
ipv6 mld snooping static-group 136
MLD snooping show commands 137
show ipv6 mld snooping 137
show mgmd debug-counters 140
MLD configuration commands for interface VLAN 141
ipv6 mld 141
ipv6 mld apply access-list 141
no ipv6 mld 142
ipv6 mld querier 143
ipv6 mld querier interval 144
ipv6 mld last-member-query-interval 144
ipv6 mld querier query-max-response-time 145
ipv6 mld robustness 146
ipv6 mld static-group 146
ipv6 mld version 147
ipv6 mld version strict 147
MLD show commands for interface VLAN 148
show ipv6 mld 148
MLD configuration commands for interface 152

ipv6 mld 152
ipv6 mld apply access-list 153
no ipv6 mld 154
ipv6 mld querier 155
ipv6 mld querier interval 155
ipv6 mld last-member-query-interval 156
ipv6 mld querier query-max-response-time 157
ipv6 mld robustness 157
ipv6 mld static-group 158
ipv6 mld snooping filter-unknown-mcast 159
ipv6 mld version 160
ipv6 mld version strict 161

Protocol Independent Multicast - Sparse Mode (V4 and V6) 162

Protocol Independent Multicast - Sparse Mode (PIM-SM) overview 162
PIM-SM defaults, protocols, and supported configuration 162
PIM-SM router types 163
How PIM-SM works 165
Enabling/disabling PIM-SM in an interface 167
Configuring PIM-SM options in an interface 168
Viewing PIM information 170
PIM-SM configuration example 172
PIM-SM configuration task list 174
Enabling or disabling PIM globally 174
Configuring join/prune interval 175
Enabling/disabling multicast traffic to SPT 175
Configuring an RP 176
Configuring a BSR 178
Configuring RPF override 180
Removing all PIM-SM related configurations on an interface 180
PIM VSX active-active 180
PIM-SM Active-Active with VSX 182
Use case 1: IPv4 Collapsed Core Scenario 1 190
Access-Switch-1 191
Core VSX Primary Configuration 195
Core VSX Secondary Configuration 197
Edge 1 199
Edge 2 200
Logs 201
Use case 2: IPv4 MSDP configurations 207
Core VSX Primary Configuration 208
Core VSX Secondary Configuration 210
Distro VSX Primary Configuration 213
Distro VSX Secondary Configuration 215
Edge 2 217
Edge Configuration 218
Logs 219
Snooping Switch Configuration 226
Use case 3: 2-Tier IPv4 VSX Configurations 231
Core VSX Primary Configuration 232
Core VSX Secondary Configuration 234
Distro VSX Primary Configuration 236
Distro VSX Secondary Configuration 238
Edge 2 240
Edge Configuration 241
Multi-Site-VSX-IPv4 Logs 242

Snooping Switch Configuration ... 248
Use case 4: IPv6 Collapsed Core Scenario 1 ... 254
Access-Switch-1 ... 254
Core VSX Primary Configuration ... 259
Core VSX Secondary Configuration ... 261
Edge 1 ... 263
Edge 2 ... 264
IPv6 Logs ... 265
Use case 5: IPv6 2 Layer VSX Scenario 2 ... 271
Access-Switch-1 ... 272
Core VSX Primary Configuration ... 279
Core VSX Secondary Configuration ... 281
Distro VSX Primary Configuration ... 283
Distro VSX Secondary Configuration ... 285
Edge 1 ... 287
Edge 2 ... 288
IPv6 Multi-Layer VSX Logs ... 289
PIM-SM commands for IPv4 ... 295
accept-register access-list ... 295
accept-rp ... 296
active-active ... 298
anycast-rp source-directly-connected ... 299
bfd all-interfaces ... 300
bsr-candidate bsm-interval ... 301
bsr-candidate hash-mask-length ... 301
bsr-candidate priority ... 302
bsr-candidate source-ip-interface ... 303
disable ... 304
enable ... 305
ip multicast boundary ... 306
ip multicast multipath ... 308
ip mroute ... 309
ip pim-sparse ... 310
ip pim-sparse bfd ... 311
ip pim-sparse bsr-boundary ... 312
ip pim-sparse dr-priority ... 313
ip pim-sparse hello-delay ... 314
ip pim-sparse hello-interval ... 316
ip pim-sparse ip-addr ... 317
ip pim-sparse lan-prune-delay ... 318
ip pim-sparse override-interval ... 319
ip pim-sparse propagation-delay ... 320
join-prune-interval ... 321
multicast-route-limit ... 322
no ip pim-sparse ... 323
register-rate-limit ... 324
register-source ... 325
router pim ... 326
rp-address access list ... 333
rp-address ... 335
rp-candidate group-prefix ... 336
rp-candidate hold-time ... 337
rp-candidate priority ... 338
rp-candidate source-ip-interface ... 338
rpf-override ... 339
show ip mroute ... 341

show ip mroute brief 342
show ip mroute group-addr 343
show ip multicast anomalies 345
show ip multicast boundary interface 346
show ip pim 347
show ip pim bsr 349
show ip pim bsr elected 351
show ip pim bsr local 352
show ip pim interface 353
show ip pim interface interface-name 355
show ip pim interface interface-name counters 357
show ip pim neighbor 360
show ip pim pending 362
show ip pim rp 363
show ip pim rp-registered-source 364
show ipv pim rp registered sources 365
show ip pim rp-candidate 366
show ip pim rp-set 368
show ip pim rp-set learned 369
show ip pim rp-set static 370
show ip pim rpf 371
show ip pim rpf-override 373
show ip pim rpf-override source 374
show ip pim tree-state 375
sources-per-group 378
spt-threshold 379
PIM-SM commands for IPv6 380
accept-register access-list 380
accept-rp 381
bsr-candidate bsm-interval 382
bsr-candidate hash-mask-length 383
bsr-candidate priority 384
bsr-candidate source-ip-interface 385
disable 386
enable 387
ipv6 mroute 387
ipv6 pim6-sparse 389
ipv6 pim6-sparse bfd 390
ipv6 pim6-sparse dr-priority 391
ipv6 pim6-sparse hello-delay 392
ipv6 pim6-sparse hello-interval 393
ipv6 pim6-sparse ipv6-addr 394
ipv6 pim6-sparse lan-prune-delay 395
ipv6 pim6-sparse override-interval 396
ipv6 pim6-sparse propagation-delay 397
join-prune-interval 398
no ipv6 pim6-sparse 399
register-source 400
router pim6 401
rp-address access list 402
rp-address 403
rp-candidate group-prefix 405
rp-candidate hold-time 405
rp-candidate priority 406
rp-candidate source-ip-interface 407
rpf-override 409

show ipv6 mroute <GROUP-ADDR> 410
show ipv6 mroute 411
show ipv6 mroute brief 413
show ipv6 pim6 414
show ipv6 pim6 bsr 415
show ipv6 pim6 bsr elected 417
show ipv6 pim6 bsr local 418
show ipv6 pim6 interface <INTERFACE-NAME> 419
show ipv6 pim6 interface 420
show ipv6 pim6 neighbor 421
show ipv6 pim6 pending 423
show ipv6 pim6 rp 424
show ipv6 pim6 rp-registered-source 426
426
show ipv6 pim6 rp registered sources 426
show ipv6 pim6 rp-candidate 428
show ipv6 pim6 rpf 429
show ipv6 pim6 rpf-override 430
show ipv6 pim6 rpf-override source 431
show ipv6 pim6 rp-set 433
show ipv6 pim6 rp-set learned 434
show ipv6 pim6 rp-set static 435
show ipv6 pim6 tree-state 436
sources-per-group 439
spt-threshold 440
Debugging and Troubleshooting 441
FAQ and best practices 449

Protocol Independent Multicast - Dense Mode (V4 and V6) 452
Protocol Independent Multicast - Dense Mode (PIM-DM) overview 452
PIM-DM defaults, protocols, and supported configurations 452
PIM-DM configuration example 453
PIM-DM features 454
PIM-DM commands for IPv4 455
disable 455
enable 456
ip pim-dense 456
ip pim-dense bfd 457
ip pim-dense graft-retry-interval 459
ip pim-dense hello-delay 460
ip pim-dense hello-interval 461
ip pim-dense ip-addr 462
ip pim-dense lan-prune-delay 463
ip pim-dense max-graft-retries 464
ip pim-dense override-interval 466
ip pim-dense propagation-delay 467
ip pim-dense ttl-threshold 468
router pim 469
show ip mroute 476
show ip mroute group-addr 478
show ip mroute brief 479
show ip pim 480
show ip pim interface 481
show ip pim interface interface-name 483
show ip pim interface interface-name counters 484
show ip pim neighbor 485

show ip pim rpf 487
state-refresh-interval 489
PIM-DM commands for IPv6 490
disable 490
enable 491
ipv6 pim6-dense 491
ipv6 pim6-dense bfd 493
ipv6 pim6-dense graft-retry-interval 494
ipv6 pim6-dense hello-delay 495
ipv6 pim6-dense hello-interval 496
ipv6 pim6-dense ipv6-addr 497
ipv6 pim6-dense lan-prune-delay 498
ipv6 pim6-dense max-graft-retries 500
ipv6 pim6-dense override-interval 501
ipv6 pim6-dense propagation-delay 502
ipv6 pim6-dense ttl-threshold 503
no ipv6 pim6-dense 504
show ipv6 pim6 505
show ipv6 pim6 interface 506
show ipv6 pim6 interface <INTERFACE-NAME> 507
show ipv6 mroute 508
show ipv6 mroute brief 510
show ipv6 mroute <GROUP-ADDR> 511
show ipv6 pim6 neighbor 513
show ipv6 pim6 rpf 515
router pim6 517
state-refresh-interval 518

Protocol Independent Multicast - Source-Specific Multicast 520

Protocol and feature details 520
Supported platforms and standards 520
Configuration examples 521
PIM-SSM IPv4 configurations 521
PIM-SSM IPv6 configurations 522
Considerations and best practices 524
Use case 525
PIM-SSM commands 525
ip igmp apply ssm-map access-list 525
show ip igmp ssm-map 527
PIM-SSM commands for IPv4 528
pim-ssm 528
pim-ssm range-access-list 530
show ip mroute 531
show ip multicast summary 532
show ip pim interface interface-name counters 534
PIM-SSM commands for IPv6 537
ipv6 mld apply ssm-map access-list 537
pim-ssm 539
pim-ssm range-access-list 540
show ipv6 mld ssm-map 541
show ipv6 mroute 542
show ipv6 pim interface counters 544
Debugging and troubleshooting 546

Bidirectional PIM 550

BIDIR-PIM commands 551

ip pim-bidir 551
ip pim-bidir hello-delay 552
ip pim-bidir lan-prune-delay 553
ip pim-bidir override-interval 554
ip pim-bidir propagation-delay 555
no ip pim-bidir 556
show ip pim dfe 556
show ip pim dfe 557
show running-config pim 558

Multicast Source Discovery Protocol (MSDP) 560

Multicast Source Discovery Protocol (MSDP) overview 560
MSDP router config commands 560
disable 560
enable 561
router msdp 562
sa-interval 563
sa-limit 563
MSDP peer configuration commands 565
connection-retry-interval 565
connect-source 566
clear ip msdp peer statistics 567
description 568
disable 569
enable (ip msdp peer) 569
ip msdp peer 570
keepalive 571
mesh-group 572
password (router msdp) 573
sa-filter access-list 574
MSDP show commands 575
show ip msdp count 575
show ip msdp peer 576
show ip msdp sa-cache 578
show ip msdp summary 579

mDNS gateway 581

mDNS gateway overview 581
Configuring mDNS gateway 582
mDNS gateway commands 583
debug mdns 583
description 584
id 585
mdns-sd 585
mdns-sd apply-profile tx 586
mdns-sd enable 587
mdns-sd profile 588
mdns-sd service 589
clear mdns-sd statistics 590
sequence-number 590
show mdns-sd service-entries 592
show mdns-sd statistics 593
show mdns-sd statistics profile 594
show mdns-sd summary 595
show running-config interface 595
show running-config mdns-sd profile 596

show running-config mdns-sd service 597

Single fabric Multicast VXLAN (V4 and V6) 599

Protocol and feature details 600
Broadcast, unknown unicast, multicast (BUM) traffic replication 600
Overlay multicast support 600
L2 multicast over VXLAN 600
L2 multicast over VXLAN enabled with IGMP or MLD snooping 601
Split horizon and L2 multicast 602
VSX and L2 multicast 602
Recommended configuration on the VSX VTEPs 605
IGMP or MLD querier positioning 606
L3 multicast over VXLAN 606
Centralized L3 gateway 606
Distributed L3 gateways 607
Border VTEP to external (non overlay) network 609
VSX and L3 Multicast 610
VSX Border VTEP with L3 connectivity to external (non overlay) network 610
RP placement and election 615
Anycast RP support for VXLANs 615
EVPN VXLAN distributed anycast gateway 617
Designated router priorities 618
Supported platforms and standards 619
Scale 619
Supported RFCs and standards 619
Configuration task list 619
Multicast VXLAN and EVPN 619
VSX VTEP 619
IGMP/MLD snooping 620
PIM/PIM6 and IGMP/MLD on SVI with source and receivers 620
Static RP on VTEP 621
Overlay BSR/RP on VTEP 622
EVPN VXLAN distributed anycast gateway configuration 623
Considerations and best practices 624
Use cases 626
Use case 1: Campus network with centralized L3 gateway 626
Edge 627
Core-vsx-primary 631
Core-vsx-secondary 645
8320-vsx-pri 656
8320-vsx-sec 658
6300-VSF-VTEP1 660
6300-VTEP2 672
Anycast RP support 681
Use case 2: DC network with distributed L3 gateway 683
Spine01 684
Spine02 686
Leaf01-primary 688
Leaf01-secondary 699
Leaf02 711
8325-border-prim 721
8325-border-sec 733
Edge-primary 745
Edge-secondary 752
Use Case 3: IPv6 VXLAN tunnel source with dual stack IPv4/IPv6 multicast overlay 759
Configuration example for the 8360-Standalone switch: 760

Configuration example for the 8360-BL-Primary switch: 766
Configuration example for the 8360-BL-Secondary switch: 770
Configuration example for the 8400 Core1-Primary switch: 775
Configuration example for the 8400 Core1-Secondary switch: 777
Configuration example for the 6410Agg-Primary switch: 779
Configuration example for the 6410Agg-Secondary switch: 781
Configuration Example for the 6300 standalone VTEP switch: 784
Configuration example for the 6300-VSF VTEP switch: 788
Configuration example for the 6400 access switch: 794
Example Configuration Outputs 806
Scale-IPv6 Underlay 807
Sample Multicast over VXLAN Config of a VSX Leaf in Symmetric IRB topology 808
Multicast support over static VXLAN tunnels 811
Deployment scenarios 811
VSX deployment scenario 814
RR 814
Edge-1 (VSX primary) 815
Edge-1 (VSX secondary) 817
EDGE-2 819
Extended Edge 820
Multicast VXLAN commands 822
clear ip mroute 822
dyn-vxlan-tunnel-bridging-mode 823
ip pim-sparse datapath-auto-include 824
ip pim-sparse vsx-virtual-neighbor 825
ipv6 pim6-sparse datapath-auto-include 826
ipv6 pim6-sparse vsx-virtual-neighbor 827
register-source 828
show ip mroute 829
show ip pim neighbor 832
show ipv6 mroute 834
show ipv6 pim6 interface vlan 836
show ipv6 pim6 neighbor 837
IGMP/MLD 840
PIM-SM 840
PIM-SSM 841
Recommendations for PIM-SSM over VXLAN 841
Limitations 841
Mroute output for SSM over VXLAN 841
PIM-SSM Scenario 842
Core VSX primary 843
Core VSX secondary 848
Distro VSX primary 853
Distro VSX secondary 854
Edge 855
VTEP 1 856
VTEP 2 860
Debugging and troubleshooting 863
Debugging and troubleshooting of anycast RP 873
FAQ 874
References 876
Multi-fabric multicast VXLAN 877
Protocol and feature details 880
Multi-fabric Shared Border 880
Routemap Configuration with local Broadcast Group ID 881

Multi-fabric Border 882
Multi-fabric Identifier 882
Supported platforms and standards 882
Scale 882
Border VTEP extensions 883
Packet forwarding rules at the border router 883
Multicast Routing Across Fabrics 884
PIM-SSM 885
Distributed Anycast Gateway 885
Caveats 885
Considerations and Best Practices 885
RP Replacement 885
Multi-fabric L3VNI and L2VNI Stretch 886
Shared Border 886
Use Cases 886
Use case 1: one fabric per site (PIM-SM) 886
Site-1-Access-vtep-1 887
Site-1-Access-vtep-2 892
Site-1-Border-vtep-primary 894
Site-1-Border-vtep-secondary 903
Site-1-External-router 910
Site-2-Access-vtep-1 914
Site-2-Access-vtep-2 919
Site-2-Border-vtep-primary 922
Site-2-Border-vtep-secondary 928
Anycast RP configured between Site-1 border VSX VTEP and Site-2 border VSX VTEP 936
Use case 2: multiple fabrics per site (PIM-SM) 944
Site-1-Access-vtep-1 945
Site-1-Border-vtep-primary 950
Site-1-Border-vtep-secondary 959
Site-1-Distro-vsx-primary 968
Site-1-Distro-vsx-secondary 969
Site-1-External-router 971
Site-2-Access-vtep-1 974
Site-2-Access-vtep-2 979
Site-2-Border-vtep-primary 985
Site-2-Border-vtep-secondary 993
Site-2-Distro-vsx-primary 1002
Site-2-Distro-vsx-secondary 1004
Site-2-External-router 1005
Site-3-Access-vtep-1 1009
Site-3-Access-vtep-2 1011
Site-3-Border-vtep-primary 1014
Site-3-Border-vtep-secondary 1022
Use case 3: one fabric per site (PIM-SSM) 1029
Site-1-Access-vtep-1 1030
Site-1-Access-vtep-2 1036
Site-1-Border-vtep-Primary 1040
Site-1-Border-vtep-Secondary 1053
Site-1-External-router 1065
Site-2-Access-vtep-1 1069
Site-2-Access-vtep-2 1074
Site-2-Border-vtep-Primary 1078
Site-2-Border-vtep-Secondary 1088
Use case 4: multiple fabrics per site (PIM-SSM) 1100

Site-1-Access-vtep-1 ... 1100
Site-1-Border-vtep-Primary ... 1104
Site-1-Border-vtep-Secondary ... 1113
Site-1-Distro-vsx-primary ... 1122
Site-1-Distro-vsx-secondary ... 1123
Site-1-External-router ... 1125
Site-2-Access-vtep-1 ... 1128
Site-2-Access-vtep-2 ... 1133
Site-2-Border-vtep-Primary ... 1138
Site-2-Border-vtep-Secondary ... 1148
Site-2-Distro-vsx-primary ... 1157
Site-2-Distro-vsx-secondary ... 1159
Site-2-External-router ... 1160
Site-3-Access-vtep-1 ... 1163
Site-3-Access-vtep-2 ... 1166
Site-3-Border-vtep-Primary ... 1168
Site-3-Border-vtep-Secondary ... 1176
Use case 5: Shared Border (PIM-SM) ... 1184
External DUT ... 1184
Site-1-BorderVtep-SA ... 1196
Site-2-fabric1-Access-vtep-1 ... 1208
Site-2-Fabric1-Access-vtep-2 ... 1224
Site-2-Fabric1-BorderRR-primary ... 1240
Site-2-Fabric1-BorderRR-secondary ... 1243
Site-2-Fabric2-Access-vtep-1 ... 1245
Site-2-Fabric2-Access-vtep-2 ... 1260
Site-2-Fabric2-BorderRR-SA ... 1274
Site-2-Shared-Border-vsx-primary ... 1277
Site-2-Shared-Border-vsx-secondary ... 1293
Multicast VXLAN Multi-fabric commands ... 1310
show ip mroute detail ... 1311
ip multicast multi-fabric border ... 1313
ip multicast multi-fabric identifier ... 1314
Debugging and Troubleshooting ... 1315
Check underlay network reachability and VXLAN tunnel between VTEPs ... 1315
Verify split-horizon rules are disabled at the Border VTEP ... 1316
Validate PIM Neighbors at the Border VTEP ... 1316
Validate MRoutes at the Border VTEP ... 1316
Site-A Border VTEP ... 1317
Site-B Border VTEP ... 1317
Multicast receivers not receiving traffic ... 1317
Troubleshooting from the reciver designated VTEP (DR) ... 1318
Checking the RP for the affected flow ... 1318
Checking if the VTEP has a reverse path to reach RP or Multicast Source ... 1318
Troubleshooting once the RPF Neighbor towards the RP/Source is found ... 1319
Verify if the Source DR has successfully registered the flow with RP ... 1320
Troubleshooting Source DR registration issues with RP ... 1320
Troubleshooting RP, RP-Set and BSR Election issues ... 1322
Troubleshooting multicast on a Two site Multi-fabric topology ... 1322
Troubleshooting Multicast Shared Border Router Issues ... 1326
Frequently Asked Questions ... 1328

Multicast Routing and Bridging ... 1330

Supported platforms and standards ... 1330
Multicast datapath commands for IPv4 ... 1330
show ip multicast bridging datapath ... 1330

show ip multicast routing datapath ... 1332
Multicast datapath commands for IPv6 ... 1333
show ipv6 multicast bridging datapath ... 1334
show ipv6 multicast routing datapath ... 1335

Multicast Scenario-based Debugging ... 1338
Issue: A user switching channels impacts traffic on other channels. ... 1338
Issue two: Momentary/Permanent traffic drops, RP (Rendezvous Point) not reachable ... 1342
Issue three: Multicast Join Latency ... 1345
Issue four: traffic loss, pixelization issues (L2) ... 1348
Issue five: Interoperability issues with other vendors (Cisco) ... 1352

Static routes ... 1367
Protocol and Feature Details ... 1367
Deployments ... 1368
Static-only mode ... 1368
Hybrid mode with PIM ... 1369
Redistribution mode into PIM ... 1370
Supported platforms and standards ... 1371
Standards ... 1371
Static multicast scenarios ... 1371
Overlapping Static Multicast Routes ... 1371
Scenario 1: Traffic is dropped due to {S, G} preferrence over {*, G} ... 1371
Scenario 2: Traffic is duplicated due to {S, G} and {*, G} from different upstreams ... 1372
PIM + Static Scenarios ... 1373
PIM + Static without redistribution ... 1374
PIM + Static with redistribution ... 1376
VSX Scenarios ... 1379
ECMP scenarios ... 1397
ECMP downstream ... 1397
ECMP upstream with static multicast routes ... 1397
ECMP upstream with PIM ... 1398
ECMP downstream with summary route as backup ... 1399
Inter-operability ... 1400
Inter-operability with PIM ... 1400
Arbitration with PIM ... 1400
Redistribution with PIM ... 1400
Inter-operability with IGMP ... 1401
Inter-operability with other vendors ... 1402
Considerations and Best Practices ... 1402
Use cases ... 1403
Use case 1: SSDP enabled networks ... 1403
Use case 2: Fixed channel subscription scenarios ... 1403
Use case 3: IP video surveillance ... 1404
Use case 4: Precision time protocol ... 1404
Use case configuration ... 1404
PIM and static ANY redistribute distroVSX ... 1405
End-to-end static, no PIM ... 1417
Hybrid mode with PIM ... 1429
PIM and static ANY redistribute distroVSX ... 1443
PIM and static SG redistribute coreVSX ... 1455
PIM and static SG redistribute DistroVSX ... 1484
Static Route commands ... 1505
ip multicast-static-route ... 1505
ip multicast-static-route (l3vni) ... 1508

ipv6 multicast-static-route 1509
ipv6 multicast-static-route (l3vni) 1511
redistribute static 1512
show capacities multicast static route 1514
show ip multicast-static-route 1515
show ip multicast-static-route detail 1516
show ip multicast-static-route (group) 1517
show ipv6 multicast-static-route 1520
show ipv6 multicast-static-route detail 1522
show ipv6 multicast-static-route (group) 1523
show running-config 1524
Debugging and Troubleshooting 1525
Frequently Asked Questions 1528

Support and Other Resources 1530
Accessing HPE Aruba Networking Support 1530
Accessing Updates 1531
Warranty Information 1531
Regulatory Information 1531
Documentation Feedback 1531

Chapter 1
About this document

This document describes features of the AOS-CX network operating system. It is intended for administrators responsible for installing, configuring, and managing Aruba switches on a network.

Applicable products

This document applies to the following products:

- HPE Aruba Networking 6200 Switch Series (JL724A, JL725A, JL726A, JL727A, JL728A, R8Q67A, R8Q68A, R8Q69A, R8Q70A, R8Q71A, R8V08A, R8V09A, R8V10A, R8V11A, R8V12A, R8Q72A, JL724B, JL725B, JL726B, JL727B, JL728B, S0M81A, S0M82A, S0M83A, S0M84A, S0M85A, S0M86A, S0M87A, S0M88A, S0M89A, S0M90A, S0G13A, S0G14A, S0G15A, S0G16A, S0G17A)
- HPE Aruba Networking 6300 Switch Series (JL658A, JL659A, JL660A, JL661A, JL662A, JL663A, JL664A, JL665A, JL666A, JL667A, JL668A, JL762A, R8S89A, R8S90A, R8S91A, R8S92A, S0E91A, S0X44A, S3L75A, S3L76A, S3L77A)
- HPE Aruba Networking 6400 Switch Series (R0X31A, R0X38B, R0X38C, R0X39B, R0X39C, R0X40B, R0X40C, R0X41A, R0X41C, R0X42A, R0X42C, R0X43A, R0X43C, R0X44A, R0X44C, R0X45A, R0X45C, R0X26A, R0X27A, JL741A, S0E48A,S0E48A #0D1, S1T83A, S1T83A #0D1)
- HPE Aruba Networking 8100 Switch Series (R9W94A, R9W95A, R9W96A, R9W97A)
- HPE Aruba Networking 8320 Switch Series (JL479A, JL579A, JL581A)
- HPE Aruba Networking 8325 Switch Series (JL624A, JL625A, JL626A, JL627A)
- HPE Aruba Networking 8360 Switch Series (JL700A, JL701A, JL702A, JL703A, JL706A, JL707A, JL708A, JL709A, JL710A, JL711A, JL700C, JL701C, JL702C, JL703C, JL706C, JL707C, JL708C, JL709C, JL710C, JL711C, JL704C, JL705C, JL719C, JL718C, JL717C, JL720C, JL722C, JL721C)
- HPE Aruba Networking 8400 Switch Series (JL366A, JL363A, JL687A)
- HPE Aruba Networking 9300 Switch Series (R9A29A, R9A30A, R8Z96A, S0F81A, S0F82A, S0F83A, S0F84A, S0F85A, S0F86A, S0F87A, S0F88A, S0F95A, S0F965A)
- HPE Aruba Networking 10000 Switch Series (R8P13A, R8P14A)

Latest version available online

Updates to this document can occur after initial publication. For the latest versions of product documentation, see the links provided in Support and Other Resources.

Command syntax notation conventions

Convention	Usage
`example-text`	Identifies commands and their options and operands, code examples, filenames, pathnames, and output displayed in a command window. Items that appear like the example text in the previous column are to be entered

Convention	Usage
	exactly as shown and are required unless enclosed in brackets (**[ ]**).
example-text	In code and screen examples, indicates text entered by a user.
Any of the following: ■ *<example-text>* ■ <example-text> ■ *example-text* ■ *example-text*	Identifies a placeholder—such as a parameter or a variable—that you must substitute with an actual value in a command or in code: ■ For output formats where italic text cannot be displayed, variables are enclosed in angle brackets (**< >**). Substitute the text—including the enclosing angle brackets—with an actual value. ■ For output formats where italic text can be displayed, variables might or might not be enclosed in angle brackets. Substitute the text including the enclosing angle brackets, if any, with an actual value.
|	Vertical bar. A logical **OR** that separates multiple items from which you can choose only one. Any spaces that are on either side of the vertical bar are included for readability and are not a required part of the command syntax.
{ }	Braces. Indicates that at least one of the enclosed items is required.
[ ]	Brackets. Indicates that the enclosed item or items are optional.
... or . . .	Ellipsis: ■ In code and screen examples, a vertical or horizontal ellipsis indicates an omission of information. ■ In syntax using brackets and braces, an ellipsis indicates items that can be repeated. When an item followed by ellipses is enclosed in brackets, zero or more items can be specified.

About the examples

Examples in this document are representative and might not match your particular switch or environment.

The slot and port numbers in this document are for illustration only and might be unavailable on your switch.

Understanding the CLI prompts

When illustrating the prompts in the command line interface (CLI), this document uses the generic term **switch**, instead of the host name of the switch. For example:

```
switch>
```

The CLI prompt indicates the current command context. For example:

```
switch>
```

Indicates the operator command context.

```
switch#
```

Indicates the manager command context.

switch(*CONTEXT-NAME*)#

Indicates the configuration context for a feature. For example:

```
switch(config-if)#
```

Identifies the **interface** context.

Variable information in CLI prompts

In certain configuration contexts, the prompt may include variable information. For example, when in the VLAN configuration context, a VLAN number appears in the prompt:

```
switch(config-vlan-100)#
```

When referring to this context, this document uses the syntax:

```
switch(config-vlan-<VLAN-ID>)#
```

Where <*VLAN-ID*> is a variable representing the VLAN number.

Identifying switch ports and interfaces

Physical ports on the switch and their corresponding logical software interfaces are identified using the format:

member/*slot*/*port*

On the 6200 Switch Series

- *member*: Member number of the switch in a Virtual Switching Framework (VSF) stack. Range: 1 to 8. The primary switch is always member 1. If the switch is not a member of a VSF stack, then member is 1.
- *slot*: Always 1. This is not a modular switch, so there are no slots.
- *port*: Physical number of a port on the switch.

For example, the logical interface **1/1/4** in software is associated with physical port 4 in slot 1 on member 1.

On the 6300 Switch Series

- *member*: Member number of the switch in a Virtual Switching Framework (VSF) stack. Range: 1 to 10. The primary switch is always member 1. If the switch is not a member of a VSF stack, then member is 1.
- *slot*: Always 1. This is not a modular switch, so there are no slots.
- *port*: Physical number of a port on the switch.

For example, the logical interface **1/1/4** in software is associated with physical port 4 on member 1.

On the 6400 Switch Series

- *member*: Always 1. VSF is not supported on this switch.
- *slot*: Specifies physical location of a module in the switch chassis.
  - Management modules are on the front of the switch in slots 1/1 and 1/2.
  - Line modules are on the front of the switch starting in slot 1/3.
- *port*: Physical number of a port on a line module.

For example, the logical interface **1/3/4** in software is associated with physical port 4 in slot 3 on member 1.

On the 83xx, 9300, and 10000 Switch Series

- *member*: Always 1. VSF is not supported on this switch.
- *slot*: Always 1. This is not a modular switch, so there are no slots.
- *port*: Physical number of a port on the switch.

For example, the logical interface **1/1/4** in software is associated with physical port 4 on the switch.



If using breakout cables, the port designation changes to x:y, where x is the physical port and y is the lane when split to 4 x 10G or 4 x 25G. For example, the logical interface 1/1/4:2 in software is associated with lane 2 on physical port 4 in slot 1 on member 1.

On the 8400 Switch Series

- *member*: Always 1. VSF is not supported on this switch.
- *slot*: Specifies physical location of a module in the switch chassis.
  - Management modules are on the front of the switch in slots 1/5 and 1/6.
  - Line modules are on the front of the switch in slots 1/1 through 1/4, and 1/7 through 1/10.
- *port*: Physical number of a port on a line module

For example, the logical interface **1/1/4** in software is associated with physical port 4 in slot 1 on member 1.

Identifying modular switch components

- Power supplies are on the front of the switch behind the bezel above the management modules. Power supplies are labeled in software in the format: *member/power supply*:
  - *member*: 1.
  - *power supply*: 1 to 4.
- Fans are on the rear of the switch and are labeled in software as: *member/tray/fan*:
  - *member*: 1.
  - *tray*: 1 to 4.
  - *fan*: 1 to 4.
- Fabric modules are not labeled on the switch but are labeled in software in the format: *member/module*:
  - *member*: 1.
  - *member*: 1 or 2.
- The display module on the rear of the switch is not labeled with a member or slot number.

Chapter 2
Multicast overview

Multicast addressing allows one-to-many or many-to-many communication among hosts on a network. Typical applications of multicast communication include: audio and video streaming, desktop conferencing, collaborative computing, and similar applications.

In a network where IP multicast traffic is transmitted for multimedia applications, such traffic is blocked at routed interface (VLAN) boundaries unless a multicast routing protocol is running. Protocol Independent Multicast (PIM) is a family of routing protocols that form multicast trees to forward traffic from multicast sources to subnets that have used a protocol such as IGMP to request the traffic. PIM relies on the unicast routing tables created by any of several unicast routing protocols to identify the path back to a multicast source (Reverse Path Forwarding, or RPF). With this information, PIM sets up the distribution tree for the multicast traffic. IGMP provides the multicast traffic link between a host and a multicast router running PIM-SM. Both PIM-SM and IGMP must be enabled on VLANs whose member ports have directly connected hosts with a valid need to join multicast groups.

IGMP snooping (Internet Group Management Protocol controls) can be configured per-VLAN basis to reduce unnecessary bandwidth usage. In the factory default state (IGMP and IGMP snooping disabled), the switch simply floods all IP multicast traffic it receives on a given VLAN through all ports on that VLAN (except the port on which it received the traffic). This can result in significant and unnecessary bandwidth usage in networks where IP multicast traffic is a factor. Enabling IGMP allows the ports to detect IGMP queries and report packets and manage IP multicast traffic through the switch. IGMP will be configured on the hosts, and multicast traffic will be generated by one or more servers (inside or outside of the local network). Switches in the network (that support IGMP snooping) can then be configured to direct the multicast traffic to only the ports where needed. If multiple VLANs are configured, you can configure IGMP snooping on a per-VLAN basis.

Multicast Listener Discovery (MLD) is an IPv6 protocol used on a local link for multicast group management. MLD snooping is a subset of the MLD protocol that operates at the port level and conserves network bandwidth by reducing the flooding of multicast IPv6 packets.



Static multicast routes can be configured in bridge mode to prevent traffic from being routed from one interface to another without impacting CPU usage by multicast daemons. If a multicast deployment is using ACLs or policies to block traffic for specific groups or sources, and a static multicast route is also configured to drop or allow traffic along with these policies, traffic will be forwarded/routed only if both the static multicast route and the policy are configured to allow traffic. If one or more of these are configured to drop the traffic, traffic will be dropped.

Multicast protocols

Layer 3 multicast protocols include:

- IGMP (Internet Group Management Protocol) for last-hop multicast group management. Current RFCs include:
  - IGMPv2 (RFC 2236)
  - IGMPv3 (RFC 3376)

- PIM (Protocol Independent Multicast) for intra-domain multicast routing.
  - PIM-SM (Sparse mode) (RFC 4601)
  - PIM-DM (Dense mode) (RFC 3973)
  - BSR (Bootstrap router) (RFC 5059)
- MSDP (Multicast Source Discovery Protocol) (RFC 3618)
- MLD (Multicast Listener Discovery) v1 and v2
  - MLD v1 - RFC 2710
  - MLD v2 - RFC 3810

Layer 2 multicast protocol:

- IGMP snooping for IPv4 multicast filtering.
- MLD snooping for IPv6 multicast filtering.

Multicast addresses

Each multicast host group is identified by a single IP address in the range of 224.0.0.0 through 239.255.255.255.

- **For the 8320 and 8325 switch:** AOS-CX supports 4K IPv4 multicast flows.
- **For the 10000 switch:**AOS-CX supports 4K IPv4 multicast flows.
- **For the 9300 switch:**AOS-CX supports 4K IPv4 multicast flows.
- **For the 8400 switch:** AOS-CX supports 16K IPv4 multicast flows.
- **For the 8100/8360 switch:** AOS-CX supports 4K IPv4 multicast flows.
- **For the 6400/6300 switch:** AOS-CX supports 4K IPv4 multicast flows.
- **For the 6200 switch:** AOS-CX supports 1K IPv4 multicast flows.

For a list of all reserved and well known multicast addresses, see the standards document at the following links:

- https://www.iana.org/assignments/multicast-addresses/multicast-addresses.xhtml
- https://www.iana.org/assignments/ipv6-multicast-addresses/ipv6-multicast-addresses.xhtml

Sub-interface recommendations and limitations

(Supported only on the Aruba 6300, 6400, 8100, 8325, 8360 and 10000 Switch Series.)

The following recommendations and limitations apply:

- When ROP/sub-interface as uplink is used towards multicast source, a PIM-enabled point-to-point transit VLAN over ISL between VSX devices should be added to ensure an alternate path to reach the upstream multicast source. This transit VLAN is not carried on VSX LAGs. (A dedicated point-to-point link between VSX primary and secondary can also be used.)
- If KA is used for the P2P sub-interface link, KA has to be in a different VRF.
- BFD is not supported on sub-interfaces.
- For PIMv6 configurations, ensure that the 802.1Q VLAN ID and SVI VLAN ID are different. If both the VLAN IDs are same, then the neighborship will not be formed correctly. This is applicable only for 8325 and 10000 Switch Series.

Important considerations

Note the following considerations for deployments using IPTV or SSDP advertisement packets.

IPTV considerations

To reduce join and leave latency, reduce the number of hops to the host- or client-connected access switch. An L3 access node will significantly reduce the join and leave latency, as compared to a purely L2 snooping switch. Limiting the number of users to 300 users or fewer at any point of time will also prevent join and leave failures in the event all logged in users are continuously using IPTV channels.

The default IGMP robustness value of 2 should not be modified. Configuring FFL will result in reduced leave latency but it will also result in join and leave failures.

In SSDP advertisement packets destined for the multicast address (Pv4) 239.255.255.250 and/Or ff0X::c , all scope ranges indicated by 'X' cause AOS-CX platforms to program a hardware bridged entry for the corresponding VLAN where such SSDP packets are received. However, these bridge entries are updated to a ROUTE entry whenever a Join is received causing the hash table to fill up.

If SSDP service is not enabled in the network, Aruba recommends disabling SSDP either through VLAN ACLs or through policy as shown in the following examples:

Example 1: Filter SSDP packets using ACL

```
access-list ip drop_ssdp
  10 deny udp any 239.255.255.250 eq 1900

vlan 10
  apply access-list ip drop_ssdp in

interface 1/1/1
  no shutdown
  no routing
  vlan access 10

interface vlan 10
  ip address 192.168.1.2/24
  ip igmp enable
  ip pim-sparse enable
router pim
  enable
```

Example 2: Filter SSDP packets using Policy

```
class ip drop_class
   10 match any any 239.255.255.250

policy drop_ssdp
   10 class ip drop_class action drop

vlan 10
   apply policy drop_ssdp in

interface 1/1/1
   no shutdown
   no routing
   vlan access 10

interface vlan 10
```

```
   ip address 192.168.1.2/24
   ip igmp enable
   ip pim-sparse enable

router pim
   enable
```

MLD snooping

Multicast Listener Discovery (MLD) snooping optimizes multicast traffic across the network to prevent traffic from flooding ports on a VLAN.

- For example, one of the features of MLD snooping lets you configure the network so that traffic is forwarded only to ports that initiate an MLD request for multicast.
- Another feature of MLD lets you enable a setting so that packets that do not match the configured version are dropped.
- You can also block ports from traffic.



MLD snooping is disabled by default and has to be enabled on all applicable VLANs.

MLD snooping global configuration commands

ipv6 mld snooping

```
ipv6 mld snooping drop-unknown {vlan-shared | vlan-exclusive}
no ipv6 mld snooping drop-unknown {vlan-shared | vlan-exclusive}
```

Description

This command configures the drop unknown mode. While MLD snooping is enabled, the traffic will be forwarded only to ports that initiate an MLD request for multicast. Drop unknown mode can be a filter across all VLANs (vlan-shared) or per VLAN (exclusive-vlan). The default configuration is vlan-shared.

The **no** form of this command configures the drop unknown mode on the switch to the default **vlan-shared**.

Parameter	Description
`vlan-shared`	Required: Enable shared VLAN filter on the switch.
`vlan-exclusive`	Required: Enable exclusive drop unknown filter per VLAN.

Example

```
switch(config)# ipv6 mld snooping drop-unknown vlan-shared
switch(config)# ipv6 mld snooping drop-unknown vlan-exclusive
switch(config)# no ipv6 mld snooping drop-unknown
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config`	Administrators or local user group members with execution rights for this command.

mgmd delayed-refresh timer

```
mgmd delayed-refresh timer <value>
no mgmd delayed-refresh timer <value>
```

Description

This command delays the refresh for some IGMP or MLD protocol-related values. When this command is enabled, IGMP/MLD **last_reporter value**, source, group, or querier uptime, and the **create time** and **expiry time** values will be updated based on the configured timer values. By default, the timer value is 30 seconds. This command is disabled by default, where the values listed above will be updated for every control packet. Best practices is to enable this feature when CPU utilization by the OVSDB server is increasing because of increased MGMD operations.

Parameter	Description
timer <value>	Number of seconds the timer will delay the update. Range: 5-30.

Example

Configuring the MGMD delayed refresh.

```
switch(config)# mgmd delayed-update timer 20
```

Disabling the MGMD delayed refresh.feature:

```
switch(config)# no mgmd delayed-update timer 20
```

Command History

Release	Modification
10.10	Command Introduced

Command Information

Platforms	Command context	Authority
6400 8100 8320 8325 8360	`config`	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
8400 10000		

mgmd querier-offload

```
mgmd querier-offload
no mgmd querier-offload
```

Description

Configures the IGMP/MLD querier (mgmd) offload feature. When the querier offload is enabled, during VSX software upgrade or VSX querier node reboot, the querier responsibility is offloaded to the VSX peer which is up and running. This is enabled by default.

The **no** form of this command disables the querier offload functionality.



This feature is applicable only to the VSX switches not to standalone switches.

Example

Configuring the querier offload feature:

```
switch(config)# mgmd querier-offload
```

Disabling the querier offload feature:

```
switch(config)# no mgmd querier-offload
```

Command History

Release	Modification
10.10	Command Introduced

Command Information

Platforms	Command context	Authority
6400 8100 8320 8325 8360 8400 10000	config	Administrators or local user group members with execution rights for this command.

MLD snooping VLAN configuration commands

ipv6 mld snooping

```
ipv6 mld snooping {enable | disable}
no ipv6 mld snooping [enable | disable]
```

Description

This command enables or disables MLD snooping on the VLAN.

The **no** form of this command disables all MLD snooping configurations on the VLAN.

Parameter	Description
`enable`	Required: Enable MLD snooping on the VLAN.
`disable`	Required: Disable MLD snooping on the VLAN.

Example

Enable MLD snooping on VLAN 2:

```
switch(config)# vlan 2
switch(config-vlan)# ipv6 mld snooping enable
switch(config-vlan)# ipv6 mld snooping disable
```

Remove all MLD snooping configurations on VLAN 2:

```
switch(config)# vlan 2
switch(config-vlan)# no ipv6 mld snooping enable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan-<VLAN-ID>`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping apply access-list

```
ipv6 mld snooping apply access-list <ACL-NAME>
no ipv6 mld snooping apply access-list <ACL-NAME>
```

Description

Configures the ACL on a particular interface to filter the MLD join or leave packets based on rules set in the particular ACL name.

The **no** form of this command disables the rules set for the ACL.



This configuration will override the ACL associated with IGMP snooping on the corresponding L2 VLAN.

Parameter	Description
`access-list`	Associates an ACL with the IGMP.
<ACL-NAME>	Specifies the name of the ACL. **NOTE:** If the access list is configured for both L2 VLAN and L3 VLAN, the L3 VLAN configuration will be applied.

Usage

- Existing classifier commands are used to configure the ACL.
- In case an IGMPv3 packet with multiple group addresses is received, the switch only processes the permitted group addresses based on the ACL rule set. The packet is forwarded to querier and PIM router even though one of the groups present in the packet is blocked by ACL. This avoids the delay in learning of the permitted groups. Since the access switch configured with ACL blocks the traffic for the groups which are denied, forwarding of joins has no impact. If all the groups in the packet are denied by the ACL rule, the packet is not forwarded to the querier and PIM router. Existing joins will timeout.
- In case of IGMPv2, if there is no match or if there is a deny rule match, the packet is dropped.

Examples

Configuring the ACL to filter MLD packets based on permit/deny rules set in access list **mygroup**:

```
switch(config)# access-list ipv6 mygroup
switch(config-acl-ip)# 10 deny icmpv6 any ff55::2
switch(config-acl-ip)# 20 deny icmpv6 any ff55::3
switch(config-acl-ip)# 30 permit icmpv6 any ff55::1
switch(config-acl-ip)# exit
switch(config)# interface vlan 2
switch(config-vlan)# ipv6 mld snooping apply access-list mygroup
```

Configuring the ACL to remove the rules set in access list `mygroup`:

```
switch(config-vlan)# no ipv6 mld snooping apply access-list mygroup
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping auto vlan

`ipv6 mld snooping [auto vlan <VLAN-LIST>]`

```
no ipv6 mld snooping [auto vlan <VLAN-LIST>]
```

Description

This command configures the given ports in auto mode, which is the default port mode.

The **no** form of this command disables auto ports.

Parameter	Description
<VLAN-LIST>	Required: Specifies a list of VLANs on which the port should be configured as an auto port. Specifies the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60).

Example

On the 6400 Switch Series, interface identification differs.

Configuring auto ports for VLANs on the interface:

```
switch# configure terminal
switch(config)# int 1/1/1
switch(config-vlan)# no shut
switch(config-vlan)# no routing
switch(config-vlan)# ipv6 mld snooping auto vlan 10
switch(config-vlan)# ipv6 mld snooping auto vlan 10-20
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-vlan	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping blocked vlan

```
ipv6 mld snooping [blocked vlan <VLAN-LIST>]
no ipv6 mld snooping [blocked vlan <VLAN-LIST>]
```

Description

By default ports are configured in auto mode. This command configures the given ports in blocked mode.

The **no** form of this command removes blocked ports.

Parameter	Description
<VLAN-LIST>	Required: Specifies a list of VLANs on which the port should be

Parameter	Description
	configured as a blocked port. Specifies the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60).

Example

On the 6400 Switch Series, interface identification differs.

Configuring blocked ports for the VLANs on the interface:

```
switch# configure terminal
switch(config)# int 1/1/1
switch(config-vlan)# no shut
switch(config-vlan)# no routing
switch(config-vlan)# ipv6 mld snooping blocked vlan 10
switch(config-vlan)# ipv6 mld snooping blocked vlan 10-20
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping fastlearn

`ipv6 mld snooping fastlearn <port-list>`

Description

This command enables the port to learn group information on receiving topology change notification.

The **no** form of this command disables fastlearn on the ports.

Parameter	Description
`port-list`	Required: 1/1/1-1/1/2, ports to be configured as fastlearn ports.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# ipv6 mld snooping fastlearn 1/1/3
switch(config)# ipv6 mld snooping fastlearn 1/1/1-1/1/2
switch(config)# ipv6 mld snooping fastlearn 1/1/5,1/1/6
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping fastleave vlan

```
ipv6 mld snooping [fastleave vlan <VLAN-LIST>]
no ipv6 mld snooping [fastleave vlan <VLAN-LIST>]
```

Description

Configures the specified ports as fastleave ports. Enables the switch to immediately remove an interface from the bridge table upon receiving the leave group message.

The **no** form of this command disables fastleave configuration on the ports.

Parameter	Description
<VLAN-LIST>	Required: Specifies a list of VLANs on which the port should be configured as a fastleave port. Specifies the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60).

Usage

MLD fastleave is configured for ports on a per-VLAN basis. By default, the querier sends a MLD Group-Specific Query message out of the interface, upon which the leave group message is received to ensure that no other receivers are connected to the interface. If receivers are directly attached to the switch, it is inefficient to send the membership query as the receiver wanting to leave is the only connected host. Fastleave processing eliminates the MLD Group-Specific Query message. Thus, it allows the switch to immediately remove an interface from the bridge table upon receiving the leave Group message. This processing speeds up the overall leave process and also eliminates the CPU overhead of having to generate an MLD Group-Specific Query message.

Example

On the 6400 Switch Series, interface identification differs.

Configuring fastleave ports for the VLAN:

```
switch# configure terminal
switch(config)# int 1/1/1
switch(config-vlan)# no shut
switch(config-vlan)# no routing
switch(config-vlan)# ipv6 mld snooping fastleave vlan 10
switch(config-vlan)# ipv6 mld snooping fastleave vlan 10-20
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping forced fastleave vlan

```
ipv6 mld snooping [forced-fastleave <VLAN-LIST>]
no ipv6 mld snooping [forced-fastleave <VLAN-LIST>]
```

Description

Configures the given ports in forced fastleave mode.

The **no** form of this command disables forced fastleave configuration on the ports.

Parameter	Description
<VLAN-LIST>	Required: Specifies a list of VLANs on which the port should be configured as a forced fastleave port. Specifies the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60).

Usage

With forced fastleave enabled, MLD speeds up the process of blocking unnecessary multicast traffic to a switch port that is connected to multiple end nodes. When a port having multiple end nodes receives a leave group request from one end node for a given multicast group, forced fastleave activates and waits a small amount of time to receive a join request from any other member of the same group on that port. If the port does not receive a join request for that group within the forced fastleave interval, the switch then blocks any further traffic to that group on that port.

Example

On the 6400 Switch Series, interface identification differs.

Configuring forced-fastleave ports for the VLAN:

```
switch# configure terminal
switch(config)# int 1/1/1
switch(config-vlan)# no shut
switch(config-vlan)# no routing
switch(config-vlan)# ipv6 mld snooping forced-fastleave vlan 10
switch(config-vlan)# ipv6 mld snooping forced-fastleave vlan 10-20
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping forward vlan

```
ipv6 mld snooping [forward vlan <VLAN-LIST>]
no ipv6 mld snooping [forward vlan <VLAN-LIST>]
```

Description

By default ports are configured in auto mode. This command configures the given ports in forward mode.

The **no** form of this command disables forward ports.

Parameter	Description
<VLAN-LIST>	Required: Specifies a list of VLANs on which the port should be configured as a forward port. Specifies the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60).

Example

On the 6400 Switch Series, interface identification differs.

Configuring forward ports for VLANs on the interface:

```
switch# configureterminal
switch(config)# int 1/1/1
switch(config-vlan)# no shut
switch(config-vlan)# no routing
switch(config-vlan)# ipv6 mld snooping forward vlan 10
switch(config-vlan)# ipv6 mld snooping forward vlan 10-20
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping preprogram-starg-flow

```
ipv6 mld snooping preprogram-starg-flow {enable | disable}
```

Description

This command configures the preprogramming of the starg flow feature on MLD snooping enabled VLANs.

Parameter	Description
`enable`	Enable preprogramming starg flows on the VLAN.
`disable`	Disable prprogramming starg flows on the VLAN.

Usage

When this feature is enabled, a summarized multicast bridge entry is programmed into the hardware table when a starg or sg MLD join is received on the MLD snooping enabled VLAN. This enables multicast flow to be programmed in the hardware even before the data packet arrives for multicast flow. MLDv2 joins that are sent for a specific source are treated similar to starg joins and a summarized entry is programmed in the corresponding hardware.

Preprogramming of Starg Flows is supported only on the MLD snooping enabled VLANs. If MLD snooping is disabled on a VLAN, this feature is auto-disabled.

This feature is currently supported for MLDv1 and MLDv2 joins, which means a summarized multicast flow is programmed in advance when a MLDv1 or MLDv2 join for a specific group is received. For MLDv2 deployments, traffic from all of the sources for a specific multicast group are sent to all of the clients, regardless of whether they are sending MLDv1 or MLDv2 joins for this group. Keeping this feature disabled is recommended on VLANs where traffic from the specific source is only expected for the MLDv2 clients.

On the 6200, 6300, 6400, and 8100 switch series, a single starg entry is programmed in advance for each join received. Data driven programming of SG entries does not occur when traffic is received from a specific source for this group. A single starg entry is used to forward the traffic to the clients for all of the active joins in the feature enabled VLANs.

When an unknown multicast packet is received on a VLAN where the feature is enabled, it triggers programming of a starg entry in the hardware instead of SG.

It is highly recommended to not enable this feature on devices where PIM or L3 multicast routing is enabled as it can lead to issues like permanent traffic loss.

Configuring this feature on devices where there are multiple sources sending traffic for the same group address is recommended.

This feature is mutually exclusive with the MLD snooping static group feature.



Optimization may vary environment to environment, based on scale.

Example

Enable preprogramming of starg flow on VLAN 2:

```
switch(config)# vlan 2
switch(config-vlan)# ipv6 mld snooping preprogramming-starg-flow enable
```

Remove all preprogramming of starg flow on VLAN 2:

```
switch(config)# vlan 2
switch(config-vlan)# ipv6 mld snooping preprogramming-starg-flow disable
```

Command History

Release	Modification
10.13	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8360	config-vlan-*<VLAN-ID>*	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping version

```
ipv6 mld snooping [version <ver>]
no ipv6 mld snooping [version <ver>]
```

Description

This command configures the MLD snooping version on the VLAN. MLD version 2 is the default.

The **no** form of the command configures the default MLD snooping version on the VLAN, **2**.

Parameter	Description
ver	Required: 1-2, MLD snooping version.

Example

```
switch(config)# vlan 2
switch(config-vlan)# ipv6 mld snooping version 2
```

```
switch(config-vlan)# no ipv6 mld snooping version 2
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-vlan-<*VLAN-ID*>	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping static-group

```
ipv6 mld snooping [static-group <X:X::X:X>]
no ipv6 mld snooping [static-group <X:X::X:X>]
```

Description

This command configures static multicast group.

The **no** form of this command disables static multicast group.

Parameter	Description
static-group	Required: **<X:X::X:X>**, MLD static multicast group.

Example

Configuring static multicast group:

```
switch(config)# vlan 2
switch(config-vlan)# ipv6 mld snooping static-group ff12::c
```

Removing the configuration of static multicast group:

```
switch(config)# vlan 2
switch(config-vlan)# no ipv6 mld snooping static-group ff12::c
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-vlan-<*VLAN-ID*>	Administrators or local user group members with execution rights for this command.

MLD snooping show commands

show ipv6 mld snooping

```
show ipv6 mld snooping [vlan <vlan-id> [group <ip-addr>|{port <IF-NAME>}|{vsx-peer]]
   counters
   detail
   groups [vlan <vlan-id> [vsx-peer [vlan <vlan-id>]]
   no ...
```

```
 packet-exceptions
 static-groups [vsx-peer]
 statistics
 vsx-peer vlan [<vlan-id>]
```

NOTE: The `vsx-peer` parameter is not supported by the 6300 Series Switch

Description

This command shows MLD snooping details for all VLANs. Specify a VLAN ID or a VLAN and a group to display details for only that VLAN or VLAN group.

Parameter	Description
`vlan <vlan-id>`	Shows MLD snooping protocol information and number of different groups joined for the VLAN.
`group`	Shows MLD snooping details for the specified VLAN, including the number of different groups joined for the VLAN. Identify the group by IP address or interface name.
`<ip-addr>`	Dispaly MLD snooping information for the selected group IP address.
`port <IF-NAME>`	Display information for a VLAN port. Specify the port name in **member**/**slot**/**port** format.
`vsx-peer`	Display VSX peer switch information.
`counters`	Shows MLD query packets transmitted (Tx), received (Rx), and error packet counters.
`detail`	Shows the total VLANs with MLD enabled. When issued with the **vlan <vlan-id>** parameter, this command displays details for the selected VLAN.
`groups`	Show MLD snooping groups information.
`vlan <vlan-id>`	Display IGMP snooping operational information for specified VLAN
`[vsx-peer [vlan <vlan-id>]`	Display IGMP snooping operational information for the specified vsx-peer switch.
`no ...`	Negates any configured parameter.
`packet-exceptions`	Troubleshoot issues in an L2 multicast bridge entries for data packets forwarded to the CPU.
`static-groups [vsx-peer]`	Shows MLD snooping static group details, including the number of static groups joined. Include the optional [vsx-peer] parameter to display VSX peer switch information.
`statistics`	Show MLD snooping statistics.
`[vsx-peer} vlan <vlan-id>`	Displays VSX peer switch information for the specified VLAN ID.

Examples

```
switch# show ipv mld snooping vlan 2 group port 1/1/1

VLAN ID   : 2
VLAN Name : VLAN2

Group Address : ff05::2:1
Last Reporter : fe80::1
Group Type    : Filter

                                          V1        Sources   Sources
Port      Vers Mode Uptime    Expires     Timer     Forwarded Blocked
--------- ---- ---- --------- --------- --------- --------- --------
1/1/1     2    INC  1m 46s    2m 34s                3         0

Group Address  : ff05::2:1
Source Address : 3000::1
Source Type    : Filter

Port      Mode Uptime    Expires   Configured Mode
--------- ---- --------- --------- ----------------
1/1/1     INC  1m 46s    2m 34s    Auto

Group Address  : ff05::2:1
Source Address : 3000::2
Source Type    : Filter

Port      Mode Uptime    Expires   Configured Mode
--------- ---- --------- --------- ----------------
1/1/1     INC  1m 46s    2m 34s    Auto

Group Address  : ff05::2:1
Source Address : 3000::3
Source Type    : Filter

Port      Mode Uptime    Expires   Configured Mode
--------- ---- --------- --------- ----------------
1/1/1     INC  1m 46s    2m 34s    Auto
```

```
switch# show ipv6 mld snooping counters
MLD Snooping VLAN Counters

Rx Counters :

V1 All Hosts Queries                            0
V2 All Hosts Queries                            0
V2 Group Specific Queries                       0
Group And Source Specific Queries               0
V1 Member Reports                               0
V2 Member Reports                               0
V1 Member Leaves                                0


Tx Counters :

Flood on vlan                                   44
V1 Group Specific Queries                       0
V2 Group Specific Queries                       0

Errors:

Unknown Message Type                            0
```

```
Malformed Packets                                0
Bad Checksum                                     0
Packet received on MLD-disabled Interface        0
Interface Wrong Version Queries                  0
Packets dropped by ACL                           0

Port Counters:

Membership Timeout                               0
```

```
switch# show ipv6 mld snooping groups

MLD Group Address Information

VLAN ID Group Address     Expires   UpTime    Last Reporter                  Type
------- ----------------- --------- --------- ------------------------------ ----
10      ff12::c           3m 54s    0m 26s    2001::1
Filter
10      ff12::d           4m 17s    0m 3s     2001::1
```

```
switch# show ipv6 mld snooping vlan 2 statistics
MLD Snooping statistics

VLAN ID   :   2
VLAN Name :   VLAN2

Number of Include Groups       :   1
Number of Exclude Groups       :   0
Number of Static Groups        :   1
Total Multicast Groups Joined  :   2
```

```
switch# show ipv6 mld snooping packet-exceptions
List of L2 Multicast Bridge entries for which data packets are hitting CPU
Vlan   Group Address    Source-Address          Packet Count   Last Seen Time
----   --------------   -----------------       ------------   --------------
10     ff03::10/128     1010::10/128            19             01h:02m:05s
10     ff03::12/128     1010::11/128            30             00d:02h:01m
10     ff04::10/12      1010::10/128            40             01m:02w:03d
20     ff03::11/128     5000::10/128            20             02m:02w:00d
20     ff03::12/128     5000::10/128            41             0001y:01m:02w:05d
20     ff04::10/128     5000::10/128            30             00d:02h:02m
```

Command History

Release	Modification
10.10	The **packet-exceptions** parameter is introduced.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show mgmd debug-counters

```
show mgmd debug-counters
```

Description

This command displays packet throttle counters and packet queue sizes for IGMP/MLD debug counters.

Example

```
switch# show mgmd debug-counters
Global MGMD Debug Counters
Group Throttle Count                        : 0
Dropped Packet Count                        : 100
Max Pkt Handler Queue Depth                 : 2048
Current Pkt Handler Queue Depth             : 1000
```

Command History

Release	Modification
10.10	--

Command Information

Platforms	Command context	Authority
All platforms	config	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

MLD configuration commands for interface VLAN

ipv6 mld

```
ipv6 mld {enable | disable}
no ipv6 mld [enable | disable]
```

Description

This command enables or disables MLD on the interface VLAN.

The **no** form of this command disables MLD on the interface VLAN.

Parameter	Description
enable	Required: Enable MLD on the interface VLAN.
disable	Required: Disable MLD on the interface VLAN.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld enable
switch(config-if-vlan)# ipv6 mld disable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld apply access-list

```
ipv6 mld apply access-list <ACL-NAME>
no ipv6 mld apply access-list <ACL-NAME>
```

Description

Configures the ACL on a particular interface to filter the MLD join or leave packets based on rules set in the particular ACL name.

The **no** form of this command disables the rules set for the ACL.

Parameter	Description
`access-list`	Associates an ACL with the IGMP.
<ACL-NAME>	Specifies the name of the ACL.

Usage

- Existing classifier commands are used to configure the ACL.
- In case an IGMPv3 packet with multiple group addresses is received, the switch only processes the permitted group addresses based on the ACL rule set. The packet is forwarded to querier and PIM router even though one of the groups present in the packet is blocked by ACL. This avoids the delay in learning of the permitted groups. Since the access switch configured with ACL blocks the traffic for the groups which are denied, forwarding of joins has no impact. If all the groups in the packet are denied by the ACL rule, the packet is not forwarded to the querier and PIM router. Existing joins will timeout.
- In case of IGMPv2, if there is no match or if there is a deny rule match, the packet is dropped.

Examples

Configuring the ACL to filter MLD packets based on permit/deny rules set in access list **mygroup**:

```
switch(config)# access-list ipv6 mygroup
switch(config-acl-ip)# 10 deny icmpv6 any ff55::2
switch(config-acl-ip)# 20 deny icmpv6 any ff55::3
switch(config-acl-ip)# 30 permit icmpv6 any ff55::1
switch(config-acl-ip)# exit
switch(config)# interface vlan 2
switch(config-vlan)# ipv6 mld apply access-list mygroup
```

Configuring the ACL to remove the rules set in access list **mygroup**:

```
switch(config-vlan)# no ipv6 mld apply access-list mygroup
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

no ipv6 mld

`no ipv6 mld`

Description

This command removes all MLD configurations on the interface.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# no ipv6 mld
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld querier

```
ipv6 mld querier
```

Description

This command configures MLD querier.

The **no** form of this command disables MLD querier.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld querier
switch(config-if-vlan)# no ipv6 mld querier
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld querier interval

```
ipv6 mld querier [interval <interval-value>]
```

Description

This command configures MLD querier interval. The default interval-value is 125.

Parameter	Description
`interval-value`	Required: 5-300, configures MLD querier interval. **NOTE:** Default interval-value is 125. Use the **no ipv6 mld querier interval** command to set interval-value to the default.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld querier interval 100
switch(config-if-vlan)# no ipv6 mld querier interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld last-member-query-interval

`ipv6 mld last-member-query-interval <interval-value>`

Description

This command configures MLD last member query interval value in seconds. The default interval-value is 1 second.

Parameter	Description
`interval-value`	Required: 1-2, configures MLD last-member-query-interval.



Default interval-value is 1 second. Use the `no ipv6 mld last-member-query-interval` command to set interval-value to the default.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld last-member-query-interval 2
switch(config-if-vlan)# no ipv6 mld last-member-query-interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld querier query-max-response-time

`ipv6 mld querier query-max-response-time <response-time>`

Description

This command configures MLD max response time value in seconds. The default max-response-time-value is 10 seconds.

Parameter	Description
`max-response-time-value`	Required: 10-128, configures MLD querier max-response-time. **NOTE:** Default max-response-time-value is 10 seconds. Use the **no ipv6 mld querier query-max-response-time** command to set max-response-time-value to the default.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld query-max-response-time 50
switch(config-if-vlan)# no ipv6 mld query-max-response-time
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld querier-wait-time

```
ipv6 mld querier-wait-time <QUERIER-WAIT-TIME>
[no] ipv6 mld querier-wait-time <QUERIER-WAIT-TIME>
```

Description

Configures initial MLD querier-wait-time value in seconds.

The **no** form of this command sets the MLD querier-wait-time to the default value of 260 seconds. Note that the wait timer can be configured to any numbers within the 1-300 second range.

Parameter	Description
<QUERIER-WAIT-TIME-VALUE>	Configures MLD querier-wait-time to desired value.

Example

```
6200-1(config-if-vlan)# ipv6 mld querier-wait-time
<1-300>  Querier Wait value (Default: 260)
6200-1(config-if-vlan)#
```

Command History

Release	Modification
10.13	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld robustness

`ipv6 mld robustness <VALUE>`

Description

This command configures MLD robustness. The robustness value represents the number of times the querier retries queries on the connected subnets. The default robustness-value is 2 seconds.

Parameter	Description
<VALUE>	Required: 1-7, configures MLD robustness. **NOTE:** Default robustness-value is 2 seconds. Use the **no ipv6 mld robustness** command to set robustness-value to the default.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld robustness 5
switch(config-if-vlan)# no ipv6 mld robustness
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld static-group

`ipv6 mld static-group <MULTICAST-GROUP-IP>`

Description

This command configures MLD static group.

Parameter	Description
<MULTICAST-GROUP-IP>	Required: X:X::X:X, configures MLD static group.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld static-group ff12::c
switch(config-if-vlan)# no ipv6 mld static-group ff12::c
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld version

```
ipv6 mld version <VERSION>
no ipv6 mld version <VERSION>
```

Description

This command configures MLD version.

The **no** form of the command configures the default MLD version of **2**.

Parameter	Description
<VERSION>	Required: 1-2, configures MLD version.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld version 2
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if-vlan	Administrators or local user group members with execution rights for this command.

ipv6 mld version strict

```
ipv6 mld version <VERSION> [strict]
```

Description

This command configures MLD strict version. Packets that do not match the configured version will be dropped. By default, strict option is not enabled.

Parameter	Description
<VERSION>	Required: 1-2, configures MLD version.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld version 2 strict
switch(config-if-vlan)# no ipv6 mld version 2 strict
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if-vlan	Administrators or local user group members with execution rights for this command.

MLD show commands for interface VLAN

Only the default VRF is supported on the Aruba 6200 Switch Series.

show ipv6 mld

```
show ipv6 mld
   all-vrfs
   counters
   group <x:x::x:x> [source x:x::x:x]
   groups
   interface {<INTF-ID>|<INTF-ID.ID>}|{vlan <vlan-id}}
   static-groups
   statistics [all-vrfs|{vrf <vrf-name>}]
   vrf <vrf-name}
   vsx-peer
```

Description

This command shows MLD groups joined details.

Parameter	Description
`all-vrfs`	Show MLD snooping info for all VRFs in all interfaces or groups, or for all VRFs in a specified group, interface or VLAN
`counters`	Show all MLD counters, or display counters for the specified interface or VLAN
`group <x:x::x:x> [source <x:x::x:x>]`	Show MLD group information for the specified group, group and interface, or group and vlan. Include the optional **source <x:x::x:x>** parameter to dislay source information for the group.
`groups`	Show MLD group information for all VRFs, or for groups in the specified interface or VLAN.
`interface`	Shows MLD configuration information for a specified interface , sub interface, or VLAN.
`<INTF-ID>`	Specify an Interface ID
`<INTF-ID.ID>`	Specify a sub-interface ID. (Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.)
`vlan <vlan-id>`	Specify a VLAN ID
`static-groups`	Display all static groups information, or include one of the additional parameters apply additional filters: ■ **all-vrfs**: Display MLD static-group information for all VRFs ■ **vrf <vrf-name>**: Display MLD static-group information for the selected VRF
`statistics`	Display all MLD statistics, or include one of the additional parameters apply additional filters: ■ **all-vrfs**: Display MLD statistics information for all VRFs ■ **vrf <vrf-name>**: Display MLD statistics information forthe selcted VRF
`vrf <vrf-name>`	Show MLD information for the specified VRF.
`vsx-peer`	Display VSX-peer information.

Examples

Showing the current MLD configuration and status

```
switch# show ipv6 mld

VRF Name                    : default
Interface                   : vlan10
MLD Configured Version      : 2
MLD Operating Version       : 2
```

```
Querier State              : Querier
Querier IP [this switch]   : fe80::7272:cfff:fe96:d3ec
Querier Uptime             : 39m 44s
Querier Expiration Time    : 0m 31s
MLD Snoop Enabled on VLAN  : True
```

Showing the MLD configuration on a specified VLAN or interface:

```
switch# show ipv6 mld interface vlan 10

MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Querier
Querier IP [this switch]   : fe80::7272:cfff:fe96:d3ec
Querier Uptime             : 40m 42s
Querier Expiration Time    : 1m 39s
MLD Snoop Enabled on VLAN  : True

switch# show ipv6 mld interface 1/1/2

MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Querier
Querier IP [this switch]   : fe80::7272:cfff:fe96:d3ec
Querier Uptime             : 40m 42s
Querier Expiration Time    : 1m 39s
MLD Snoop Enabled on VLAN  : True
```

Showing MLD configuration on sub-interface 1/1/2.10:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch# show ipv6 mld interface 1/1/2.10

MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Querier
Querier IP [this switch]   : fe80::7272:cfff:fe96:13ec
Querier Uptime             : 40m 42s
Querier Expiration Time    : 1m 39s
MLD Snoop Enabled on VLAN  : True
```

Showing MLD groups information for a specified interface:

```
switch# show ipv6 mld interface 1/1/1 groups

MLD group information for group ff55::1

Interface Name   : 1/1/1
VRF Name         : default

Group Address    : ff55::1
Last Reporter    : fe80::a00:9ff:fe77:1062

                              V1        Sources   Sources
Vers Mode Uptime    Expires   Timer     Forwarded Blocked
```

```
---- ---- --------- --------- --------- --------- --------
2    EXC  0m 14s    4m 6s
```

Showing MLD groups information for a specified sub-interface:

```
switch# show ipv6 mld interface 1/1/1.10 groups

MLD group information for group ff56::1

Interface Name   : 1/1/1.10
VRF Name         : default

Group Address    : ff56::1
Last Reporter    : fe80::a00:9ff:fe77:1062

                             V1        Sources   Sources
Vers Mode Uptime    Expires  Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------
2    EXC  1m 14s    2m 6s
```

Showing MLD static groups

```
switch# show ipv6 mld static-groups all-vrfs

MLD Static Group Address Information

VRF Name   :default
Interface Name   Group Address
---------------- ----------------------------------------
vlan2            ff12::c
vlan2            ff12::d
VRF Name   :test
Interface Name   Group Address
---------------- ----------------------------------------
vlan3            ff13::1
vlan3            ff13::2
```

Showing MLD counters

```
switch# show ipv6 mld counters

MLD Counters

Interface Name      : vlan2
VRF Name            : default
Membership Timeout  : 0
                                              Rx            Tx
                                              ------------- -------------
V1 All Hosts Queries                          0             0
V2 All Hosts Queries                          0             12
V1 Group Specific Queries                     0             0
V2 Group Specific Queries                     0             0
Group And Source Specific Queries             0             0
V2 Member Reports                             0             N/A
V1 Member Reports                             0             N/A
V1 Member Leaves                              0             N/A
Packets dropped by ACL                        0             N/A
```

```
switch# show ipv6 mld counters vrf default

MLD Counters

Interface Name      : vlan2
VRF Name            : default
Membership Timeout  : 0
                                                Rx             Tx
                                                -------------- --------------
V1 All Hosts Queries                            0              0
V2 All Hosts Queries                            0              12
V1 Group Specific Queries                       0              0
V2 Group Specific Queries                       0              0
Group And Source Specific Queries               0              0
V2 Member Reports                               0              N/A
V1 Member Reports                               0              N/A
V1 Member Leaves                                0              N/A
Packets dropped by ACL
```

Showing MLD statistics on a specified interface:

```
switch# show ipv6 mld interface 1/1/1 statistics

MLD statistics

Interface Name : 1/1/1
VRF Name       : default

Number of Include Groups       :   2
Number of Exclude Groups       :   0
Number of Static Groups        :   0
Total Multicast Groups Joined  :   2
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

MLD configuration commands for interface

ipv6 mld

```
ipv6 mld {enable | disable}
no ipv6 mld {enable | disable}
```

Description

This command enables or disables MLD on the interface.

The **no** form of this command disables MLD on the interface.

Parameter	Description
`enable`	Required: Enable MLD on the interface.
`disable`	Required: Disable MLD on the interface.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld enable
switch(config-if)# ipv6 mld disable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld apply access-list

```
ipv6 mld apply access-list <ACL-NAME>
no ipv6 mld apply access-list <ACL-NAME>
```

Description

Configures the ACL on a particular interface to filter the MLD join or leave packets based on rules set in the particular ACL name.

The **no** form of this command removes the rules set for the ACL.

Parameter	Description
`access-list`	Associates an ACL with the IGMP.
<ACL-NAME>	Specifies the name of the ACL.

Usage

- Existing classifier commands are used to configure the ACL.
- In case an IGMPv3 packet with multiple group addresses is received, the switch only processes the permitted group addresses based on the ACL rule set. The packet is forwarded to querier and PIM router even though one of the groups present in the packet is blocked by ACL. This avoids the delay in learning of the permitted groups. Since the access switch configured with ACL blocks the traffic for the groups which are denied, forwarding of joins has no impact. If all the groups in the packet are denied by the ACL rule, the packet is not forwarded to the querier and PIM router. Existing joins will timeout.
- In case of IGMPv2, if there is no match or if there is a deny rule match, the packet is dropped.

Examples

On the 6400 Switch Series, interface identification differs.

Configuring the ACL to filter MLD packets based on permit/deny rules set in access list **mygroup**:

```
switch(config)# access-list ipv6 mygroup
switch(config-acl-ip)# 10 deny icmpv6 any ff55::2
switch(config-acl-ip)# 20 deny icmpv6 any ff55::3
switch(config-acl-ip)# 30 permit icmpv6 any ff55::1
switch(config-acl-ip)# exit
switch(config)# interface 1/1/1interface vlan 1
switch(config-vlan)# ipv6 mld apply access-list mygroup
```

Configuring the ACL to remove the rules set in access list **mygroup**:

```
switch(config-vlan)# no ipv6 mld apply access-list mygroup
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

no ipv6 mld

`no ipv6 mld`

Description

This command removes all MLD configurations on the interface.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# no ipv6 mld
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if	Administrators or local user group members with execution rights for this command.

ipv6 mld querier

ipv6 mld querier

Description

This command configures MLD querier. This functionality will allow the interface to join in the querier-election process.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld querier
switch(config-if)# no ipv6 mld querier
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if	Administrators or local user group members with execution rights for this command.

ipv6 mld querier interval

ipv6 mld querier [interval *<interval-value>*]

Description

This command configures MLD querier interval. The default interval-value is 125.

Parameter	Description
`interval-value`	Required: 5-300, configures MLD querier interval. **NOTE:** Default interval-value is 125. Use the `no ipv6 mld querier interval` command to set interval-value to the default.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld querier interval 100
switch(config-if)# no ipv6 mld querier interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld last-member-query-interval

`ipv6 mld last-member-query-interval <interval-value>`

Description

This command configures MLD last member query interval value in seconds. The default interval-value is 1 second.

Parameter	Description
`interval-value`	Required: 1-2, configures MLD last-member-query-interval.



Default interval-value is 1 second. Use the `no ipv6 mld last-member-query-interval` command to set interval-value to the default.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld last-member-query-interval 2
switch(config-if)# no ipv6 mld last-member-query-interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if	Administrators or local user group members with execution rights for this command.

ipv6 mld querier query-max-response-time

`ipv6 mld querier query-max-response-time <response-time>`

Description

This command configures MLD max response time value in seconds. The default max-response-time-value is 10 seconds.

Parameter	Description
max-response-time-value	Required: 10-128, configures MLD querier max-response-time. **NOTE:** Default max-response-time-value is 10 seconds. Use the **no ipv6 mld querier query-max-response-time** command to set max-response-time-value to the default.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld query-max-response-time 50
switch(config-if)# no ipv6 mld query-max-response-time
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld robustness

```
ipv6 mld robustness <value>
```

Description

This command configures MLD robustness. The robustness value represents the number of times the querier retries queries on the connected subnets. The default robustness-value is 2 seconds.

Parameter	Description
`robustness-value`	Required: 1-7, configures MLD robustness.



Default robustness-value is 2 seconds. Use the `no ipv6 mld robustness` command to set robustness-value to the default.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1l/1interface vlan 1
switch(config-if)# ipv6 mld robustness 5
switch(config-if)# no ipv6 mld robustness
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld static-group

```
ipv6 mld static-group <multicast-group-ip>
```

Description

This command configures MLD static group.

Parameter	Description
`multicast-group-ip`	Required: X:X::X:X, configures MLD static group.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld static-group ff12::c
switch(config-if)# no ipv6 mld static-group ff12::c
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping filter-unknown-mcast

```
ipv6 mld snooping filter-unknown-mcast
no ipv6 mld snooping filter-unknown-mcast
```

Description

Configures the unknown multicast to steal when the MLD snooping is enabled.

The **no** form of this command returns to the default behavior of initial flooding of unknown multicast traffic.

Usage

In the default behavior, the unknown multicast traffic is flooded until the IP Multicast Flow programming is done on the hardware. This is known as initial flooding of unknown multicast. Use this command to filter unknown multicast instead of flooding.



Initial flooding of multicast traffic is observed for a few seconds after the device comes up from a reboot. This issue is only seen when the multicast source connected device is rebooted. Once the device is up after a reboot, it takes a few seconds for the CPU Rx rule to be programmed during the timeframe that the initial flooding is observed. This is an expected behavior.

Example

Configure the unknown multicast to steal globally on IGMP snooping enabled VLANs.

```
switch# configure terminal
switch(config)# ipv6 mld snooping filter-unknown-multicast
```

Removing the configuration of the unknown multicast to steal globally on IGMP snooping enabled VLANs.

```
switch# configure terminal
switch(config)# no ipv6 mld snooping filter-unknown-multicast
```

Command History

Release	Modification
10.11	Command introduced on the 6200, 6300, 6400, 8100, and 8360.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8360	config	Administrators or local user group members with execution rights for this command.

ipv6 mld version

```
ipv6 mld version <version>
no ipv6 mld version <version>
```

Description

This command configures MLD version.

The **no** form of this command removes MLD version from the interface.

Parameter	Description
version	Required: 1-2, configures MLD version.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld version 2
```

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# no ipv6 mld version 2
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if	Administrators or local user group members with execution rights for this command.

ipv6 mld version strict

```
ipv6 mld version <version> [strict]
```

Description

This command configures MLD strict version. Packets that do not match the configured version will be dropped. By default, strict option is not enabled.

Parameter	Description
version	Required: 1-2, configures MLD version.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld version 2 strict
switch(config-if)# no ipv6 mld version 2 strict
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if	Administrators or local user group members with execution rights for this command.

Chapter 4
Internet Group Management Protocol (IGMP)

In a network where IP multicast traffic is transmitted for various multimedia applications, you can use the switch to reduce unnecessary bandwidth usage on a per-port basis by configuring IGMP (Internet Group Management Protocol). IGMPv3 (RFC 3376) and IGMPv2 (RFC 2236) are the current RFCs for IGMP.

In the factory default state (IGMP disabled), the switch simply floods all IP multicast traffic it receives on a given VLAN through all ports on that VLAN (except the port on which it received the traffic). This can result in significant and unnecessary bandwidth usage in networks where IP multicast traffic is a factor. Enabling IGMP allows the ports to detect IGMP queries and report packets and manage IP multicast traffic through the switch.

IGMP is useful in multimedia applications such as LAN TV, desktop conferencing, and collaborative computing, where there is MultiPoint communication; that is, communication from one to many hosts, or communication originating from many hosts and destined for many other hosts.

In such MultiPoint applications, IGMP will be configured on the hosts, and multicast traffic will be generated by one or more servers (inside or outside of the local network). Switches in the network (that support IGMP) can then be configured to direct the multicast traffic to only the ports where needed. If multiple VLANs are configured, you can configure IGMP on a per-VLAN basis.

Enabling IGMP allows the router to become querier. If there is another querier in the LAN, the router will resume non querier functionality and will respond to query/report packets.

IGMP defaults, protocols, and supported configuration

IGMP default configuration:

- IGMP is disabled by default.
- The default IGMP version is IGMPv3.

IGMP supported protocols include:

- IGMPv2 (RFC 2236)
- IGMPv3 (RFC 3376)

Static groups:

You can configure a maximum of 32 IGMP static groups on the Aruba 6200 Switch Series.

How the IGMP protocol works

IGMP manages multicast group memberships based on the query and response mechanism.

IGMP is an internal protocol of the IP suite. IP manages multicast traffic by using switches, multicast routers, and hosts that support IGMP. A multicast router is not necessary as long as a switch is configured to support IGMP with the querier feature enabled. A set of hosts, routers, and/or switches that send or receive multicast data streams to or from the same sources, is called a multicast group. All devices in the group use the same multicast group address.

The multicast group uses three fundamental types of messages to communicate:

- Query: A message sent from the querier (multicast router or switch) asking for a response from each host belonging to the multicast group. If a multicast router supporting IGMP is not present, the switch must assume this function to elicit group membership information from the hosts on the network.
- Join: A message sent by a host to the querier to indicate that the host wants to be or is a member of a given group indicated in the join message.
- Leave group: A message sent by a host to the querier to indicate that the host has ceased to be a member of a specific multicast group.

An IP multicast packet includes the multicast group (address) to which the packet belongs. When an IGMP client connected to a switch port needs to receive multicast traffic from a specific group, it joins the group by sending an IGMP join request to the network. (The multicast group specified in the join request is determined by the requesting application running on the IGMP client.)

When the client is ready to leave the multicast group, it sends a Leave Group message to the network and ceases to be a group member. When the leave request is detected, the appropriate IGMP device ceases transmitting traffic for the designated multicast group through the port on which the leave request was received (as long as there are no other current members of that group on the affected port.)

Thus, IGMP identifies members of a multicast group (within a subnet) and allows IGMP-configured hosts (and routers) to join or leave multicast groups.

Considerations when configuring IGMP

With the factory default setting, multicast data transmitted from the sources will be flooded on all ports in the VLAN. Configuring IGMP snooping avoids flooding and causes the switch to forward data only to the receivers.

The function of the IGMP querier is to poll other IGMP-enabled devices in an IGMP-enabled interface to elicit group membership information. On enabling IGMP, the router performs this function if there is no other device in the interface to act as querier.

Basic steps to configure IGMP:

1. Configure VLANs.
2. Configure ports and assign them to the VLANs.
3. Configure the L3 interface (an interface VLAN/route only port/L3 LAG) and assign an IP address to the interface.
4. Enable IGMP.
5. Choose the desired IGMP version. The default is version 3.

IGMP configuration considerations:

- For IGMP to be operational, the interface has to be administratively up. For interface VLANs, the L2 VLAN has to be up and one of the ports in the VLAN has to be up.
- The IP address must be assigned for the interface to become querier. Without an IP address, the device will remain in a non querier state.
- A querier is required for proper IGMP operation. For this reason, you must enable IGMP on the L3 Interface. If the querier functionality is not configured or disabled, you must ensure that there is an IGMP querier in the same VLAN.

- For IGMP snooping to be operational on a VLAN, the VLAN has to be administratively up and at least one port in the VLAN has to be up.
- If IGMP snooping is enabled on the VLAN, and IGMP is enabled on the interface VLAN, and the configured version does not match, the lowest version is chosen as the operating version.
- If the switch becomes the querier for a particular interface, then subsequently detects queries transmitted from another device on the same VLAN, the switch ceases to operate as the querier for that interface.
- The switch automatically ceases querier operation in an IGMP-enabled interface if it detects another querier on the interface. You can also use the switch CLI to disable the querier capability.
- Multicast traffic will be flooded on the VLAN, if TTL=1 or TTL>255 regardless of IGMP joins and group membership within the VLAN.
- The switch automatically ceases to be a querier if it receives a query message from another switch/router in its network with a lower IP address.

IGMP configuration task list

Tasks at a glance.

- Enabling or disabling IGMP
- Specifying the IGMP version
- Configuring IGMP static groups
- Configuring IGMP query and response parameters
- Disabling IGMP
- Viewing IGMP information

Enabling or disabling IGMP

Prerequisites

You must be in an interface configuration context, as indicated by the **switch(config-if)#** prompt, **switch(config-if-vlan)#** prompt, or **switch(config-lag-if)#** prompt.

For IGMP to be operational, the interface has to be up. To become querier, the interface must have an IP address associated with it.

Procedure

IGMP is disabled by default. Enable IGMP on an interface using the following command.

```
ip igmp {enable | disable}
```

For example, the following command enables IGMP on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp enable
```

Use the **disable** parameter to disable IGMP on an interface.

Specifying the IGMP version

The version can be either 2 (IGMPv2) or 3 (IGMPv3). The default is 3. IGMPv2 supports filtering based on groups. IGMPv3 is more advanced and includes filtering based on source and groups.

If using the `strict` option, packets that do not match the configured version will be dropped.

Prerequisites

You must be in an interface configuration context, as indicated by the **switch(config-if)#** prompt, **switch(config-if-vlan)#** prompt, or **switch(config-lag-if)#** prompt.

Procedure

Specify the IGMP version for an interface using one of the following commands.

`ip igmp version <VERSION>`

`ip igmp version <VERSION> strict`

For example, the following command sets the IGMP version to 2 on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp version 2
```

And the following command sets IGMP strict version to 2 on interface VLAN 5:

```
switch(config)# interface vlan 5
switch(config-if-vlan)# ip igmp version 2 strict
switch(config-if-vlan)# no ip igmp version 2 strict
```

Configuring IGMP static groups

The switch will always flood the traffic destined for a group configured as static group. So the hosts will receive the traffic for static groups even if they have not subscribed for that group. You can configure a maximum of 32 IGMP static groups.

Prerequisites

You must be in an interface configuration context, as indicated by the **switch(config-if)#** prompt, **switch(config-if-vlan)#** prompt, or **switch(config-lag-if)#** prompt.

Procedure

Configure an IGMP static group on an interface using the following command.

`ip igmp static-group <MULTICAST-GROUP-IP>`

For example, the following command configures an IGMP static multicast group as 239.1.1.1 on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp static-group 239.1.1.1
```

The **no** form of the command removes an IGMP static group.

Configuring IGMP query and response parameters

Configure query and response parameters such as querier interval, last member query interval, max response time, and robustness.

Prerequisites

You must be in an interface configuration context, as indicated by the `switch(config-if)#` prompt, `switch(config-if-vlan)#` prompt, or `switch(config-lag-if)#` prompt.

Procedure

Configure IGMP query and response parameters on an interface using the following commands.

- Make sure that the IGMP querier is enabled. (In IGMPv3 the IGMP querier is enabled by default.) Configure the IGMP querier on an interface using the following command: `ip igmp querier`.
- Configure the IGMP querier interval on an interface using the following command: `ip igmp querier interval` *`<INTERVAL-VALUE>`*. The interval is from 5-300 seconds, with a default of 125.
- Configure the IGMP last member query interval value in seconds on an interface using the following command: `ip igmp last-member-query-interval` *`<INTERVAL-VALUE>`*. The interval is from 1-2 seconds, with a default of 1.
- Configure the IGMP max response time value in seconds on an interface using the following command: `ip igmp querier query-max-response-time` *`<RESPONSE-TIME>`*. The response time is from 10-128 seconds, with a default of 10.
- Configure the IGMP robustness (the number of times to retry a query) on an interface using the following command: `ip igmp robustness` *`<VALUE>`*. The robustness value is from 1-7 with default of 2.

For example, the following command configures the IGMP querier interface interval as 100 on interface VLAN 2. The `no` form of the command sets the interval to the default.

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp querier interval 100
switch(config-if-vlan)# no ip igmp querier interval
```

Disabling IGMP

Prerequisites

You must be in an interface configuration context, as indicated by the **switch(config-if)#** prompt, **switch(config-if-vlan)#** prompt, or **switch(config-lag-if)#** prompt.

Procedure

Remove IGMP from an interface using the following command.
`no ip igmp`

For example, the following command removes IGMP on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# no ip igmp
```

Viewing IGMP information

For some commands, you can specify viewing information by interface or by VRF.

Prerequisites

Use these show commands from the Operator (**>**) or Manager (**#**) context.

Procedure

To view IGMP information, use the following commands.

- To view IGMP configuration details and status, use: **show ip igmp** or use **show ip igmp interface**.
- To view IGMP statistics and groups joined, use: **show ip igmp statistics** or use **show ip igmp interface statistics**.
- To view IGMP counters, use: **show ip igmp counters** or use **show ip igmp interface counters**.
- To view IGMP static groups, use: **show ip igmp static-groups**.
- To view IGMP group information, use: **show ip igmp groups** or use **show ip igmp interface groups**.
- To view IGMP group details for a specific group and source, use: **show ip igmp group** or use **show ip igmp interface group**. Optionally you can also display joined group details by VRF.

IGMP configuration example

The output of the following `show running-config` command shows an example of an IGMP configuration with IGMP snooping.

```
switch# show running-config
Current configuration:
!
!
!
!
!
access-list ip mygroup
    10 permit any any 239.1.1.1/24
access-list ip mygroup1
    10 permit any any any
vlan 1
    no shutdown
vlan 2
    ip igmp snooping enable
    ip igmp snooping static group 239.1.1.10
    ip igmp snooping static group 239.1.1.11
! 'mygroup' will be ignored in this configuration as 'mygroup1' is configured in
'vlan2'.
    ip igmp snooping apply access-list mygroup
interface 1/1/1
    no shutdown
    ip address 100.1.1.1/24
    ip igmp enable
interface 1/1/1.1
    no shutdown
    routing
    ip address 100.100.100.1/24
    ip igmp enable
    ip igmp querier interval 5
    ip igmp last-member-query-interval 2
    ip igmp query-max-response-time 30
    ip igmp static-group 239.1.1.1
    ip igmp apply access-list mygroup1
interface 1/1/2
    no shutdown
```

```
    ip address 200.1.1.1/24
    ip igmp enable
    ip igmp querier interval 5
    ip igmp last-member-query-interval 2
    ip igmp query-max-response-time 50
    ip igmp static-group 239.1.1.1
    ip igmp apply access-list mygroup1
interface 1/1/3
    no shutdown
    no routing
    vlan access 2
    ip igmp snooping blocked vlan 2
interface 1/1/3
     no shutdown
     no routing
     vlan access 2
     ip igmp snooping forward vlan 2
interface vlan2
    no shutdown
    ip address 20.1.1.1/24
    ip igmp enable
    ip igmp querier interval 5
    ip igmp robustness 5
    ip igmp last-member-query-interval 2
    ip igmp query-max-response-time 50
    ip igmp static-group 239.1.1.1
    ip igmp apply access-list mygroup1
```

IGMP commands

For commands in the interface configuration context, the interface must be an L3 interface. The supported contexts include: `config-if`, `config-if-vlan`, `config-lag-if`, `config-sub-if`.



The sub-interface related configuration examples provided in this section apply only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.



Only the default VRF is supported on the Aruba 6200 Switch Series.

ip igmp

```
ip igmp {enable | disable}
no ip igmp [enable | disable]
```

Description

Enables or disables IGMP on the current interface. IGMP is disabled by default.

The **no** form of this command disables IGMP on the current interface.

Parameter	Description
`enable`	Enable IGMP.
`disable`	Disable IGMP.

Examples

Enabling IGMP on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp enable
Disabling IGMP on interface VLAN 2:
```

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp disable
```

Enabling IGMP on interface 1/1/1:

```
switch(config)# interface 1/1/1
switch(config-if)# no shutdown
switch(config-if)# routing

switch(config-subif)# ip igmp enable
```

Disabling IGMP on interface 1/1/1:

```
switch(config)# interface 1/1/1
switch(config-subif)# ip igmp disable
```

```
switch(config)# interface 1/1/1
switch(config-subif)# no ip igmp enable
```

Enabling IGMP on sub-interface 1/1/1.1:

Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.1
switch(config-subif)# no shutdown
switch(config-subif)# ip igmp enable
```

Disabling IGMP on sub-interface 1/1/1.1:

Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.1
switch(config-subif)# ip igmp disable
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

All platforms	`config-if-vlan`
	`config-if`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

ip igmp apply access-list

```
ip igmp apply access-list <ACL-NAME>
no ip igmp apply access-list <ACL-NAME>
```

Description

Configures the ACL on a particular interface to filter the IGMP join or leave packets based on rules set in the particular ACL name.

The **no** form of this command unconfigures the rules set for the ACL.



This configuration will override the ACL associated with IGMP snooping on the corresponding L2 VLAN.

Parameter	Description
`access-list`	Associates an ACL with the IGMP.
<ACL-NAME>	Specifies the name of the ACL.

Usage

- Existing classifier commands are used to configure the ACL.
- In case an IGMPv3 packet with multiple group addresses is received, the switch only processes the permitted group addresses based on the ACL rule set. The packet is forwarded to querier and PIM router even though one of the groups present in the packet is blocked by ACL. This avoids the delay in learning of the permitted groups. Since the access switch configured with ACL blocks the traffic for the groups which are denied, forwarding of joins has no impact. If all the groups in the packet are denied by the ACL rule, the packet is not forwarded to the querier and PIM router. Existing joins will timeout.
- In case of IGMPv2, if there is no match or if there is a deny rule match, the packet is dropped.

Examples

Configuring the ACL on a VLAN to filter IGMP packets based on permit/deny rules set in access list **mygroup**:

```
switch(config)# access-list ip mygroup
switch(config-acl-ip)# 10 deny igmp any 239.255.255.250
switch(config-acl-ip)# 20 deny igmp any 239.255.255.253
switch(config-acl-ip)# 30 permit igmp any 239.1.1.1
switch(config-acl-ip)# exit
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp apply access-list mygroup
```

Configuring the ACL to remove the rules set in access list **mygroup**:

```
switch(config-if-vlan)# no ip igmp apply access-list mygroup
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ip igmp last-member-query-interval

```
ip igmp last-member-query-interval <INTERVAL-VALUE>
no ip igmp last-member-query-interval <INTERVAL-VALUE>
```

Description

Configures an IGMP last member query interval value in seconds on an interface, depending on the command context you are in.

The **no** form of this command sets the value to a default of 1 second on an interface.

Parameter	Description
<INTERVAL-VALUE>	Specifies an IGMP last-member-query-interval on the interface. Default: 1 second. Range: 1-2 seconds.

Examples

Configuring an IGMP last member query interval of 2 on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp last-member-query-interval 2
switch(config-if-vlan)# no ip igmp last-member-query-interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

All platforms	`config-if-vlan`
	`config-if`
	`config-lag-if`
		Administrators or local user group members with execution rights for this command.

ip igmp querier

```
ip igmp querier
no ip igmp querier
```

Description

Configures an IGMP querier on an interface, depending on the command context you are in. This functionality will allow an interface to join in the querier-election process.

The **no** form of this command disables IGMP querier on an interface.

Examples

Configuring an IGMP querier on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp querier
```

Disabling an IGMP querier on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# no ip igmp querier
```

Configuring an IGMP querier on interface 1/1/1:

```
switch(config)# interface 1/1/1
switch(config-if)# no shutdown
switch(config-if)# routing
switch(config-subif)# ip igmp querier
```

Disabling an IGMP querier on interface 1/1/1:

```
switch(config)# interface 1/1/1
switch(config-subif)# no ip igmp querier
```

Configuring an IGMP querier on sub-interface 1/1/1.1



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.1
switch(config-subif)# no shutdown
switch(config-subif)# ip igmp querier
```

Disabling an IGMP querier on sub-interface 1/1/1.1:

Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.1
switch(config-subif)# no ip igmp querier
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

All platforms	`config-if-vlan`
	`config-if`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

ip igmp querier interval

```
ip igmp querier interval <INTERVAL-VALUE>
no ip igmp querier interval
```

Description

Configures the interval between IGMP queries on an interface, depending on the command context you are in.

The **no** form of this command sets the IGMP querier interval to the default value of 125 seconds on an interface.

Parameter	Description
<INTERVAL-VALUE>	Specifies the IGMP querier interval in seconds on the interface. Default: 125 seconds. Range: 5-300.

Examples

Configuring an IGMP querier interface interval of 100 on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp querier interval 100
```

Resetting an IGMP querier interval to the default value:

```
switch(config-if-vlan)# no ip igmp querier interval
```

Configuring an IGMP querier interface interval of 100 on interface 1/1/1:

```
switch(config)# interface 1/1/1
switch(config-if)# no shutdown
switch(config-if)# routing
switch(config-subif)# ip igmp querier interval 100
```

Configuring an IGMP querier interface interval of 100 on sub-interface 1/1/1.1:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.1
switch(config-subif)# no shutdown
switch(config-subif)# ip igmp querier interval 100
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

All platforms	`config-if-vlan`
	`config-if`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

ip igmp querier query-max-response-time

```
ip igmp querier query-max-response-time <RESPONSE-TIME>
no ip igmp querier query-max-response-time <RESPONSE-TIME>
```

Description

Configures the IGMP querier max response time value in seconds on an interface, depending on the command context you are in.

The **no** form of this command sets the querier max response time value to the default of 10 seconds on an interface.

Parameter	Description
<RESPONSE-TIME>	Specifies the IGMP querier max response time value on the interface. Default: 10 seconds. Range: 10-128 seconds.

Examples

Configuring the IGMP querier maximum response time of 50 for interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp query-max-response-time 50
```

Resetting an IGMP querier interval to the default value:

```
switch(config-if-vlan)# no ip igmp query-max-response-time
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if-vlan config-if config-lag-if	Administrators or local user group members with execution rights for this command.

ip igmp querier-wait-time

```
ip igmp querier-wait-time <QUERIER-WAIT-TIME>
no ip igmp querier-wait-time <QUERIER-WAIT-TIME>
```

Description

Configures initial IGMP querier-wait-time value in seconds.

The **no** form of this command sets the IGMP querier-wait-time to the default value of 260 seconds. Note that the wait timer can be configured to any numbers within the 1-300 second range.

Parameter	Description
<QUERIER-WAIT-TIME>	Configures IGMP querier-wait-time to desired value.

Examples

Configuring IGMP querier-wait-time:

```
6200-1(config-if-vlan)# ip igmp querier-wait-time
<1-300>  Querier Wait value (Default: 260)
6200-1(config-if-vlan)#
```

Command History

Release	Modification
10.13	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	config-if-vlan config-if config-lag-if	Administrators or local user group members with execution rights for this command.

ip igmp robustness

```
ip igmp robustness <VALUE>
no ip igmp robustness <VALUE>
```

Description

Configures IGMP robustness on an interface, depending on the command context. The robustness parameter allows tuning for the expected packet loss on a subnet.

The **no** form of this command sets the robustness value to the default of 2 on an interface.

Parameter	Description
<VALUE>	Specifies an IGMP robustness value on the interface. Default: 2. Range: 1-7.

Examples

Configuring an IGMP robustness of 5 on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp robustness 5
```

Resetting the IGMP robustness to the default:

```
switch(config-if-vlan)# no ip igmp robustness
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if-vlan config-if config-lag-if	Administrators or local user group members with execution rights for this command.

ip igmp router-alert-check

```
ip igmp router-alert-check [enable | disable]
no ip igmp router-alert-check [enable | disable]
```

Description

Enables or disables IGMP router alert check for IGMP packets. IGMP packets without the router alert field set are dropped if router alert check is enabled. Router alert check is disabled by default.

The **no** form of this command disables router alert check for IGMP packets.

Parameter	Description
`enable`	Enable IGMP router alert check.
`disable`	Disable IGMP router alert check.

Examples

Enabling IGMP router alert check on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp router-alert-check enable
```

Disabling IGMP router alert check on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp router-alert-check disable
```

```
switch(config)# interface vlan 2
switch(config-if-vlan)# no ip igmp router-alert-check enable
```

Command History

Release	Modification
10.08	Command introduced.

Command Information

Platforms	Command context	Authority

All platforms	`config-if-vlan`
	`config-if`
	`config-lag-if`
		Administrators or local user group members with execution rights for this command.

ip igmp static-group

`ip igmp static-group <MULTICAST-GROUP-IP>`
`no ip igmp static-group <MULTICAST-GROUP-IP>`

Description

Configures an IGMP static multicast group on an interface, depending on the command context you are in. You can configure a maximum of 32 IGMP static groups.

The **no** form of the command unconfigures IGMP static multicast group on an interface.

Parameter	Description
<MULTICAST-GROUP-IP>	Specifies an IGMP static multicast group IP address on the interface. Format: A.B.C.D

Examples

Administrators or local user group members with execution rights for this command.

Configuring an IGMP static group on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp static-group 239.1.1.1
```

Resetting an IGMP static group on an interface to the default (none):

```
switch(config-if)# no ip igmp static-group 239.1.1.10
```

Command History

Release	Modification
10.13	Command introduced.

Command Information

Platforms	Command context	Authority

All platforms	`config-if-vlan`
	`config-if`
	`config-lag-if`
		Administrators or local user group members with execution rights for this command.

ip igmp version

```
ip igmp version <VERSION>
no ip igmp version <VERSION>
```

Description

Configures the IGMP version on an interface, depending on the command context you are in.

The **no** form of the command configures the default IGMP version, 3, on the interface.

Parameter	Description
<VERSION>	Specifies the IGMP version on the interface. Select 2 for IGMPv2 (RFC2236). Select 3 for IGMPv3 (RFC3376). Values: 2 or 3.

Examples

Configuring an IGMP version on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp version 2
```

Configuring an IGMP version on interface 1/1/1:

```
switch(config)# interface 1/1/1
switch(config-if)# ip igmp version 2
```

Removing an IGMP version on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# no ip igmp version 2
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

All platforms	`config-if-vlan`
	`config-if`
	`config-lag-if`
		Administrators or local user group members with execution rights for this command.

ip igmp version strict

```
ip igmp version <VERSION> strict
no ip igmp version <VERSION> strict
```

Description

Configures an IGMP strict version on an interface, depending on the command context you are in. Drops packets that do not match the configured version.

The **no** form of the command removes the strict version configuration from the interface.

Parameter	Description
<VERSION>	Specifies the IGMP version on the interface. Select 2 for IGMPv2 (RFC2236). Select 3 for IGMPv3 (RFC3376). Values: 2 or 3.

Examples

Configuring the IGMP strict version to 2 on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp version 2 strict
```

Resetting the IGMP strict version to the default (none):

```
switch(config-if)# no ip igmp version 2 strict
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

All platforms	`config-if-vlan`
	`config-if`
	`config-lag-if`
		Administrators or local user group members with execution rights for this command.

no ip igmp

`no ip igmp`

Description

Disables all IGMP configurations on an interface or sub-interface, depending on the command context you are in.

Examples

Removing IGMP on interface VLAN 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# no ip igmp
```

Removing IGMP on interface 1/1/1:

```
switch(config)# interface 1/1/1

switch(config-subif)# no ip igmp
```

Removing IGMP on sub-interface 1/1/1.1:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.1
switch(config-subif)# no ip igmp
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

All platforms	`config-if-vlan`
	`config-if`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

show ip igmp

`show ip igmp [vrf <VRF-NAME> | all-vrfs] [vsx-peer]`

Description

Shows IGMP configuration information and status, or shows information by VRF.

Parameter	Description
`vrf <VRF-NAME> | all-vrfs`	Optional. Used to show information by VRF. Specify the VRF by VRF name. With no **<VRF-NAME>** specified, the default VRF is implied. To show information for all VRFs, specify **all-vrfs**.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing IGMP configuration and status:

```
switch# show ip igmp

VRF Name  : default
Interface : vlan2
IGMP Configured Version    : 3
IGMP Operating Version     : 3
Querier State              : Querier
Querier IP [this switch]   : 20.1.1.1
Querier Uptime             : 1m 4s
Querier Expiration Time    : 0m 1s
IGMP Snoop Enabled on VLAN : True
```

Showing IGMP information for VRF test:

```
switch# show ip igmp vrf test

VRF Name  : test
Interface  : 1/1/2
IGMP Configured Version  : 3
IGMP Operating Version   : 2
Querier State            : Querier
Querier IP [this switch] : 100.1.1.1
Querier Uptime           : 2m 55s
Querier Expiration Time  : 0m 16s

Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
240.100.3.194          3    INC  0m 30s    3m 50s


IGMP is not enabled on interface 1/1/3


VRF Name  : test
Interface  : vlan2
IGMP Configured Version    : 3
IGMP Operating Version     : 3
Querier State              : Querier
Querier IP [this switch]   : 20.1.1.1
Querier Uptime             : 1m 4s
Querier Expiration Time    : 0m 1s
IGMP Snoop Enabled on VLAN : True

Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
238.224.153.165        2         0m 38s    3m 42s


VRF Name  : test
Interface  : vlan10
IGMP Configured Version    : 3
IGMP Operating Version     : 3
Querier State              : Querier
Querier IP [this switch]   : 10.1.1.1
Querier Uptime             : 1m 4s
Querier Expiration Time    : 0m 1s
IGMP Snoop Enabled on VLAN : True

Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
239.209.3.194          3    INC  0m 38s    3m 42s
```

Showing IGMP information for all VRFs:

```
switch# show ip igmp all-vrfs
VRF Name  : test
Interface  : 1/1/2
IGMP Configured Version  : 3
IGMP Operating Version   : 2
Querier State            : Querier
Querier IP [this switch] : 100.1.1.1
Querier Uptime           : 2m 55s
Querier Expiration Time  : 0m 16s
```

```
Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
240.100.3.194          3    INC  0m 30s    3m 50s

VRF Name  : test
Interface  : vlan2
IGMP Configured Version    : 3
IGMP Operating Version     : 3
Querier State              : Querier
Querier IP [this switch]   : 20.1.1.1
Querier Uptime             : 1m 4s
Querier Expiration Time    : 0m 1s
IGMP Snoop Enabled on VLAN : True

Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
238.224.153.165        2         0m 38s    3m 42s
VRF Name  : default
Interface  : vlan5
IGMP Configured Version    : 3
IGMP Operating Version     : 2
Querier State              : Querier
Querier IP [this switch]   : 50.1.1.1
Querier Uptime             : 1m 1s
Querier Expiration Time    : 0m 4s
IGMP Snoop Enabled on VLAN : False
VRF Name  : test
Interface  : vlan10
IGMP Configured Version    : 3
IGMP Operating Version     : 3
Querier State              : Querier
Querier IP [this switch]   : 10.1.1.1
Querier Uptime             : 1m 4s
Querier Expiration Time    : 0m 1s
IGMP Snoop Enabled on VLAN : True

Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
239.209.3.194          3    INC  0m 38s    3m 42s
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip igmp counters

`show ip igmp counters [vrf <VRF-NAME> | all-vrfs] [vsx-peer]`

Description

Shows IGMP counter details, or shows counters by VRF.

Parameter	Description
`vrf <VRF-NAME> | all-vrfs`	Optional. Used to show information by VRF. Specify the VRF by VRF name. With no **<VRF-NAME>** specified, the default VRF is implied. Specify **all-vrfs** to show information for all VRFs.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing IGMP counters:

```
switch# show ip igmp counters

IGMP Counters

Interface Name      : vlan2
VRF Name            : default
Membership Timeout  : 0
                                              Rx             Tx
                                              -------------- --------------
V1 All Hosts Queries                          0              0
V2 All Hosts Queries                          0              12
V3 All Hosts Queries                          0              0
V2 Group Specific Queries                     0              0
V3 Group Specific Queries                     0              0
Group And Source Specific Queries             0              0
V3 Member Reports                             0              N/A
V2 Member Reports                             0              N/A
V1 Member Reports                             0              N/A
V2 Member Leaves                              0              N/A
Packets dropped by ACL                        0              N/A
```

Showing IGMP counters for the default VRF:

```
switch# show ip igmp counters vrf default

IGMP Counters

Interface Name      : vlan2
VRF Name            : default
Membership Timeout  : 0
                                              Rx             Tx
                                              -------------- --------------
V1 All Hosts Queries                          0              0
V2 All Hosts Queries                          0              12
V3 All Hosts Queries                          0              0
V2 Group Specific Queries                     0              0
V3 Group Specific Queries                     0              0
Group And Source Specific Queries             0              0
V3 Member Reports                             0              N/A
V2 Member Reports                             0              N/A
```

```
V1 Member Reports                          0             N/A
V2 Member Leaves                           0             N/A
Packets dropped by ACL                     0             N/A
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip igmp group

`show ip igmp group <GROUP-IP> [source <SOURCE-IP>] [vrf <VRF-NAME> | all-vrfs] [vsx-peer]`

Description

Shows IGMP joined group information for the specified group, or shows joined group source and display information by VRF.

Parameter	Description
<GROUP-IP>	Specifies the IP address of the group. Format: A.B.C.D
`source` *<SOURCE-IP>*	Specifies the IP address of the source. Format: A.B.C.D
`vrf` *<VRF-NAME>* `|` `all-vrfs`	Optional. Used to show information by VRF. Specify the VRF by VRF name. With no **<VRF-NAME>** specified, the default VRF is implied. Specify **all-vrfs** to show information for all VRFs.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing IGMP joined group details for group 239.1.1.10:

```
switch# show ip igmp group 239.1.1.10

IGMP group information for group 239.1.1.10

Interface Name    : vlan2
VRF Name          : default

Group Address     : 239.1.1.10
```

```
Last Reporter    : 100.1.1.10

                                V1        V2        Sources   Sources
Vers Mode Uptime    Expires     Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  16m 34s   2m 27s
```

Showing IGMP joined group details for group 239.1.1.10 and source 10.1.1.10:

```
switch# show ip igmp group 239.1.1.10 source 10.1.1.10

Interface Name  : vlan2
VRF Name  : default
Group Address  : 239.1.1.10
Source Address : 10.1.1.10

Mode Uptime    Expire
---- --------- -------
     0m 13s    4m 7s
```

Showing IGMP joined group details for group 239.1.1.10 for all VRFs:

```
switch# show ip igmp group 239.1.1.10 all-vrfs

IGMP group information for group 239.1.1.10

Interface Name   : vlan10
VRF Name         : default

Group Address    : 239.1.1.10
Last Reporter    : 100.1.1.10

                                V1        V2        Sources   Sources
Vers Mode Uptime    Expires     Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  17m 5s    4m 2s
```

Showing IGMP joined group details for group 239.1.1.10 source 10.1.1.10 for all VRFs:

```
switch# show ip igmp group 239.1.1.10 source 10.1.1.10 all-vrfs

Interface Name  : vlan10
VRF Name  : default
Group Address  : 239.1.1.10
Source Address : 10.1.1.10

Mode Uptime    Expire
---- --------- -------
     0m 39s    3m 41s
```

Showing IGMP joined group details group 239.1.1.10 for the default VRF:

```
switch# show ip igmp group 239.1.1.10 vrf default
```

```
IGMP group information for group 239.1.1.10

Interface Name   : vlan2
VRF Name         : default

Group Address    : 239.1.1.10
Last Reporter    : 100.1.1.10

                              V1        V2        Sources   Sources
Vers Mode Uptime    Expires   Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  17m 35s   3m 32s
```

Showing IGMP joined group details group 239.1.1.10 source 10.1.1.10 for the default VRF:

```
switch# show ip igmp group 239.1.1.10 source 10.1.1.10 vrf default

Interface Name  : vlan10
VRF Name  : default
Group Address  : 239.1.1.10
Source Address : 10.1.1.10

Mode Uptime    Expire
---- --------- -------
     0m 59s    3m 21s
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip igmp groups

`show ip igmp groups [vrf <VRF-NAME> | all-vrfs] [vsx-peer]`

Description

Shows IGMP group information, or you can display group information by VRF.

Parameter	Description
`vrf <VRF-NAME> | all-vrfs`	Optional. Used to show information by VRF. Specify the VRF by VRF name. With no **<VRF-NAME>** specified, the default VRF is implied. Specify **all-vrfs** to show information for all VRFs.

Parameter	Description
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing IGMP group information:

```
switch# show ip igmp groups

IGMP group information for group 239.1.1.10

Interface Name   : vlan2
VRF Name         : default

Group Address    : 239.1.1.10
Last Reporter    : 100.1.1.10

                                V1        V2        Sources   Sources
Vers Mode Uptime    Expires     Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  0m 36s    3m 44s

IGMP group information for group 239.1.1.11

Interface Name   : vlan2
VRF Name         : default

Group Address    : 239.1.1.11
Last Reporter    : 100.1.1.10

                                V1        V2        Sources   Sources
Vers Mode Uptime    Expires     Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  0m 36s    3m 44s
```

Showing IGMP groups for all VRFs:

```
switch# show ip igmp groups all-vrfs
IGMP group information for group 239.1.1.1

Interface Name   : vlan10
VRF Name         : test

Group Address    : 239.1.1.1
Last Reporter    : 100.1.1.20

                                V1        V2        Sources   Sources
Vers Mode Uptime    Expires     Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  0m 13s    4m 7s

IGMP group information for group 239.1.1.2

Interface Name   : vlan10
VRF Name         : test
```

```
Group Address    : 239.1.1.2
Last Reporter    : 100.1.1.20

                              V1        V2        Sources   Sources
Vers Mode Uptime    Expires   Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  0m 13s    4m 7s

IGMP group information for group 239.1.1.1

Interface Name   : vlan10
VRF Name         : test

Group Address    : 239.1.1.1
Last Reporter    : 100.1.1.20

                              V1        V2        Sources   Sources
Vers Mode Uptime    Expires   Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  0m 13s    4m 7s

IGMP group information for group 239.1.1.2

Interface Name   : vlan10
VRF Name         : test

Group Address    : 239.1.1.2
Last Reporter    : 100.1.1.20

                              V1        V2        Sources   Sources
Vers Mode Uptime    Expires   Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  0m 13s    4m 7s

IGMP group information for group 239.1.1.1

Interface Name   : vlan20
VRF Name         : default

Group Address    : 239.1.1.1
Last Reporter    : 200.1.1.10

                              V1        V2        Sources   Sources
Vers Mode Uptime    Expires   Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  0m 13s    4m 7s

IGMP group information for group 239.1.1.2

Interface Name   : vlan20
VRF Name         : default

Group Address    : 239.1.1.2
Last Reporter    : 200.1.1.10

                              V1        V2        Sources   Sources
Vers Mode Uptime    Expires   Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  0m 13s    4m 7s
```

Showing IGMP groups for the default VRF:

```
switch# show ip igmp groups vrf default

IGMP group information for group 239.1.1.10

Interface Name   : vlan2
VRF Name         : default

Group Address    : 239.1.1.10
Last Reporter    : 100.1.1.10

                              V1        V2        Sources   Sources
Vers Mode Uptime    Expires   Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  9m 23s    3m 20s

IGMP group information for group 239.1.1.11

Interface Name   : vlan2
VRF Name         : default

Group Address    : 239.1.1.11
Last Reporter    : 100.1.1.10

                              V1        V2        Sources   Sources
Vers Mode Uptime    Expires   Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  9m 23s    3m 20s

IGMP group information for group 239.1.1.10

Interface Name   : vlan2
VRF Name         : default

Group Address    : 239.1.1.10
Last Reporter    : 100.1.1.10

                              V1        V2        Sources   Sources
Vers Mode Uptime    Expires   Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  9m 23s    3m 20s

IGMP group information for group 239.1.1.11

Interface Name   : vlan2
VRF Name         : default

Group Address    : 239.1.1.11
Last Reporter    : 100.1.1.10

                              V1        V2        Sources   Sources
Vers Mode Uptime    Expires   Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  9m 23s    3m 20s
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip igmp interface

```
show ip igmp interface [{<INTF-ID>|<INTF-ID.ID>|{vlan <VLAN-ID>}]
counters [vsx-peer]
group <A.B.C.D> [{source <A.B.C.D>}| [vsx-peer]
groups [vsx-peer]
statistics [vsx-peer]
[vsx-peer]
```

Description

Shows IGMP configuration information for a specific interface (VLAN, port or LAG).

Parameter	Description
<INTF-ID>	Specifies an interface (such as 1/1/2 or LAG10).
<INTF-ID.ID>	Required. Specifies a sub-interface. (Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.)
vlan *<VLAN-ID>*	Specifies a VLAN. Values: 1-4094.
vsx-peer	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing IGMP configuration information for interface VLAN 2:

```
switch# show ip igmp interface vlan 2

IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State            : Querier
Querier IP [this switch] : 20.1.1.1
Querier Uptime           : 1m 46s
Querier Expiration Time  : 0m 1s
Snoop Enabled on VLAN    : True

switch# show ip igmp interface vlan  10

IGMP is not enabled
```

Showing IGMP configuration information for the specified interface 1/1/2:

```
switch# show ip igmp interface 1/1/2

IGMP Configured Version    : 3
```

```
IGMP Operating Version     : 3
Querier State              : Querier
Querier IP [this switch]   : 100.1.1.1
Querier Uptime             : 51m 44s
Querier Expiration Time    : 1m 51s
```

Showing IGMP configuration information for sub-interface 1/1/5.10:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch# show ip igmp interface 1/1/5.10

IGMP Configured Version    : 3
IGMP Operating Version     : 3
Querier State              : Querier
Querier IP [this switch]   : 200.1.1.1
Querier Uptime             : 11m 44s
Querier Expiration Time    : 1m 51s
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip igmp interface counters

`show ip igmp interface {<INTF-ID> | <INTF-ID.ID>| vlan <VLAN-ID>} counters [vsx-peer]`

Description

Shows IGMP counter details for a specific interface or VLAN interface.

Parameter	Description
<INTF-ID>	Specifies an interface (such as 1/1/2).
<INTF-ID.ID>	Required: Specifies a sub-interface. (Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.)
`vlan` *<VLAN-ID>*	Specifies a VLAN. Values: 1-4094.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not

Parameter	Description
	have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing IGMP counters for interface VLAN 2:

```
switch# show ip igmp interface vlan 2 counters

IGMP Counters

Interface Name      : vlan2
VRF Name            : default
Membership Timeout  : 0
                                              Rx             Tx
                                              -------------- --------------
V1 All Hosts Queries                          0              0
V2 All Hosts Queries                          0              0
V3 All Hosts Queries                          0              29
V2 Group Specific Queries                     0              0
V3 Group Specific Queries                     0              2
Group And Source Specific Queries             0              2
V3 Member Reports                             0              N/A
V2 Member Reports                             0              N/A
V1 Member Reports                             0              N/A
V2 Member Leaves                              0              N/A
Packets dropped by ACL                        0              N/A
```

Showing IGMP counters for sub-interface 10:

Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch# show ip igmp interface 1/1/5.10 counters

IGMP Counters

Interface Name      : 1/1/5.10
VRF Name            : default
Membership Timeout  : 0
                                              Rx             Tx
                                              -------------- --------------
V1 All Hosts Queries                          0              0
V2 All Hosts Queries                          0              0
V3 All Hosts Queries                          0              9
V2 Group Specific Queries                     0              0
V3 Group Specific Queries                     0              0
Group And Source Specific Queries             0              0
V3 Member Reports                             3              N/A
V2 Member Reports                             4              N/A
V1 Member Reports                             0              N/A
V2 Member Leaves                              0              N/A
Packets dropped by ACL                        0              N/A
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip igmp interface group

`show ip igmp [interface {<INTF-ID> | <INTF-ID.ID> | vlan <VLAN-ID>} [group <GROUP-IP> [source <SOURCE-IP>] [vsx-peer]]]`

Description

Shows IGMP joined group information for a specific interface or VLAN interface, or specify a source IP.

Parameter	Description
<INTF-ID>	Specifies an interface (such as 1/1/2).
<INTF-ID.ID>	Required: Specifies the sub-interface. (Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.)
`vlan` *<VLAN-ID>*	Specifies a VLAN. Values: 1-4094.
<GROUP-IP>	Specifies the IP address of the group. Format: A.B.C.D
`source` *<SOURCE-IP>*	Specifies the IP address of the source. Format: A.B.C.D
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing IGMP joined group details for group 239.1.1.1 for interface VLAN 10:

```
switch# show ip igmp interface vlan 10 group 239.1.1.1

IGMP group information for group 239.1.1.1

Interface Name   : vlan10
VRF Name         : default

Group Address    : 239.1.1.1
Last Reporter    : 100.1.1.10

                                V1        V2        Sources   Sources
Vers Mode Uptime    Expires     Timer     Timer     Forwarded Blocked
```

```
---- ---- --------- --------- --------- --------- --------- --------
3    INC  8m 10s    2m 21s                        1

Group Address  : 239.1.1.1
Source Address : 10.1.1.1

Mode Uptime    Expire
---- --------- -------
INC  8m 10s    2m 21s
```

Showing IGMP joined group details for group 239.1.1.1 for interface VLAN 10 with source details for 10.1.1.1:

```
switch# show ip igmp interface vlan 10 group 239.1.1.1 source 10.1.1.1

Interface Name  : vlan10
VRF Name  : default
Group Address  : 239.1.1.1
Source Address : 10.1.1.1

Mode Uptime    Expire
---- --------- -------
INC  8m 52s    3m 51s
```

Showing IGMP joined group details for group 239.1.1.1 for sub-interface 1/1/1.10:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch# show ip igmp interface 1/1/5.10 group 239.1.1.1

IGMP group information for group 239.1.1.1

Interface Name   : 1/1/5.10
VRF Name         : default

Group Address    : 239.1.1.1
Last Reporter    : 10.1.1.10

                               V1        V2        Sources   Sources
Vers Mode Uptime    Expires    Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    INC  1m 49s    1m 31s                        1

Group Address  : 239.1.1.1
Source Address : 10.1.1.1

Mode Uptime    Expire
---- --------- -------
INC  1m 49s    1m 31s
```

Showing IGMP joined group details for group 239.1.1.1 for sub-interface 1/1/1.10 with source details for 10.1.1.1:

```
switch# show ip igmp interface 1/1/5.10 group 239.1.1.1 source 10.1.1.1
```

```
Interface Name  : 1/1/5.10
VRF Name  : default
Group Address  : 239.1.1.1
Source Address : 10.1.1.1

Mode Uptime    Expire
---- --------- -------
INC  1m 3s     4m 25s
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip igmp interface groups

`show ip igmp [interface {<INTF-ID> | <INTF-ID.ID> | vlan <VLAN-ID>} [groups] [vsx-peer]]`

Description

Shows IGMP group information for a specific interface or VLAN interface.

Parameter	Description
<INTF-ID>	Specifies an interface (such as 1/1/2).
<INTF-ID.ID>	Required: Specifies the sub-interface. (Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.)
`vlan` *<VLAN-ID>*	Specifies a VLAN. Values: 1-4094.
<GROUP-IP>	Specifies the IP address of the group. Format: A.B.C.D
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing IGMP groups for interface VLAN 2:

```
switch# show ip igmp interface vlan 2 groups

IGMP group information for group 239.1.1.1

Interface Name   : vlan2
VRF Name         : default

Group Address    : 239.1.1.1
Last Reporter    : 100.1.1.10

                              V1        V2        Sources   Sources
Vers Mode Uptime    Expires   Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    INC  4m 40s    3m 51s                        1

Group Address  : 239.1.1.1
Source Address : 10.1.1.1

Mode Uptime    Expire
----------------------
INC  4m 40s    3m 51s

IGMP group information for group 239.1.1.2

Interface Name   : vlan2
VRF Name         : default

Group Address    : 239.1.1.2
Last Reporter    : 100.1.1.10

                              V1        V2        Sources   Sources
Vers Mode Uptime    Expires   Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    INC  4m 40s    3m 51s                        1

Group Address  : 239.1.1.2
Source Address : 10.1.1.1

Mode Uptime    Expire
---- --------- -------
INC  4m 40s    3m 51s
```

Showing IGMP groups for sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch# show ip igmp interface 1/1/5.10 groups

IGMP group information for group 239.1.1.1

Interface Name   : 1/1/5.10
VRF Name         : default

Group Address    : 239.1.1.10
Last Reporter    : 10.1.1.1

                              V1        V2        Sources   Sources
Vers Mode Uptime    Expires   Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
2         11m 59s   1m 44s              1m 44s
```

```
IGMP group information for group 239.1.1.2

Interface Name   : 1/1/5.10
VRF Name         : default

Group Address    : 239.1.1.20
Last Reporter    : 10.1.1.10

                                V1        V2        Sources   Sources
Vers Mode Uptime    Expires     Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
2         11m 59s   1m 44s              1m 44s
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip igmp interface statistics

`show ip igmp interface {<INTF-ID> | <INTF-ID.ID> | vlan <VLAN-ID>} statistics [vsx-peer]`

Description

Shows IGMP statistics for a specific interface or VLAN interface, including groups joined.

Parameter	Description
<INTF-ID>	Specifies an interface (such as 1/1/2 or LAG1).
<INTF-ID.ID>	Required: Specifies the sub-interface. (Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.)
`vlan` *<VLAN-ID>*	Specifies a VLAN. Values: 1-4094.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing IGMP statistics for interface VLAN 2:

```
switch# show ip igmp interface vlan 2 statistics

IGMP statistics

Interface Name : vlan2
VRF Name       : default

Number of Include Groups       :   2
Number of Exclude Groups       :   0
Number of Static Groups        :   0
Total Multicast Groups Joined  :   2
```

Showing IGMP statistics for the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch# show ip igmp interface 1/1/5.10 statistics

IGMP statistics

Interface Name : 1/1/5.10
VRF Name       : default

Number of Include Groups       :   0
Number of Exclude Groups       :   2
Number of Static Groups        :   0
Total Multicast Groups Joined  :   2
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip igmp static-groups

`show ip igmp static-groups [vrf <VRF-NAME> | all-vrfs] [vsx-peer]`

Description

Shows IGMP static groups, or shows information by VRF.

Parameter	Description
`vrf <VRF-NAME> | all-vrfs`	Optional. Used to show information by VRF. Specify the VRF by VRF name. With no **<VRF-NAME>** specified, the default VRF is implied. Specify **all-vrfs** to show information for all VRFs.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing IGMP static-group information:

```
switch# show ip igmp static-groups

IGMP Static Group Address Information

VRF Name    default
Interface Name   Group Address
---------------- -----------------
vlan10            238.1.1.1
```

Showing IGMP statics-group information for all VRFs:

```
switch# show ip igmp static-groups all-vrfs

IGMP Static Group Address Information
VRF Name   :test
Interface Name   Group Address
---------------- -----------------
vlan20            239.1.1.1
VRF Name   :default
Interface Name   Group Address
---------------- -----------------
vlan10            238.1.1.1
```

```
Showing IGMP static-group information for VRF test:
                switch# show ip igmp static-groups vrf test

IGMP Static Group Address Information

VRF Name   :test
Interface Name   Group Address
---------------- -----------------
vlan20            239.1.1.1
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip igmp statistics

```
show ip igmp statistics [vrf <VRF-NAME> | all-vrfs] [vsx-peer]
```

Description

Shows IGMP statistics, including groups joined, or shows statistics by VRF.

Parameter	Description
`vrf <VRF-NAME> | all-vrfs`	Optional. Used to show information by VRF. Specify the VRF by VRF name. With no **<VRF-NAME>** specified, the default VRF is implied. Specify **all-vrfs** to show information for all VRFs.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing IGMP statistics:

```
switch# show ip igmp statistics
IGMP statistics

VRF Name       : default

Number of Include Groups       :   1
Number of Exclude Groups       :   0
Number of Static Groups        :   0
Total Multicast Groups Joined  :   1
```

Showing IGMP statistics for all VRFs:

```
switch# show ip igmp statistics all-vrfs
IGMP statistics
VRF Name       : test

Number of Include Groups       :   2
Number of Exclude Groups       :   0
Number of Static Groups        :   0
Total Multicast Groups Joined  :   2
VRF Name       : default

Number of Include Groups       :   1
Number of Exclude Groups       :   0
Number of Static Groups        :   0
Total Multicast Groups Joined  :   1
```

Showing IGMP statistics for VRF test:

```
switch# show ip igmp statistics vrf test
IGMP statistics

VRF Name       : test

Number of Include Groups       :   2
Number of Exclude Groups       :   0
Number of Static Groups        :   0
Total Multicast Groups Joined  :   2
```

Command History

Release	Modification
10.07 or earlier	--

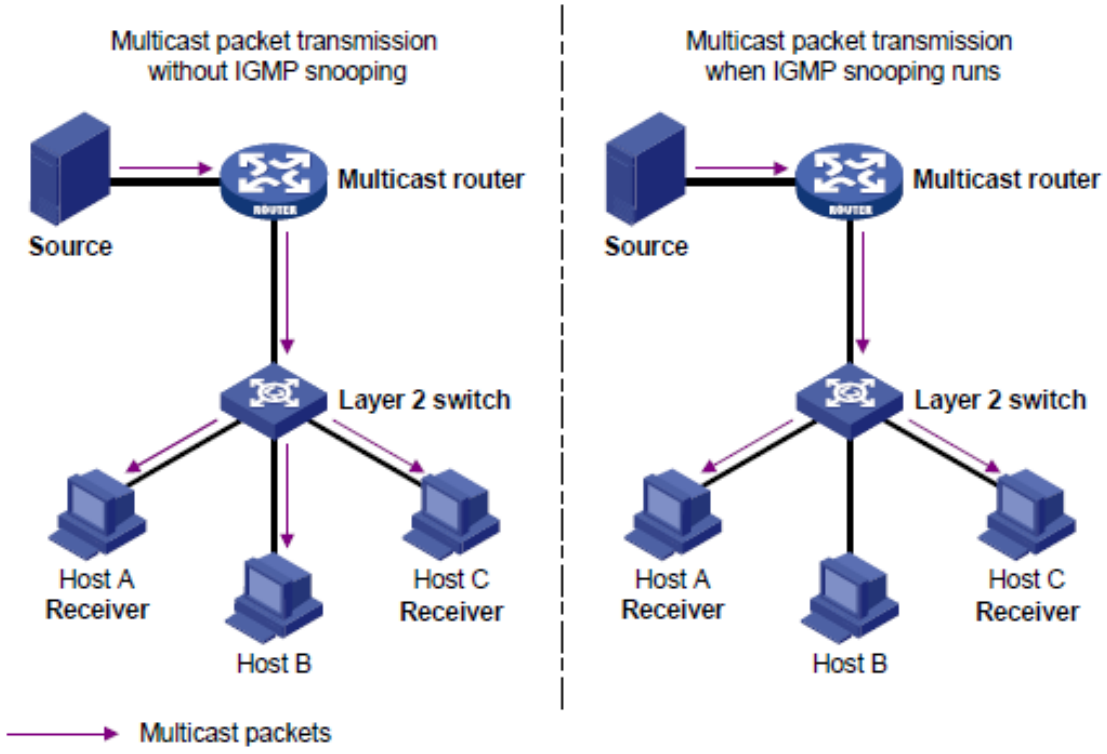
Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

Chapter 5
IGMP snooping

IGMP snooping runs on a Layer 2 device as a multicast constraining mechanism to improve multicast forwarding efficiency. It creates Layer 2 multicast forwarding entries from IGMP packets that are exchanged between the hosts and the router.

When IGMP snooping is not enabled, the snooping switch floods multicast packets to all hosts in a VLAN. IGMP L2 snooping switch provides the benefit of conserving bandwidth on those segments of the network where no node has expressed interest in receiving packets addressed to the group address. When IGMP snooping is enabled, the L2 snooping switch forwards multicast packets of known multicast groups to only the receivers.



IGMP snooping defaults, protocols, and supported configuration

IGMP snooping default configuration

- IGMP snooping is disabled by default and has to be enabled on all applicable VLANs.
- Version 3 is used by default.

IGMP snooping related protocols

- IGMPv2 (RFC 2236)
- IGMPv3 (RFC 3376)
- Considerations for Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) Snooping Switches (RFC 4541)

Static groups

You can configure a maximum of 32 IGMP snooping static groups.

How IGMP snooping works

IGMP message types include: Query, Report (Join), and Leave Group. An IGMP snooping enabled Layer 2 device performs differently depending on the message type.

Query

A message sent from the querier (multicast router or switch) asking for a response from each host belonging to the multicast group. If a multicast router supporting IGMP is not present, then the switch must assume this function in order to elicit group membership information from the hosts on the network.

The IGMP querier periodically sends IGMP general queries to all hosts and routers on the local subnet to check for the existence of multicast group members. After receiving an IGMP general query, the snooping switch forwards the query to all ports in the VLAN except the receiving port.

Report (Join)

A message sent by a host to the querier to indicate that the host wants to be or is a member of a given group indicated in the report message.

A host sends an IGMP report to the IGMP querier for the following purposes:

- Responds to queries if the host is a multicast group member.
- Applies for a multicast group membership.

After receiving an IGMP report from a host, the snooping switch forwards the report through all the router ports in the VLAN. It also looks up the forwarding table for a matching entry as follows:

- If no match is found, the snooping switch creates a forwarding entry with the receiving port as an outgoing interface. It also starts group membership expiry timer for the port to track the amount of time that must pass before a multicast router decides there are no more members of a group on a network.
- If a match is found but the matching forwarding entry does not contain the receiving port, the snooping switch adds the receiving port to the outgoing interface list. It also starts group membership expiry timer for the port.
- If a match is found and the matching forwarding entry contains the receiving port, the snooping switch restarts the group membership expiry timer for the port.

Leave Group

A message sent by a host to the querier to indicate that the host has ceased to be a member of a specific multicast group.

An IGMPv1 receiver host does not send any leave messages when it leaves a multicast group. The snooping switch cannot immediately update the status of the port that connects to the receiver host.

The snooping switch does not remove the port from the outgoing interface list in the associated forwarding entry until the group membership timer expires.

An IGMPv2 or IGMPv3 host sends an IGMP leave message when it leaves a multicast group. Upon receiving leave message, the switch forwards the IGMP leave message to all router ports in the VLAN . IGMP querier then sends an IGMP group-specific query to the multicast group to identify whether the group has active receivers attached to the receiving port.

After receiving the IGMP group-specific query, the switch forwards the query through all router ports and member ports of the group in the VLAN. Then, it waits for the responding IGMP report message from the directly connected hosts. If the port does not receive an IGMP report message when the group membership timer expires, the snooping switch removes the port from the forwarding entry for the multicast group.

IGMP snooping configuration task list

- Enabling or Disabling IGMP Snooping
- Specifying the IGMP snooping version
- Configuring IGMP snooping static groups
- Enabling Drop-Unknown Filters
- Configuring IGMP snooping fast learn ports globally
- Configuring IGMP snooping per port filtering
- Disabling IGMP Snooping
- Viewing IGMP snooping information

Enabling or disabling IGMP snooping

IGMP snooping is disabled by default. The default behavior is to flood multicast traffic in the VLAN. Use the following to enable IGMP snooping.

Prerequisites

You must be in the VLAN configuration context, as indicated by the **switch(config-vlan)#** prompt.

The VLAN has to be configured and up.

Procedure

Enable IGMP snooping on a VLAN using the following command.

```
ip igmp snooping {enable | disable}
```

For example, the following command enables IGMP snooping on VLAN 2:

```
switch(config)# vlan 2
switch(config-vlan)#
```

Use the **no** command to disable IGMP snooping on a VLAN.

Specifying the IGMP snooping version

The IGMP snooping version can be either 2 (IGMPv2) or 3 (IGMPv3). The default is 3. IGMPv2 supports filtering based on groups. IGMPv3 is more advanced and includes filtering based on source and groups.

Prerequisites

You must be in the VLAN configuration context, as indicated by the **switch(config-vlan)#** prompt.

Procedure

Specify the IGMP snooping version for a VLAN using the following command.

```
ip igmp snooping version <VERSION>
```

For example, the following command sets the IGMP snooping version to 2 on VLAN 2:

```
switch(config)# vlan 2
switch(config-vlan)# ip igmp snooping version 2
```

Configuring IGMP snooping static groups

Configure IGMP snooping static groups.

Prerequisites

You must be in the VLAN configuration context, as indicated by the **switch(config-vlan)#** prompt.

Procedure

Configure an IGMP snooping static group on a VLAN using the following command.

```
ip igmp snooping static-group <MULTICAST-IP-ADDRESS>
```

For example, the following command configures the IGMP snooping static multicast group as 239.1.1.1 on VLAN 2:

```
switch(config)# vlan 2
switch(config-vlan)# ip igmp snooping static-group 239.1.1.1
```

The **no** form of the command removes the IGMP snooping static group.

Enabling drop-unknown filters

While IGMP snooping is enabled, the traffic will be forwarded only to joined ports. Configuring drop unknown filters, ensures that packets are not forwarded to ports where a request for the traffic stream has not been received.

This could either be a filter across all VLANs (**vlan-shared**) or per VLAN (**vlan-exclusive**). The default is **vlan-shared**.

Prerequisites

You must be in the configuration context, as indicated by the **switch(config)#** prompt.

Procedure

Globally enable dropping multicast data using the following command.

```
ip igmp snooping drop-unknown {vlan-shared | vlan-exclusive}
```

For example, the following command configures a shared VLAN filter on the switch:

```
switch(config)# ip igmp snooping drop-unknown vlan-shared
```

Configuring IGMP snooping fast learn ports globally

Configuring fast learn on a port enables faster response to topology change notifications. When spanning tree changes the port state from blocked to forwarding, the device acting as querier will immediately send a general query on the fast learn enabled port. Then the device acting as a non-querier will replay the joins. This will help in faster convergence of multicast flows.

Prerequisites

You must be in the configuration context, as indicated by the **switch(config)#** prompt.

Procedure

Configure one or more ports as IGMP snooping fast learn ports using the following command.

`ip igmp snooping fastlearn <PORT-LIST>`

For example, the following command configures ports 1/1/1-1/1/3 as fast learn ports:

```
switch(config)# ip igmp snooping fastlearn 1/1/1-1/1/3
```

Configuring IGMP snooping per port filtering

Configure IGMP snooping traffic handling by specifying auto, blocked, or forward for a port, list of ports or range of ports. In auto mode traffic flow is controlled by the IGMP joins/leaves. Auto mode is the default. In blocked mode, joins and traffic are always blocked on this port. In forward mode traffic is always forwarded on this port, irrespective of joins.

Prerequisites

You must be in the VLAN configuration context, as indicated by the **switch(config-vlan)#** prompt.

Procedure

Configure IGMP snooping traffic handling for ports on a VLAN using the following commands.

- Configure the specified ports in auto mode using the following command: **ip igmp snooping auto *<PORT-LIST>***.
- Configure the specified ports in blocked mode using the following command: **ip igmp snooping blocked *<PORT-LIST>***.
- Configure the specified ports in forward mode using the following command: **ip igmp snooping forward *<PORT-LIST>***.

For example, the following command configures ports 1/1/1, 1/1/2, and 1/1/3 in auto mode for VLAN 2:

```
switch(config)# vlan 2
switch(config-vlan)# ip igmp snooping auto 1/1/1,1/1/2-1/1/3
```

Disabling IGMP snooping

Prerequisites

You must be in the VLAN configuration context, as indicated by the **switch(config-vlan)#** prompt.

Procedure

Disable IGMP snooping on a VLAN using the following command.

```
no ip igmp snooping
```

For example, the following command removes IGMP snooping on VLAN 2:

```
switch(config)# vlan 2
switch(config-vlan)# no ip igmp snooping
```



Disabling and enabling igmp snooping on a VLAN causes IGMP querier re-election.

Viewing IGMP snooping information

Prerequisites

Use these show commands from the Operator (>) or Manager (#) context.

Procedure

To view IGMP snooping information, use the following commands.

- To view IGMP snooping configuration details and status, use: **show ip igmp snooping**.
- To view IGMP snooping query packet Tx, Rx, and Error packet counter details, use: **show ip igmp snooping counters**.
- To view IGMP snooping group information, use: **show ip igmp snooping groups**.
- To view IGMP snooping protocol information and the number of groups joined, use: **show ip igmp snooping statistics**.
- To view IGMP snooping query packet Tx, Rx, and Error packet counters for the specified VLAN, use: **show ip igmp snooping vlan counters**.
- To view IGMP snooping statistics details for the specified VLAN including the number of different groups joined for the VLAN, use: **show ip igmp snooping vlan statistics**.
- To view IGMP snooping group information for the specified VLAN, use: **show ip igmp snooping vlan**.
- To view IGMP snooping group details for the specified VLAN including information about all IGMP snooping groups or sources learned on a particular port, use: **show ip igmp snooping vlan group port**.
- To view IGMP snooping static groups details for the specified VLAN, use: **show ip igmp snooping static-groups**.

IGMP snooping commands

ip igmp snooping apply access list

```
ip igmp snooping apply access list <ACL-NAME>
no ip igmp snooping apply access list <ACL-NAME>
```

Description

Configures the access list (ACL) in a particular interface to filter IGMP join or leave packets based on rules set in a particular access list name. The **no** form of this command removes the configuration.

Parameter	Description
<ACL-NAME>	Specifies the access list name.

Usage

Existing classifier commands are used to configure ACL. In case of IGMPv3 packets with multiple group addresses received, only permitted group addresses based on the ACL rule set are proccessed. The packet is forwarded to querier and PIM router even though one of the groups present in the packet is blocked by ACL to avoid the delay in learning of the permitted groups because the access switch configured with the ACL blocks the traffic for the groups which are denied forwarding of joins have no impact. If all of the groups in a packet are denied by the ACL rule packet, it is not forwarded to the querier and PIM router. If the ACE has the source address configured, the source address in the IGMPv3 report is matched against the ACL and corresponding action is taken. Existing joins timeout.

With IGMPv2, if there is no match or if there is a deny rule match, the packet is dropped.



If the access list is configured for both L2 VLAN and L3 VLAN, then the L3 VLAN configuration is applied.

Example

Configure the access list:

```
switch(config)# vlan 2
switch(config-vlan-2)# ip igmp snooping apply access-list mygroup
```

Remove the access list:

```
switch(config)# vlan 2
switch(config-vlan-2)# no ip igmp snooping apply access-list mygroup
```

Command History

Release	Modification
10.13	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

ip igmp snooping (config mode)

```
ip igmp snooping
   drop-unknown vlan-shared|vlan-exclusive
```

```
fastlearn <PORT-LIST>
```

Description

Configures drop-unknown and fastlearn modes on the ports. While IGMP snooping is enabled, the traffic will be forwarded only to ports that made an IGMP request for the multicast. Drop unknown filters ensure that packets are not forwarded to ports that did not make a request for the traffic stream. This could either be a filter across all VLANs (**vlan-shared**) or per VLAN (**vlan-exclusive**). The default is **vlan-shared**. Fast learn enables the port to learn group information when receiving a topology change notification. By default, fast learn is not enabled on ports.

Parameter	Description
`drop-unknown`	Drop unknown filters ensure that packets are not forwarded to ports that did not make a request for the traffic stream.
`vlan-shared`	Enables a shared VLAN filter on the switch. Default is **vlan-shared.**
`vlan-exclusive`	Enables an exclusive drop unknown filter per VLAN.
`fastlearn <PORT-LIST>`	Enable fast learn on ports. This parameter specifies a list of one or more ports to be configured as fast learn ports. You can specify a single port, a comma-separated list of ports or a range of ports such as 1/1/1-1/1/3. You may also enter an L2 LAG (1-128)
`no ...`	Negates any configured parameter.

Example

On the 6400 Switch Series, interface identification differs.

Configuring fast learn ports:

```
switch(config)# ip igmp snooping fastlearn 1/1/3
switch(config)# ip igmp snooping fastlearn 1/1/1-1/1/2
switch(config)# ip igmp snooping fastlearn 1/1/5,1/1/6
```

Configuring a shared VLAN filter on the switch:

```
switch(config)# ip igmp snooping drop-unknown vlan-shared
```

Configuring a exclusive drop unknown filter per VLAN:

```
switch(config)# ip igmp snooping drop-unknown vlan-exclusive
```

Disabling drop unknown on the switch:

```
switch(config)# no ip igmp snooping drop-unknown
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config`	Administrators or local user group members with execution rights for this command.

ip igmp snooping (interface mode)

```
ip igmp snooping
   auto vlan <VLAN-LIST>
   blocked vlan <VLAN-LIST>
   fastleave vlan <VLAN-LIST>
   forced-fastleave vlan <VLAN-LIST>
   forward vlan <VLAN-LIST>
   no ...
```

Description

Configure IP IGMP snooping for the VLAN on the interface. When IGMP snooping is enabled, the L2 snooping switch forwards multicast packets of known multicast groups to only the receivers. When IGMP snooping is not enabled, the snooping switch floods multicast packets to all hosts on the VLAN.

Parameter	Description
`auto vlan <VLAN-LIST>`	Instruct the device to monitor incoming multicast traffic on the specified ports on a VLAN or VLAN range. This is the default behavior. Enter the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60).
`blocked vlan <VLAN-LIST>`	Configures the specified ports in blocked mode for the specified VLAN list. In blocked mode, joins and traffic are always blocked on this port. Enter the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60).
`fastleave vlan <VLAN-LIST>`	IGMP fastleave is configured for ports on a per-VLAN basis. Upon receiving a Leave Group message, the querier sends an IGMP Group-Specific Query message out of the interface to ensure that no other receivers are connected to the interface. If receivers are directly attached to the switch, it is inefficient to send the membership query as the receiver wanting to leave is the only connected host. When a fastleave-enabled switch port is connected to a single host and receives a leave, the switch does not wait for the querier status update interval, but instead immediately removes the IGMP client from its IGMP table and ceases transmitting multicast traffic to the client. (If the switch detects multiple end nodes on the port, Fastleave does not activate regardless of whether one or more of these end nodes are IGMP clients.) This processing speeds up the overall leave process and also eliminates the CPU overhead of having to generate an IGMP Group-Specific Query message.

Parameter	Description
	This parameter specifies a list of VLANs on which the port should be configured as a fastleave port. Specifies the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60).
`forced-fastleave vlan <VLAN-LIST>`	With forced fastleave enabled, IGMP speeds up the process of blocking unnecessary multicast traffic to a switch port that is connected to multiple end nodes. When a port having multiple end nodes receives a leave group request from one end node for a given multicast group, forced fastleave activates and waits for a second to receive a join request from any other member of the same group on that port. If the port does not receive a join request for that group within the forced fastleave interval, the switch then blocks any further traffic to that group on that port. This parameter specifies a list of VLANs on which the port should be configured as a forced fastleave port. Specifies the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60). This command is available in **config-if** mode.
`forward vlan <VLAN-LIST>`	Configures the specified ports in forward mode in the given VLAN list. In forward mode, traffic is always forwarded on this port, irrespective of joins. Specify a list of VLANs on which the port should be configured as a forward port. Specifies the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60). This command is available in **config-if** mode.
`no ...`	Negates any configured parameter.

Example

On the 6400 Switch Series, interface identification differs.

Configure auto ports for VLAN on the interface:

```
switch# configure terminal
switch(config)# int 1/1/1
switch(config-if)# no shut
switch(config-if)# no routing
switch(config-if)# vlan trunk allowed 10-20
switch(config-if)# ip igmp snooping auto vlan 10
switch(config-if)# ip igmp snooping auto vlan 10-20
```

Configuring fastleave ports for the VLAN on the interface:

```
switch# configure terminal
switch(config)# int 1/1/1
switch(config-if)# no shut
switch(config-if)# no routing
switch(config-if)# vlan trunk allowed 10-20
switch(config-if)# ip igmp snooping fastleave vlan 10
switch(config-if)# ip igmp snooping fastleave vlan 10-20
```

Configuring blocked ports for the VLAN on the interface:

```
switch# configure terminal
switch(config)# int 1/1/1
switch(config-if)# no shut
switch(config-if)# no routing
switch(config-if)# vlan trunk allowed 10-20
switch(config-if)# ip igmp snooping blocked vlan 10
switch(config-if)# ip igmp snooping blocked vlan 10-20
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ip igmp snooping (vlan mode)

```
ip igmp snooping
   apply access-list <ACL-NAME>
   enable|disable
   no ...
   static-group <MULTICAST-IP-ADDRESS>
   version <2-3> (vlan interface mode)
```

Description

These commands enable or disable IP IGMP snooping on the VLAN, create IGMP snooping static multicast groups, set the IGMP snooping version and configurethe ACL on a particular interface.

Disabling and enabling IGMP snooping on a VLAN causes IGMP querier re-election.

Parameter	Description
`access-list`	Associates an ACL with the IGMP.
`enable|disable`	Enables or disables IGMP snooping on the VLAN. By default, IGMP snooping is disabled.
`no ...`	Negates any configured parameter.
`static-group` *`<MULTICAST-IP-ADDRESS>`*	This parameter configures an IGMP snooping static multicast group. Specify the IGMP static multicast group IP address in A.B.C.D format. You can configure a maximum of 32 IGMP snooping static
`version <2-3>`	Configures the IGMP snooping version on the VLAN. Select **2** for IGMPv2 (RFC2236). Select **3** for IGMPv3 (RFC3376).

Usage

- Existing classifier commands are used to configure the ACL.
- In case an IGMPv3 packet with multiple group addresses is received, the switch only processes the permitted group addresses based on the ACL rule set. The packet is forwarded to querier and PIM router even though one of the groups present in the packet is blocked by the ACL. This avoids the delay in learning of the permitted groups. Since the access switch configured with ACL blocks the traffic for the groups which are denied, forwarding of joins has no impact. If all the groups in the packet are denied by the ACL rule, the packet is not forwarded to the querier and PIM router. Existing joins will timeout.
- In case of IGMPv2, if there is no match or if there is a deny rule match, the packet is dropped.



If the access list is configured for both L2 VLAN and L3 VLAN, the L3 VLAN configuration will be applied.

Example

On the 6400 Switch Series, interface identification differs.

Enable IGMP snooping on a VLAN:

```
switch(config)# vlan 2
switch(config-vlan)# ip igmp snooping enable
```

Disable IGMP snooping on a VLAN:

```
switch(config)# vlan 2
switch(config-vlan)# ip igmp snooping disable
```

Configuring an IGMP snooping static group:

```
switch(config)# vlan 2
switch(config-vlan)# ip igmp snooping static-group 239.1.1.1
switch(config-vlan)# no ip igmp snooping static-group 239.1.1.1
```

Configuring IGMP snooping version on the VLAN:

```
switch(config)# vlan 2
switch(config-vlan)# ip igmp snooping version 2
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan-<VLAN-ID>`	Administrators or local user group members with execution rights for this command.

ip igmp snooping filter unknown mcast

```
ip igmp snooping filter-unknown-mcast
no ip igmp snooping filter-unknown-mcast
```

Description

Enables the avoidance of initial flooding of unknown multicast traffic on IGMP-snooping-enabled VLANs.

The no form of this command returns to the default behavior of initial flooding of unknown multicast traffic.

Usage

In the default behavior, the unknown multicast traffic is flooded until the IP Multicast Flow programming is done on the hardware. This is known as initial flooding of unknown multicast. Use this command to filter unknown multicast instead of flooding.



Initial flooding of multicast traffic is observed for a few seconds after the device comes up from a reboot. This issue is only seen when the multicast source connected device is rebooted. Once the device is up after a reboot, it takes a few seconds for the CPU Rx rule to be programmed during the timeframe that the initial flooding is observed. This is an expected behavior.

Example

Configure the unknown multicast to steal globally on IGMP snooping enabled VLANs.

```
switch# configure terminal
switch(config)# ip igmp snooping filter-unknown-mcast
```

Removing the configuration of the unknown multicast to steal globally on IGMP snooping enabled VLANs.

```
switch# configure terminal
switch(config)# no ip igmp snooping filter-unknown-mcast
```

Command History

Release	Modification
10.11	Command introduced on the 6200, 6300, 6400, 8100, and 8360.

Command Information

Platforms	Command context	Authority
6200	`config`	Administrators or local user group members with execution rights

Platforms	Command context	Authority
6300 6400 8100 8360		for this command.

ip igmp snooping preprogram-starg-flow

```
ip igmp snooping preprogram-starg-flow {enable | disable}
```

Description

Configures preprogramming of the starg flow feature on the IGMP snooping enabled VLAN.

Parameter	Description
`enable`	Enables preprogramming starg flows on the VLAN.
`disable`	Disables preprogramming starg flows on the VLAN.

Usage

When this feature is enabled, a summarized multicast bridge entry is programmed into the hardware table when an IGMPv2 or IGMPv3 join is received on the IGMP snooping enabled VLAN. This enables multicast flow to be programmed in the hardware before the data packet arrives for a multicast flow. If an unknown packet is received for a multicast flow, having this feature enabled triggers programming of starg entry in the hardware on selected platforms, which is helpful in optimizing hardware resource utilization and PIM registration in deployments where a L2 device is connected along the PIM registration path.

This feature is currently supported for IGMPv2 and IGMPv3 joins, so IGMPv3 joins that are sent for a specific source are treated as IGMPv2 joins and summarized entry is programmed in the corresponding hardware.

Preprogramming of starg flows is supported only on the IGMP snooping enabled VLANs. If IGMP snooping is disabled on a VLAN, this feature is auto-disabled.

This feature is currently supported for IGMPv2 and IGMPv3 joins, as a result, summarized multicast flow is programmed in advance when an IGMPv2 join or IGMPv3 join for a specific group is received. For IGMPv3 deployments, traffic from all sources for a specific multicast group is sent to all clients, regardless of whether they send IGMPv2 or IGMPv3 joins for this group. Keeping this feature disabled is recommended on VLANs where traffic from the specific source is only expected for the IGMPv3 clients.

On the 6200, 6300, 6400, 8100, and 8360 switch series, a single starg entry is programmed in advance for each join received. Data driven programming of SG entries does not occur when traffic is received from a specific source for this group. A single starg entry is used to forward the traffic to the clients for all of the active joins in the feature enabled VLANs.

When an unknown multicast packet is received on a VLAN where this feature is enabled, it triggers programming of a starg entry in the hardware instead of the SG.

It is highly recommended to not enable this feature on devices where PIM or L3 multicast routing is enabled as it can lead to issues like permanent traffic loss.

Configuring this feature on devices where there are multiple sources sending traffic for the same group address is recommended.

This feature is mutually exclusive with the IGMP snooping static group feature.

Example

Enable preprogramming multicast starg flows:

```
switch(config)# vlan 2
switch(config-vlan-2)# ip igmp snooping preprogram-starg flow enable
```

Disable preprogramming multicast starg flows:

```
switch(config)# vlan 2
switch(config-vlan-2)# ip igmp snooping preprogram-starg flow disable
```

Command History

Release	Modification
10.13	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8360	config-vlan	Administrators or local user group members with execution rights for this command.

ip igmp snooping static group

```
ip igmp snooping static group <GROUP-NAME>
no ip igmp snooping static group <GROUP-NAME>
```

Description

Configures static multicast group. The **no** form of this command removes the configuration.

Parameter	Description
<GROUP-NAME>	Specifies the group name.

Example

Configure static multicast group on group 239.1.1.1:

```
switch(config)# vlan 2
switch(config-vlan-2)# ip igmp snooping static-group 239.1.1.1
```

Remove static multicast group on group 239.1.1.1:

```
switch(config)# vlan 2
switch(config-vlan-2)# no ip igmp snooping static-group 239.1.1.1
```

Command History

Release	Modification
10.13	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

show ip igmp snooping

```
show ip igmp snooping
   counters
   detail
   groups [vlan <vlan-id>]
   no ...
   packet-exceptions
   static-groups
   statistics
   vlan <vlan-id> [group {<ip-addr> [client_details]}|{port <IF-NAME>}|{vtep-peer
   <A.B.C.D>}]
   vsx-peer
```



NOTE: The `vsx-peer` parameter is not supported by the 6300 Series Switch

Description

Shows IGMP snooping configuration information and status for all VLANs. Specify a VLAN ID or a VLAN and a group to display details for only that VLAN or VLAN group.

Parameter	Description
`counters`	Shows IGMP query packets transmitted (Tx), received (Rx), and error packet counters.
`detail`	Shows IGMP Snooping details for all VLANs, including joined ports or VXLAN tunnel endpoints (VTEPs) for each group in the VLAN.
`groups`	Shows IGMP snooping groups information. Include the optional **vlan <vlan-id>** parameter to display information for groups on a specific VLAN.
`no ...`	Negates any configured parameter.
`packet-exceptions`	Troubleshoot issues in L2 multicast bridge entries for data packets forwarded to the CPU.

Parameter	Description
`static-groups`	Shows MLD snooping static group details, including the number of static groups joined.
`statistics`	Shows MLD snooping statistics.
`vlan <vlan-id>`	Shows IGMP snooping protocol information and number of different groups joined for the VLAN.
`group`	Shows IGMP snooping group information for the specified VLAN, including the number of different groups joined for the VLAN. Identify the group by IP address or interface name.
`<ip-addr> [client-details]`	Shows IGMP snooping group address information. Include the optional **client details** parameter to display IGMP snooping client details.
`port <IF-NAME>`	Shows IGMP snooping group information for the interface name in **member**/**slot**/**port** format.
`vtep-peer <A.B.C.D>`	Shows IGMP snooping info for the specified VTEP.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing IGMP snooping configuration and status:

```
switch# show ip igmp snooping

IGMP Snooping Protocol Info

Total VLANs with IGMP enabled             : 1
IGMP Drop Unknown Multicast               : Global


VLAN ID : 1
VLAN Name : DEFAULT_VLAN_1
IGMP Snooping is not enabled

VLAN ID : 2
VLAN Name : VLAN2
IGMP Configured Version : 3
IGMP Operating Version : 3
IGMP preprogram-starg-flow is operational
Querier Address [this switch] : 20.1.1.1
Querier Port :
Querier UpTime :0m 21s
Querier Expiration Time :0m 2s
```

Include the **detail** parameter for additional information on joined ports or VTEPs, as shown in the example below:

```
switch# show ip igmp snooping detail

IGMP Snooping Protocol Info

Total VLANs with IGMP enabled             : 1
Current count of multicast groups joined  : 4

IGMP Drop Unknown Multicast               : Global
VLAN ID : 100
VLAN Name : VLAN100
IGMP Configured Version : 3
IGMP Operating Version : 3
IGMP preprogram-starg-flow is not operational
Querier Address [this switch] : 15.1.1.1
Querier Port :
Querier UpTime :9m 32s
Querier Expiration Time :0m 10s
Router Detected Port(s) :

Active Group Address   Tracking  Vers Mode Uptime    Expires    Ports/Vteps
--------------------- ---------- ---- ---- --------- ---------- ------------------
------------
225.1.1.1              Filter    3    EXC  1m 2s     3m 19s
200.1.1.1,200.1.1.2
                                                                 1/6/22
225.1.1.2              Filter    3    EXC  1m 2s     3m 19s
200.1.1.1,200.1.1.2
                                                                 1/6/22
226.1.1.1              Filter    3    EXC  1m 4s     3m 16s     200.1.1.3
226.1.1.2              Filter    3    EXC  1m 4s     3m 16s     200.1.1.3
```

Showing IGMP snooping packet exceptions:

```
switch#  show ip igmp snooping packet-exceptions
List of L2 Multicast Bridge entries for which data packets are hitting CPU

VRF: default

Vlan   Group Address          Source-Address          Packet Count   Last Seen
Time
----   --------------------   ---------------------   ------------   -------------
------------
10     232.2.2.2/32           100.100.1.10/32         19             00h:02m:03s
10     232.2.2.3/32           100.100.1.10/32         42             01h:01m:59s
10     232.2.2.3/32           100.100.1.11/32         32             28d:10h:01m
20     232.2.2.2/32           50.1.1.10/32            31             01m:02w:01d
20     233.2.2.2/32           50.1.1.10/32            38
0001y:02m:02w:05d
```

Command History

Release	Modification
10.13	Programming starg flow is now supported.
10.10	The **packet-exceptions** parameter is introduced.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

Multicast Listener Discovery (MLD) snooping optimizes multicast traffic across the network to prevent traffic from flooding ports on a VLAN.

- For example, one of the features of MLD snooping lets you configure the network so that traffic is forwarded only to ports that initiate an MLD request for multicast.
- Another feature of MLD lets you enable a setting so that packets that do not match the configured version are dropped.
- You can also block ports from traffic.



MLD snooping is disabled by default and has to be enabled on all applicable VLANs.

MLD snooping global configuration commands

ipv6 mld snooping

```
ipv6 mld snooping drop-unknown {vlan-shared | vlan-exclusive}
no ipv6 mld snooping drop-unknown {vlan-shared | vlan-exclusive}
```

Description

This command configures the drop unknown mode. While MLD snooping is enabled, the traffic will be forwarded only to ports that initiate an MLD request for multicast. Drop unknown mode can be a filter across all VLANs (vlan-shared) or per VLAN (exclusive-vlan). The default configuration is vlan-shared.

The **no** form of this command configures the drop unknown mode on the switch to the default **vlan-shared**.

Parameter	Description
`vlan-shared`	Required: Enable shared VLAN filter on the switch.
`vlan-exclusive`	Required: Enable exclusive drop unknown filter per VLAN.

Example

```
switch(config)# ipv6 mld snooping drop-unknown vlan-shared
switch(config)# ipv6 mld snooping drop-unknown vlan-exclusive
switch(config)# no ipv6 mld snooping drop-unknown
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config`	Administrators or local user group members with execution rights for this command.

mgmd delayed-refresh timer

```
mgmd delayed-refresh timer <value>
no mgmd delayed-refresh timer <value>
```

Description

This command delays the refresh for some IGMP or MLD protocol-related values. When this command is enabled, IGMP/MLD **last_reporter value**, source, group, or querier uptime, and the **create time** and **expiry time** values will be updated based on the configured timer values. By default, the timer value is 30 seconds. This command is disabled by default, where the values listed above will be updated for every control packet. Best practices is to enable this feature when CPU utilization by the OVSDB server is increasing because of increased MGMD operations.

Parameter	Description
timer <value>	Number of seconds the timer will delay the update. Range: 5-30.

Example

Configuring the MGMD delayed refresh.

```
switch(config)# mgmd delayed-update timer 20
```

Disabling the MGMD delayed refresh.feature:

```
switch(config)# no mgmd delayed-update timer 20
```

Command History

Release	Modification
10.10	Command Introduced

Command Information

Platforms	Command context	Authority
6400 8100 8320 8325 8360 8400 10000	`config`	Administrators or local user group members with execution rights for this command.

mgmd querier-offload

```
mgmd querier-offload
no mgmd querier-offload
```

Description

Configures the IGMP/MLD querier (mgmd) offload feature. When the querier offload is enabled, during VSX software upgrade or VSX querier node reboot, the querier responsibility is offloaded to the VSX peer which is up and running. This is enabled by default.

The **no** form of this command disables the querier offload functionality.



This feature is applicable only to the VSX switches not to standalone switches.

Example

Configuring the querier offload feature:

```
switch(config)# mgmd querier-offload
```

Disabling the querier offload feature:

```
switch(config)# no mgmd querier-offload
```

Command History

Release	Modification
10.10	Command Introduced

Command Information

Platforms	Command context	Authority
6400 8100 8320 8325 8360 8400 10000	`config`	Administrators or local user group members with execution rights for this command.

MLD snooping VLAN configuration commands

ipv6 mld snooping

```
ipv6 mld snooping {enable | disable}
no ipv6 mld snooping [enable | disable]
```

Description

This command enables or disables MLD snooping on the VLAN.

The **no** form of this command disables all MLD snooping configurations on the VLAN.

Parameter	Description
`enable`	Required: Enable MLD snooping on the VLAN.
`disable`	Required: Disable MLD snooping on the VLAN.

Example

Enable MLD snooping on VLAN 2:

```
switch(config)# vlan 2
switch(config-vlan)# ipv6 mld snooping enable
switch(config-vlan)# ipv6 mld snooping disable
```

Remove all MLD snooping configurations on VLAN 2:

```
switch(config)# vlan 2
switch(config-vlan)# no ipv6 mld snooping enable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan-<VLAN-ID>`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping apply access-list

```
ipv6 mld snooping apply access-list <ACL-NAME>
no ipv6 mld snooping apply access-list <ACL-NAME>
```

Description

Configures the ACL on a particular interface to filter the MLD join or leave packets based on rules set in the particular ACL name.

The **no** form of this command disables the rules set for the ACL.



This configuration will override the ACL associated with IGMP snooping on the corresponding L2 VLAN.

Parameter	Description
`access-list`	Associates an ACL with the IGMP.
<ACL-NAME>	Specifies the name of the ACL. **NOTE:** If the access list is configured for both L2 VLAN and L3 VLAN, the L3 VLAN configuration will be applied.

Usage

- Existing classifier commands are used to configure the ACL.
- In case an IGMPv3 packet with multiple group addresses is received, the switch only processes the permitted group addresses based on the ACL rule set. The packet is forwarded to querier and PIM router even though one of the groups present in the packet is blocked by ACL. This avoids the delay in learning of the permitted groups. Since the access switch configured with ACL blocks the traffic for the groups which are denied, forwarding of joins has no impact. If all the groups in the packet are denied by the ACL rule, the packet is not forwarded to the querier and PIM router. Existing joins will timeout.
- In case of IGMPv2, if there is no match or if there is a deny rule match, the packet is dropped.

Examples

Configuring the ACL to filter MLD packets based on permit/deny rules set in access list **mygroup**:

```
switch(config)# access-list ipv6 mygroup
switch(config-acl-ip)# 10 deny icmpv6 any ff55::2
switch(config-acl-ip)# 20 deny icmpv6 any ff55::3
switch(config-acl-ip)# 30 permit icmpv6 any ff55::1
switch(config-acl-ip)# exit
switch(config)# interface vlan 2
switch(config-vlan)# ipv6 mld snooping apply access-list mygroup
```

Configuring the ACL to remove the rules set in access list `mygroup`:

```
switch(config-vlan)# no ipv6 mld snooping apply access-list mygroup
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping auto vlan

```
ipv6 mld snooping [auto vlan <VLAN-LIST>]
no ipv6 mld snooping [auto vlan <VLAN-LIST>]
```

Description

This command configures the given ports in auto mode, which is the default port mode.

The **no** form of this command disables auto ports.

Parameter	Description
<VLAN-LIST>	Required: Specifies a list of VLANs on which the port should be configured as an auto port. Specifies the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60).

Example

On the 6400 Switch Series, interface identification differs.

Configuring auto ports for VLANs on the interface:

```
switch# configure terminal
switch(config)# int 1/1/1
switch(config-vlan)# no shut
switch(config-vlan)# no routing
switch(config-vlan)# ipv6 mld snooping auto vlan 10
switch(config-vlan)# ipv6 mld snooping auto vlan 10-20
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping blocked vlan

```
ipv6 mld snooping [blocked vlan <VLAN-LIST>]
no ipv6 mld snooping [blocked vlan <VLAN-LIST>]
```

Description

By default ports are configured in auto mode. This command configures the given ports in blocked mode.

The **no** form of this command removes blocked ports.

Parameter	Description
<VLAN-LIST>	Required: Specifies a list of VLANs on which the port should be configured as a blocked port. Specifies the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60).

Example

On the 6400 Switch Series, interface identification differs.

Configuring blocked ports for the VLANs on the interface:

```
switch# configure terminal
switch(config)# int 1/1/1
switch(config-vlan)# no shut
switch(config-vlan)# no routing
switch(config-vlan)# ipv6 mld snooping blocked vlan 10
switch(config-vlan)# ipv6 mld snooping blocked vlan 10-20
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping fastlearn

`ipv6 mld snooping fastlearn <port-list>`

Description

This command enables the port to learn group information on receiving topology change notification.

The **no** form of this command disables fastlearn on the ports.

Parameter	Description
`port-list`	Required: 1/1/1-1/1/2, ports to be configured as fastlearn ports.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# ipv6 mld snooping fastlearn 1/1/3
switch(config)# ipv6 mld snooping fastlearn 1/1/1-1/1/2
switch(config)# ipv6 mld snooping fastlearn 1/1/5,1/1/6
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping fastleave vlan

```
ipv6 mld snooping [fastleave vlan <VLAN-LIST>]
no ipv6 mld snooping [fastleave vlan <VLAN-LIST>]
```

Description

Configures the specified ports as fastleave ports. Enables the switch to immediately remove an interface from the bridge table upon receiving the leave group message.

The **no** form of this command disables fastleave configuration on the ports.

Parameter	Description
<VLAN-LIST>	Required: Specifies a list of VLANs on which the port should be configured as a fastleave port. Specifies the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60).

Usage

MLD fastleave is configured for ports on a per-VLAN basis. By default, the querier sends a MLD Group-Specific Query message out of the interface, upon which the leave group message is received to ensure that no other receivers are connected to the interface. If receivers are directly attached to the switch, it is inefficient to send the membership query as the receiver wanting to leave is the only connected host. Fastleave processing eliminates the MLD Group-Specific Query message. Thus, it allows the switch to immediately remove an interface from the bridge table upon receiving the leave Group message. This processing speeds up the overall leave process and also eliminates the CPU overhead of having to generate an MLD Group-Specific Query message.

Example

On the 6400 Switch Series, interface identification differs.

Configuring fastleave ports for the VLAN:

```
switch# configure terminal
switch(config)# int 1/1/1
switch(config-vlan)# no shut
switch(config-vlan)# no routing
switch(config-vlan)# ipv6 mld snooping fastleave vlan 10
switch(config-vlan)# ipv6 mld snooping fastleave vlan 10-20
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping forced fastleave vlan

```
ipv6 mld snooping [forced-fastleave <VLAN-LIST>]
no ipv6 mld snooping [forced-fastleave <VLAN-LIST>]
```

Description

Configures the given ports in forced fastleave mode.

The **no** form of this command disables forced fastleave configuration on the ports.

Parameter	Description
<VLAN-LIST>	Required: Specifies a list of VLANs on which the port should be configured as a forced fastleave port. Specifies the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60).

Usage

With forced fastleave enabled, MLD speeds up the process of blocking unnecessary multicast traffic to a switch port that is connected to multiple end nodes. When a port having multiple end nodes receives a leave group request from one end node for a given multicast group, forced fastleave activates and waits a small amount of time to receive a join request from any other member of the same group on that port. If the port does not receive a join request for that group within the forced fastleave interval, the switch then blocks any further traffic to that group on that port.

Example

On the 6400 Switch Series, interface identification differs.

Configuring forced-fastleave ports for the VLAN:

```
switch# configure terminal
switch(config)# int 1/1/1
switch(config-vlan)# no shut
switch(config-vlan)# no routing
switch(config-vlan)# ipv6 mld snooping forced-fastleave vlan 10
switch(config-vlan)# ipv6 mld snooping forced-fastleave vlan 10-20
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-vlan	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping forward vlan

```
ipv6 mld snooping [forward vlan <VLAN-LIST>]
no ipv6 mld snooping [forward vlan <VLAN-LIST>]
```

Description

By default ports are configured in auto mode. This command configures the given ports in forward mode.

The **no** form of this command disables forward ports.

Parameter	Description
<VLAN-LIST>	Required: Specifies a list of VLANs on which the port should be configured as a forward port. Specifies the number of a single VLAN or a series of numbers for a range of VLANs, separated by commas (10, 20, 30, 40), dashes (10-40), or both (10-40,60).

Example

On the 6400 Switch Series, interface identification differs.

Configuring forward ports for VLANs on the interface:

```
switch# configureterminal
switch(config)# int 1/1/1
switch(config-vlan)# no shut
switch(config-vlan)# no routing
switch(config-vlan)# ipv6 mld snooping forward vlan 10
switch(config-vlan)# ipv6 mld snooping forward vlan 10-20
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping preprogram-starg-flow

```
ipv6 mld snooping preprogram-starg-flow {enable | disable}
```

Description

This command configures the preprogramming of the starg flow feature on MLD snooping enabled VLANs.

Parameter	Description
`enable`	Enable preprogramming starg flows on the VLAN.
`disable`	Disable prprogramming starg flows on the VLAN.

Usage

When this feature is enabled, a summarized multicast bridge entry is programmed into the hardware table when a starg or sg MLD join is received on the MLD snooping enabled VLAN. This enables multicast flow to be programmed in the hardware even before the data packet arrives for multicast flow. MLDv2 joins that are sent for a specific source are treated similar to starg joins and a summarized entry is programmed in the corresponding hardware.

Preprogramming of Starg Flows is supported only on the MLD snooping enabled VLANs. If MLD snooping is disabled on a VLAN, this feature is auto-disabled.

This feature is currently supported for MLDv1 and MLDv2 joins, which means a summarized multicast flow is programmed in advance when a MLDv1 or MLDv2 join for a specific group is received. For MLDv2 deployments, traffic from all of the sources for a specific multicast group are sent to all of the clients, regardless of whether they are sending MLDv1 or MLDv2 joins for this group. Keeping this feature disabled is recommended on VLANs where traffic from the specific source is only expected for the MLDv2 clients.

On the 6200, 6300, 6400, and 8100 switch series, a single starg entry is programmed in advance for each join received. Data driven programming of SG entries does not occur when traffic is received from a specific source for this group. A single starg entry is used to forward the traffic to the clients for all of the active joins in the feature enabled VLANs.

When an unknown multicast packet is received on a VLAN where the feature is enabled, it triggers programming of a starg entry in the hardware instead of SG.

It is highly recommended to not enable this feature on devices where PIM or L3 multicast routing is enabled as it can lead to issues like permanent traffic loss.

Configuring this feature on devices where there are multiple sources sending traffic for the same group address is recommended.

This feature is mutually exclusive with the MLD snooping static group feature.

Optimization may vary environment to environment, based on scale.

Example

Enable preprogramming of starg flow on VLAN 2:

```
switch(config)# vlan 2
switch(config-vlan)# ipv6 mld snooping preprogramming-starg-flow enable
```

Remove all preprogramming of starg flow on VLAN 2:

```
switch(config)# vlan 2
switch(config-vlan)# ipv6 mld snooping preprogramming-starg-flow disable
```

Command History

Release	Modification
10.13	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8360	config-vlan-*<VLAN-ID>*	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping version

```
ipv6 mld snooping [version <ver>]
no ipv6 mld snooping [version <ver>]
```

Description

This command configures the MLD snooping version on the VLAN. MLD version 2 is the default.

The **no** form of the command configures the default MLD snooping version on the VLAN, **2**.

Parameter	Description
ver	Required: 1-2, MLD snooping version.

Example

```
switch(config)# vlan 2
switch(config-vlan)# ipv6 mld snooping version 2
```

```
switch(config-vlan)# no ipv6 mld snooping version 2
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-vlan-*<VLAN-ID>*	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping static-group

```
ipv6 mld snooping [static-group <X:X::X:X>]
no ipv6 mld snooping [static-group <X:X::X:X>]
```

Description

This command configures static multicast group.

The **no** form of this command disables static multicast group.

Parameter	Description
static-group	Required: **<X:X::X:X>**, MLD static multicast group.

Example

Configuring static multicast group:

```
switch(config)# vlan 2
switch(config-vlan)# ipv6 mld snooping static-group ff12::c
```

Removing the configuration of static multicast group:

```
switch(config)# vlan 2
switch(config-vlan)# no ipv6 mld snooping static-group ff12::c
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan-<VLAN-ID>`	Administrators or local user group members with execution rights for this command.

MLD snooping show commands

show ipv6 mld snooping

```
show ipv6 mld snooping [vlan <vlan-id> [group <ip-addr>|{port <IF-NAME>}|{vsx-peer]]
   counters
   detail
   groups [vlan <vlan-id> [vsx-peer [vlan <vlan-id>]]
   no ...
   packet-exceptions
   static-groups [vsx-peer]
   statistics
   vsx-peer vlan [<vlan-id>]
```



NOTE: The `vsx-peer` parameter is not supported by the 6300 Series Switch

Description

This command shows MLD snooping details for all VLANs. Specify a VLAN ID or a VLAN and a group to display details for only that VLAN or VLAN group.

Parameter	Description
`vlan <vlan-id>`	Shows MLD snooping protocol information and number of different groups joined for the VLAN.
`group`	Shows MLD snooping details for the specified VLAN, including the number of different groups joined for the VLAN. Identify the group by IP address or interface name.
`<ip-addr>`	Dispaly MLD snooping information for the selected group IP address.
`port <IF-NAME>`	Display information for a VLAN port. Specify the port name in **member/slot/port** format.
`vsx-peer`	Display VSX peer switch information.
`counters`	Shows MLD query packets transmitted (Tx), received (Rx), and error packet counters.
`detail`	Shows the total VLANs with MLD enabled. When issued with the **vlan <vlan-id>** parameter, this command displays details for the selected VLAN.
`groups`	Show MLD snooping groups information.
`vlan <vlan-id>`	Display IGMP snooping operational information for specified VLAN

Parameter	Description
[vsx-peer [vlan <vlan-id>]	Display IGMP snooping operational information for the specified vsx-peer switch.
no ...	Negates any configured parameter.
packet-exceptions	Troubleshoot issues in an L2 multicast bridge entries for data packets forwarded to the CPU.
static-groups [vsx-peer]	Shows MLD snooping static group details, including the number of static groups joined. Include the optional [vsx-peer] parameter to display VSX peer switch information.
statistics	Show MLD snooping statistics.
[vsx-peer} vlan <vlan-id>	Displays VSX peer switch information for the specified VLAN ID.

Examples

```
switch# show ipv mld snooping vlan 2 group port 1/1/1

VLAN ID   : 2
VLAN Name : VLAN2

Group Address : ff05::2:1
Last Reporter : fe80::1
Group Type    : Filter

                                        V1        Sources   Sources
Port      Vers Mode Uptime    Expires   Timer     Forwarded Blocked
--------- ---- ---- --------- --------- --------- --------- --------
1/1/1     2    INC  1m 46s    2m 34s              3         0

Group Address  : ff05::2:1
Source Address : 3000::1
Source Type    : Filter

Port      Mode Uptime    Expires   Configured Mode
--------- ---- --------- --------- ----------------
1/1/1     INC  1m 46s    2m 34s    Auto

Group Address  : ff05::2:1
Source Address : 3000::2
Source Type    : Filter

Port      Mode Uptime    Expires   Configured Mode
--------- ---- --------- --------- ----------------
1/1/1     INC  1m 46s    2m 34s    Auto

Group Address  : ff05::2:1
Source Address : 3000::3
Source Type    : Filter

Port      Mode Uptime    Expires   Configured Mode
--------- ---- --------- --------- ----------------
1/1/1     INC  1m 46s    2m 34s    Auto
```

```
switch# show ipv6 mld snooping counters
MLD Snooping VLAN Counters

Rx Counters :

V1 All Hosts Queries                              0
V2 All Hosts Queries                              0
V2 Group Specific Queries                         0
Group And Source Specific Queries                 0
V1 Member Reports                                 0
V2 Member Reports                                 0
V1 Member Leaves                                  0


Tx Counters :

Flood on vlan                                     44
V1 Group Specific Queries                         0
V2 Group Specific Queries                         0

Errors:

Unknown Message Type                              0
Malformed Packets                                 0
Bad Checksum                                      0
Packet received on MLD-disabled Interface         0
Interface Wrong Version Queries                   0
Packets dropped by ACL                            0

Port Counters:

Membership Timeout                                0
```

```
switch# show ipv6 mld snooping groups

MLD Group Address Information

VLAN ID Group Address     Expires   UpTime    Last Reporter                  Type
------- ----------------- --------- --------- ------------------------------ ----
10      ff12::c           3m 54s    0m 26s    2001::1
Filter
10      ff12::d           4m 17s    0m 3s     2001::1
```

```
switch# show ipv6 mld snooping vlan 2 statistics
MLD Snooping statistics

VLAN ID   :   2
VLAN Name :   VLAN2

Number of Include Groups       :   1
Number of Exclude Groups       :   0
Number of Static Groups        :   1
Total Multicast Groups Joined  :   2
```

```
switch# show ipv6 mld snooping packet-exceptions
List of L2 Multicast Bridge entries for which data packets are hitting CPU
Vlan   Group Address    Source-Address          Packet Count   Last Seen Time
----   --------------   -----------------       ------------   --------------
```

```
10      ff03::10/128      1010::10/128            19              01h:02m:05s
10      ff03::12/128      1010::11/128            30              00d:02h:01m
10      ff04::10/12       1010::10/128            40              01m:02w:03d
20      ff03::11/128      5000::10/128            20              02m:02w:00d
20      ff03::12/128      5000::10/128            41              0001y:01m:02w:05d
20      ff04::10/128      5000::10/128            30              00d:02h:02m
```

Command History

Release	Modification
10.10	The **packet-exceptions** parameter is introduced.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show mgmd debug-counters

```
show mgmd debug-counters
```

Description

This command displays packet throttle counters and packet queue sizes for IGMP/MLD debug counters.

Example

```
switch# show mgmd debug-counters
Global MGMD Debug Counters
Group Throttle Count                        : 0
Dropped Packet Count                        : 100
Max Pkt Handler Queue Depth                 : 2048
Current Pkt Handler Queue Depth             : 1000
```

Command History

Release	Modification
10.10	--

Command Information

Platforms	Command context	Authority
All platforms	`config`	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

MLD configuration commands for interface VLAN

ipv6 mld

```
ipv6 mld {enable | disable}
no ipv6 mld [enable | disable]
```

Description

This command enables or disables MLD on the interface VLAN.

The **no** form of this command disables MLD on the interface VLAN.

Parameter	Description
`enable`	Required: Enable MLD on the interface VLAN.
`disable`	Required: Disable MLD on the interface VLAN.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld enable
switch(config-if-vlan)# ipv6 mld disable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld apply access-list

```
ipv6 mld apply access-list <ACL-NAME>
no ipv6 mld apply access-list <ACL-NAME>
```

Description

Configures the ACL on a particular interface to filter the MLD join or leave packets based on rules set in the particular ACL name.

The **no** form of this command disables the rules set for the ACL.

Parameter	Description
`access-list`	Associates an ACL with the IGMP.
<ACL-NAME>	Specifies the name of the ACL.

Usage

- Existing classifier commands are used to configure the ACL.
- In case an IGMPv3 packet with multiple group addresses is received, the switch only processes the permitted group addresses based on the ACL rule set. The packet is forwarded to querier and PIM router even though one of the groups present in the packet is blocked by ACL. This avoids the delay in learning of the permitted groups. Since the access switch configured with ACL blocks the traffic for the groups which are denied, forwarding of joins has no impact. If all the groups in the packet are denied by the ACL rule, the packet is not forwarded to the querier and PIM router. Existing joins will timeout.
- In case of IGMPv2, if there is no match or if there is a deny rule match, the packet is dropped.

Examples

Configuring the ACL to filter MLD packets based on permit/deny rules set in access list **mygroup**:

```
switch(config)# access-list ipv6 mygroup
switch(config-acl-ip)# 10 deny icmpv6 any ff55::2
switch(config-acl-ip)# 20 deny icmpv6 any ff55::3
switch(config-acl-ip)# 30 permit icmpv6 any ff55::1
switch(config-acl-ip)# exit
switch(config)# interface vlan 2
switch(config-vlan)# ipv6 mld apply access-list mygroup
```

Configuring the ACL to remove the rules set in access list **mygroup**:

```
switch(config-vlan)# no ipv6 mld apply access-list mygroup
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

no ipv6 mld

`no ipv6 mld`

Description

This command removes all MLD configurations on the interface.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# no ipv6 mld
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld querier

`ipv6 mld querier`

Description

This command configures MLD querier.

The **no** form of this command disables MLD querier.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld querier
switch(config-if-vlan)# no ipv6 mld querier
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld querier interval

`ipv6 mld querier [interval <interval-value>]`

Description

This command configures MLD querier interval. The default interval-value is 125.

Parameter	Description
`interval-value`	Required: 5-300, configures MLD querier interval. **NOTE:** Default interval-value is 125. Use the **no ipv6 mld querier interval** command to set interval-value to the default.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld querier interval 100
switch(config-if-vlan)# no ipv6 mld querier interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld last-member-query-interval

`ipv6 mld last-member-query-interval <interval-value>`

Description

This command configures MLD last member query interval value in seconds. The default interval-value is 1 second.

Parameter	Description
`interval-value`	Required: 1-2, configures MLD last-member-query-interval.

Default interval-value is 1 second. Use the `no ipv6 mld last-member-query-interval` command to set interval-value to the default.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld last-member-query-interval 2
switch(config-if-vlan)# no ipv6 mld last-member-query-interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if-vlan	Administrators or local user group members with execution rights for this command.

ipv6 mld querier query-max-response-time

`ipv6 mld querier query-max-response-time <response-time>`

Description

This command configures MLD max response time value in seconds. The default max-response-time-value is 10 seconds.

Parameter	Description
max-response-time-value	Required: 10-128, configures MLD querier max-response-time. **NOTE:** Default max-response-time-value is 10 seconds. Use the **no ipv6 mld querier query-max-response-time** command to set max-response-time-value to the default.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld query-max-response-time 50
switch(config-if-vlan)# no ipv6 mld query-max-response-time
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld robustness

`ipv6 mld robustness <VALUE>`

Description

This command configures MLD robustness. The robustness value represents the number of times the querier retries queries on the connected subnets. The default robustness-value is 2 seconds.

Parameter	Description
<VALUE>	Required: 1-7, configures MLD robustness. **NOTE:** Default robustness-value is 2 seconds. Use the **no ipv6 mld robustness** command to set robustness-value to the default.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld robustness 5
switch(config-if-vlan)# no ipv6 mld robustness
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 mld static-group

`ipv6 mld static-group <MULTICAST-GROUP-IP>`

Description

This command configures MLD static group.

Parameter	Description
<MULTICAST-GROUP-IP>	Required: X:X::X:X, configures MLD static group.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld static-group ff12::c
switch(config-if-vlan)# no ipv6 mld static-group ff12::c
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if-vlan	Administrators or local user group members with execution rights for this command.

ipv6 mld version

```
ipv6 mld version <VERSION>
no ipv6 mld version <VERSION>
```

Description

This command configures MLD version.

The **no** form of the command configures the default MLD version of **2**.

Parameter	Description
<VERSION>	Required: 1-2, configures MLD version.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld version 2
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if-vlan	Administrators or local user group members with execution rights for this command.

ipv6 mld version strict

```
ipv6 mld version <VERSION> [strict]
```

Description

This command configures MLD strict version. Packets that do not match the configured version will be dropped. By default, strict option is not enabled.

Parameter	Description
<VERSION>	Required: 1-2, configures MLD version.

Example

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld version 2 strict
switch(config-if-vlan)# no ipv6 mld version 2 strict
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

MLD show commands for interface VLAN

Only the default VRF is supported on the Aruba 6200 Switch Series.

show ipv6 mld

```
show ipv6 mld
   all-vrfs
   counters
   group <x:x::x:x> [source x:x::x:x]
   groups
   interface {<INTF-ID>|<INTF-ID.ID>}|{vlan <vlan-id}}
   static-groups
   statistics [all-vrfs|{vrf <vrf-name>}]
   vrf <vrf-name}
   vsx-peer
```

Description

This command shows MLD groups joined details.

Parameter	Description
`all-vrfs`	Show MLD snooping info for all VRFs in all interfaces or groups, or for all VRFs in a specified group, interface or VLAN
`counters`	Show all MLD counters, or display counters for the specified interface or VLAN
`group <x:x::x:x> [source <x:x::x:x>]`	Show MLD group information for the specified group, group and interface, or group and vlan. Include the optional **source <x:x::x:x>** parameter to dislay source information for the group.
`groups`	Show MLD group information for all VRFs, or for groups in the specified interface or VLAN.
`interface`	Shows MLD configuration information for a specified interface , sub interface, or VLAN.
`<INTF-ID>`	Specify an Interface ID
`<INTF-ID.ID>`	Specify a sub-interface ID. (Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.)
`vlan <vlan-id>`	Specify a VLAN ID
`static-groups`	Display all static groups information, or include one of the additional parameters apply additional filters: ■ **all-vrfs**: Display MLD static-group information for all VRFs ■ **vrf <vrf-name>**: Display MLD static-group information for the selected VRF
`statistics`	Display all MLD statistics, or include one of the additional parameters apply additional filters: ■ **all-vrfs**: Display MLD statistics information for all VRFs ■ **vrf <vrf-name>**: Display MLD statistics information forthe selcted VRF
`vrf <vrf-name>`	Show MLD information for the specified VRF.
`vsx-peer`	Display VSX-peer information.

Examples

Showing the current MLD configuration and status

```
switch# show ipv6 mld

VRF Name                    : default
Interface                   : vlan10
MLD Configured Version      : 2
MLD Operating Version       : 2
Querier State               : Querier
Querier IP [this switch]    : fe80::7272:cfff:fe96:d3ec
Querier Uptime              : 39m 44s
Querier Expiration Time     : 0m 31s
```

```
MLD Snoop Enabled on VLAN  : True
```

Showing the MLD configuration on a specified VLAN or interface:

```
switch# show ipv6 mld interface vlan 10

MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Querier
Querier IP [this switch]   : fe80::7272:cfff:fe96:d3ec
Querier Uptime             : 40m 42s
Querier Expiration Time    : 1m 39s
MLD Snoop Enabled on VLAN  : True

switch# show ipv6 mld interface 1/1/2

MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Querier
Querier IP [this switch]   : fe80::7272:cfff:fe96:d3ec
Querier Uptime             : 40m 42s
Querier Expiration Time    : 1m 39s
MLD Snoop Enabled on VLAN  : True
```

Showing MLD configuration on sub-interface 1/1/2.10:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch# show ipv6 mld interface 1/1/2.10

MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Querier
Querier IP [this switch]   : fe80::7272:cfff:fe96:13ec
Querier Uptime             : 40m 42s
Querier Expiration Time    : 1m 39s
MLD Snoop Enabled on VLAN  : True
```

Showing MLD groups information for a specified interface:

```
switch# show ipv6 mld interface 1/1/1 groups

MLD group information for group ff55::1

Interface Name   : 1/1/1
VRF Name         : default

Group Address    : ff55::1
Last Reporter    : fe80::a00:9ff:fe77:1062

                                V1        Sources   Sources
Vers Mode Uptime    Expires     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------
2    EXC  0m 14s    4m 6s
```

Showing MLD groups information for a specified sub-interface:

```
switch# show ipv6 mld interface 1/1/1.10 groups

MLD group information for group ff56::1

Interface Name   : 1/1/1.10
VRF Name         : default

Group Address    : ff56::1
Last Reporter    : fe80::a00:9ff:fe77:1062

                             V1        Sources   Sources
Vers Mode Uptime    Expires  Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------
2    EXC  1m 14s    2m 6s
```

Showing MLD static groups

```
switch# show ipv6 mld static-groups all-vrfs

MLD Static Group Address Information

VRF Name   :default
Interface Name   Group Address
---------------- ----------------------------------------
vlan2            ff12::c
vlan2            ff12::d
VRF Name   :test
Interface Name   Group Address
---------------- ----------------------------------------
vlan3            ff13::1
vlan3            ff13::2
```

Showing MLD counters

```
switch# show ipv6 mld counters

MLD Counters

Interface Name      : vlan2
VRF Name            : default
Membership Timeout  : 0
                                          Rx            Tx
                                          ------------- -------------
V1 All Hosts Queries                      0             0
V2 All Hosts Queries                      0             12
V1 Group Specific Queries                 0             0
V2 Group Specific Queries                 0             0
Group And Source Specific Queries         0             0
V2 Member Reports                         0             N/A
V1 Member Reports                         0             N/A
V1 Member Leaves                          0             N/A
Packets dropped by ACL                    0             N/A

switch# show ipv6 mld counters vrf default

MLD Counters

Interface Name      : vlan2
VRF Name            : default
```

```
Membership Timeout  : 0
                                                Rx            Tx
                                                ------------- -------------
V1 All Hosts Queries                            0             0
V2 All Hosts Queries                            0             12
V1 Group Specific Queries                       0             0
V2 Group Specific Queries                       0             0
Group And Source Specific Queries               0             0
V2 Member Reports                               0             N/A
V1 Member Reports                               0             N/A
V1 Member Leaves                                0             N/A
Packets dropped by ACL
```

Showing MLD statistics on a specified interface:

```
switch# show ipv6 mld interface 1/1/1 statistics

MLD statistics

Interface Name : 1/1/1
VRF Name       : default

Number of Include Groups       :   2
Number of Exclude Groups       :   0
Number of Static Groups        :   0
Total Multicast Groups Joined  :   2
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

MLD configuration commands for interface

ipv6 mld

```
ipv6 mld {enable | disable}
no ipv6 mld {enable | disable}
```

Description

This command enables or disables MLD on the interface.

The **no** form of this command disables MLD on the interface.

Parameter	Description
`enable`	Required: Enable MLD on the interface.
`disable`	Required: Disable MLD on the interface.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld enable
switch(config-if)# ipv6 mld disable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld apply access-list

```
ipv6 mld apply access-list <ACL-NAME>
no ipv6 mld apply access-list <ACL-NAME>
```

Description

Configures the ACL on a particular interface to filter the MLD join or leave packets based on rules set in the particular ACL name.

The **no** form of this command removes the rules set for the ACL.

Parameter	Description
`access-list`	Associates an ACL with the IGMP.
<ACL-NAME>	Specifies the name of the ACL.

Usage

- Existing classifier commands are used to configure the ACL.
- In case an IGMPv3 packet with multiple group addresses is received, the switch only processes the permitted group addresses based on the ACL rule set. The packet is forwarded to querier and PIM router even though one of the groups present in the packet is blocked by ACL. This avoids the delay in learning of the permitted groups. Since the access switch configured with ACL blocks the traffic for the groups which are denied, forwarding of joins has no impact. If all the groups in the packet are

denied by the ACL rule, the packet is not forwarded to the querier and PIM router. Existing joins will timeout.

- In case of IGMPv2, if there is no match or if there is a deny rule match, the packet is dropped.

Examples

On the 6400 Switch Series, interface identification differs.

Configuring the ACL to filter MLD packets based on permit/deny rules set in access list **mygroup**:

```
switch(config)# access-list ipv6 mygroup
switch(config-acl-ip)# 10 deny icmpv6 any ff55::2
switch(config-acl-ip)# 20 deny icmpv6 any ff55::3
switch(config-acl-ip)# 30 permit icmpv6 any ff55::1
switch(config-acl-ip)# exit
switch(config)# interface 1/1/1interface vlan 1
switch(config-vlan)# ipv6 mld apply access-list mygroup
```

Configuring the ACL to remove the rules set in access list **mygroup**:

```
switch(config-vlan)# no ipv6 mld apply access-list mygroup
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-vlan`	Administrators or local user group members with execution rights for this command.

no ipv6 mld

`no ipv6 mld`

Description

This command removes all MLD configurations on the interface.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# no ipv6 mld
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld querier

`ipv6 mld querier`

Description

This command configures MLD querier. This functionality will allow the interface to join in the querier-election process.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld querier
switch(config-if)# no ipv6 mld querier
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld querier interval

`ipv6 mld querier [interval <interval-value>]`

Description

This command configures MLD querier interval. The default interval-value is 125.

Parameter	Description
`interval-value`	Required: 5-300, configures MLD querier interval.

Parameter	Description
	NOTE: Default interval-value is 125. Use the `no ipv6 mld querier interval` command to set interval-value to the default.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld querier interval 100
switch(config-if)# no ipv6 mld querier interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld last-member-query-interval

`ipv6 mld last-member-query-interval <interval-value>`

Description

This command configures MLD last member query interval value in seconds. The default interval-value is 1 second.

Parameter	Description
`interval-value`	Required: 1-2, configures MLD last-member-query-interval.



Default interval-value is 1 second. Use the `no ipv6 mld last-member-query-interval` command to set interval-value to the default.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld last-member-query-interval 2
switch(config-if)# no ipv6 mld last-member-query-interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld querier query-max-response-time

`ipv6 mld querier query-max-response-time <response-time>`

Description

This command configures MLD max response time value in seconds. The default max-response-time-value is 10 seconds.

Parameter	Description
`max-response-time-value`	Required: 10-128, configures MLD querier max-response-time. **NOTE:** Default max-response-time-value is 10 seconds. Use the **no ipv6 mld querier query-max-response-time** command to set max-response-time-value to the default.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld query-max-response-time 50
switch(config-if)# no ipv6 mld query-max-response-time
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld robustness

`ipv6 mld robustness <value>`

Description

This command configures MLD robustness. The robustness value represents the number of times the querier retries queries on the connected subnets. The default robustness-value is 2 seconds.

Parameter	Description
`robustness-value`	Required: 1-7, configures MLD robustness.



Default robustness-value is 2 seconds. Use the `no ipv6 mld robustness` command to set robustness-value to the default.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1l/1interface vlan 1
switch(config-if)# ipv6 mld robustness 5
switch(config-if)# no ipv6 mld robustness
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld static-group

`ipv6 mld static-group <multicast-group-ip>`

Description

This command configures MLD static group.

Parameter	Description
`multicast-group-ip`	Required: X:X::X:X, configures MLD static group.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld static-group ff12::c
switch(config-if)# no ipv6 mld static-group ff12::c
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld snooping filter-unknown-mcast

```
ipv6 mld snooping filter-unknown-mcast
no ipv6 mld snooping filter-unknown-mcast
```

Description

Configures the unknown multicast to steal when the MLD snooping is enabled.

The **no** form of this command returns to the default behavior of initial flooding of unknown multicast traffic.

Usage

In the default behavior, the unknown multicast traffic is flooded until the IP Multicast Flow programming is done on the hardware. This is known as initial flooding of unknown multicast. Use this command to filter unknown multicast instead of flooding.



Initial flooding of multicast traffic is observed for a few seconds after the device comes up from a reboot. This issue is only seen when the multicast source connected device is rebooted. Once the device is up after a reboot, it takes a few seconds for the CPU Rx rule to be programmed during the timeframe that the initial flooding is observed. This is an expected behavior.

Example

Configure the unknown multicast to steal globally on IGMP snooping enabled VLANs.

```
switch# configure terminal
switch(config)# ipv6 mld snooping filter-unknown-multicast
```

Removing the configuration of the unknown multicast to steal globally on IGMP snooping enabled VLANs.

```
switch# configure terminal
switch(config)# no ipv6 mld snooping filter-unknown-multicast
```

Command History

Release	Modification
10.11	Command introduced on the 6200, 6300, 6400, 8100, and 8360.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8360	`config`	Administrators or local user group members with execution rights for this command.

ipv6 mld version

```
ipv6 mld version <version>
no ipv6 mld version <version>
```

Description

This command configures MLD version.

The **no** form of this command removes MLD version from the interface.

Parameter	Description
`version`	Required: 1-2, configures MLD version.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld version 2
```

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# no ipv6 mld version 2
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

ipv6 mld version strict

`ipv6 mld version <version> [strict]`

Description

This command configures MLD strict version. Packets that do not match the configured version will be dropped. By default, strict option is not enabled.

Parameter	Description
`version`	Required: 1-2, configures MLD version.

Example

On the 6400 Switch Series, interface identification differs.

```
switch(config)# interface 1/1/1interface vlan 1
switch(config-if)# ipv6 mld version 2 strict
switch(config-if)# no ipv6 mld version 2 strict
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	`config-if`	Administrators or local user group members with execution rights for this command.

Chapter 7
Protocol Independent Multicast - Sparse Mode (V4 and V6)

In a network, IP multicast traffic transmitted for multimedia applications is blocked at routed interface boundaries unless a multicast routing protocol is running. Protocol Independent Multicast (PIM) is a family of routing protocols. It forms multicast trees to forward traffic from multicast sources to subnets which use protocols such as IGMP and MLD to request the traffic.

Protocol Independent Multicast - Sparse Mode (PIM-SM) overview

PIM relies on the unicast routing tables to identify the path back to a multicast source (reverse path forwarding (RPF)). The unicast routing protocols create the unicast routing tables. With this information, PIM sets up the distribution tree for the multicast traffic.

PIM-Sparse Mode (PIM-SM) can be configured on physical ports, VLAN interfaces, LAG interfaces, and loopback interfaces. All such configurations work in the mentioned interfaces context.

IGMP/MLD provides the multicast traffic link between a host and a multicast router running PIM-SM. Both PIM-SM and IGMP/MLD must be enabled on VLANs whose member ports have directly connected hosts with a valid need to join multicast groups.

PIM-SM uses the pull mode for multicast forwarding, and it is suitable for large and medium-sized networks with sparsely and widely distributed multicast group members.

PIM-SM assumes that most hosts do not want to receive multicast traffic. It uses a nonflooding multicast model to direct traffic from the source to the interface when there are multicast receivers in the group. As a result, this model sends traffic only to the routers that specifically request it.

PIM-SM defaults, protocols, and supported configuration

Default configuration

PIM-SM is disabled by default. When PIM-SM is enabled, switching to SPT and LAN prune delay are the default configuration activated.

PIM specification

Complies with PIM-SM specification (RFC 4061).

BSR implementation

Complies with RFC 5059 (scope zones are not supported).

Routing protocol support

PIM uses unicast routing information from any of the routing protocols that are running on the system, such as OSPFv2, OSPFv3, BGP. Static routes are also supported with Nexthop IP addresses.

Max interface support per flow

Up to 127 outbound interfaces (and 1 inbound interface) are supported in the multicast routing table at any given time. The sum of all outbound interfaces across all current flows on a router may not exceed 127.

PIM enabled interfaces (L3 and SVI)

The maximum PIM enabled interface is 1000 with an upper limit of 128 per VRF.

On the Aruba 6200 Switch Series, only 16 PIM enabled interfaces are supported.

IGMP and MLD compatibility

PIM-SM is compatible with IGMP version 2 and version 3, MLD version 1 and version 2, and is fully interoperable with IGMP/MLD for determining multicast flows.

VRRP

PIM-SM is fully interoperable with VRRP to quickly transition multicast routes in a failover.

VRF support

PIM-SM can run on multiple VRF instances in parallel. It is supported on all VRFs supported in the system.

On the Aruba 6200 Switch Series, PIM-SM only runs on the default VRF.

Static RPs count

PIM-SM supports a maximum of eight static RPs per VRF.

PIM-SM router types

Within a PIM-SM domain, PIM-SM routers can be configured to fill one or more of the following roles:

- **Designated router (DR)**: A router performing this function forwards multicast traffic from a unicast source to the appropriate distribution (rendezvous) point.
- **Bootstrap router (BSR)**: A router elected to this function keeps all routers in a PIM-SM domain informed of the currently assigned rendezvous point (RP) for each multicast group currently known in the domain.
- **Rendezvous point (RP)**: A router elected as an RP for a multicast group receives requested multicast traffic from a DR and forwards it toward the multicast receivers requesting the traffic. An RP can be manually configured or dynamically elected through the BSR process.
- **Static RP**: This option forwards traffic in the same way as an RP, but requires manual configuration on all routers in the domain to be effective.
- **Candidate RP (C-RP)**: The C-RP periodically sends advertisement messages to the BSR, which collects RP-set information for RP election. The BSR starts a holdtime timer for a C-RP after it receives an advertisement message. If the BSR does not receive any advertisement message when the timer expires, it considers the C-RP failed or unreachable.

All of these can be enabled on each of several routers in a PIM-SM domain.

DR

In a LAN segment populated by one or more routers running PIM-SM, one such router is elected the DR for that LAN segment. When the DR receives a Join request from a multicast receiver on that LAN segment, it forwards the join toward the router operating as the RP for the requested multicast group.

Where multiple PIM-SM routers exist in a LAN segment, the following criteria is used to elect a DR:

1. The router configured with the highest DR priority in the LAN segment is elected.
2. If multiple routers in the LAN segment are configured with the same DR priority, the router having the highest IP address is elected.

In a given domain, each LAN segment capable of receiving multicast traffic from a unicast source should have at least one DR. (Enabling PIM-SM on a LAN segment automatically enables the router as a DR for that LAN segment.) Because there is an election process for DR on each LAN segment, all routers on a LAN segment must be enabled for DR. Where it is important to ensure that a particular router is elected as the DR for a given LAN segment, you can increase the DR priority on that LAN segment configuration for that router.

If it is necessary to prevent a router from operating as a DR on a given LAN segment, disable DR operation by configuring the DR priority as zero (0).

BSR

Before a DR can forward encapsulated packets for a specific multicast group to an RP, it must know which router in the domain is the elected RP for that multicast group. The BSR function enables this operation by doing the following:

1. Learns the group-to-RP mappings on the C-RPs in the domain by reading the periodic advertisements each one sends to the BSR.
2. Distributes the aggregate Candidate-RP (C-RP) information as an RP-set to the PIM-SM routers in the domain. This is followed by an election to assign a specific multicast group or range of groups to the C-RPs in the domain. The software supports assignment of up to four multicast addresses and/or ranges of multicast addresses to a Candidate Rendezvous Point.

The BSR periodically sends bootstrap messages to the other PIM-SM routers in the domain to maintain and update the RP-set data throughout the domain, and to maintain its status as the elected BSR.

RP

Instead of flooding multicast traffic as is done with PIM-DM, PIM-SM uses a set of multiple routers to operate as RPs. Each RP controls multicast traffic forwarding for one or more multicast groups as follows:

- Receives traffic from multicast sources (S) through a DR.
- Receives multicast joins from routers requesting multicast traffic.
- Forwards the requested multicast traffic to the requesting routers.

The routers requesting multicast traffic are either edge routers or intermediate routers. Edge routers are directly connected to specific multicast receivers using IGMP/MLD to request traffic. Intermediate routers are on the path between edge routers and the RP. This is known as an RP Tree (RPT) where only the multicast address appears in the routing table. For example:

`( *, G )`, where:

`*` = a variable (wildcard) representing the IP address of any multicast source

`G` = a particular multicast group address.



The multicast source and the RP should be on the same VRF.

C-RP

Within a PIM-SM domain, different RPs support different multicast addresses or ranges of multicast addresses. That is, a given PIM-SM multicast group or range of groups is supported by only one active RP, although other C-RPs can also be configured with overlapping or identical support.

A C-RP's group-prefix configuration identifies the multicast groups the RP is enabled to support.

If multiple C-RPs have group-prefixes configured so that any of these RPs can support a given multicast group, then the following criteria are used to select the RP to support the group:

1. The C-RP configured with the longest group-prefix mask applicable to the multicast group is selected to support the group. Step 2 of this procedure applies if multiple RP candidates meet this criterion.
2. The C-RP configured with the highest priority is selected. Step 3 of this procedure applies if multiple RP candidates meet this criterion
3. A hash function (using the configured **bsr-candidate hash-mask-length** value) generates a series of mask length values that are individually assigned to the set of eligible C-RPs. If the hash function matches a single RP candidate to a longer mask length than the other candidates, that candidate is selected to support the group. Apply step 4 of this procedure if the hash function matches the longest mask length to multiple RP candidates.
4. The C-RP having the highest IP address is selected to support the group.

Also, within a PIM-SM domain, a router can be configured as a C-RP available for a given multicast group or range of groups and as the static RP for a given multicast group or range of groups. The recommended practice is to use C-RPs for all multicast groups unless there is a need to ensure that a specific group or range of groups is always supported by the same routing switch.

Loopback, Route Only Port (ROP), and Switched Virtual Interface (SVI) are interfaces that can be configured as RPs. Anycast RP is also supported with the help of MSDP mesh groups.

Static RP

Like C-RPs, static RPs control multicast forwarding of specific multicast groups or ranges of contiguous groups. However, static RPs are not dynamically learned, and increase the configuration and monitoring effort to maintain them. As a result, static RPs are not recommended for use except where one of the following conditions applies:

- It is desirable to designate a specific router interface as a backup RP for specific groups.
- Specific multicast groups are expected, and a static RP would help to avoid overloading a given RP with a high volume of multicast traffic.
- A C-RP for the same groups is less reliable than another RP that would not normally be elected to support the groups.
- Tighter traffic control or a higher priority is desired for specific multicast groups.

How PIM-SM works

PIM-SM (PIM Sparse Mode) assumes that most hosts do not want to receive multicast traffic. It uses a nonflooding multicast model to direct traffic from the source to the interface when there are multicast receivers in the group. As a result, this model sends traffic only to the routers that specifically request it.

In a given PIM-SM domain, routers identified as DRs, RPs, and a BSR participate in delivering multicast traffic to the IP multicast receivers that request it. This approach avoids the flooding method of distributing multicast traffic (employed by PIM-DM) and is best suited for lower bandwidth situations.

The software supports the following operation to enable multicast traffic delivery within a PIM-SM domain:

- From a pool of eligible DR candidates in each LAN segment, one DR is elected for each LAN segment interface having at least one PIM-SM router. In a multinetted domain, this DR supports multicast traffic from a source on any subnet in the LAN segment.
- From a pool of eligible BSR candidates in the domain, one BSR is elected for the entire domain.
- From a pool of eligible C-RPs, one is elected to support each multicast group or range of groups allowed in the domain, excluding any group supported only by static RPs. The multicast groups allowed in the domain are determined by the aggregation of the groups allowed by the individually configured RPs and any static RPs. C-RPs and static RPs can be configured with overlapping support for a given set of multicast groups.

Neighbor discovery

In a PIM domain, each PIM interface on a router periodically multicasts PIM hello messages to all other PIM routers (identified by the address 224.0.0.13 for V4 and ff02::d for V6) on the local subnet. Through the exchanging of hello messages, all PIM routers on the subnet determine their PIM neighbors, maintain PIM neighboring relationship with other routers, and build and maintain shortest path trees (SPTs).

DR election

A designated router (DR) is required on both the source-side network and receiver-side network. A source-side DR acts on behalf of the multicast source to send register messages to the RP. The receiver-side DR acts on behalf of the multicast receivers to send join messages to the RP.

The DR election process is as follows:

1. The routers on the shared-media LAN send hello messages to one another. The hello messages contain the DR priority for DR election. The router with the highest DR priority is elected as the DR.
2. The router with the highest IP address wins the DR election under one of following conditions:
   - All the routers have the same DR election priority.
   - A router does not support carrying the DR priority in hello messages.

If the DR fails, its PIM neighbor lifetime expires and the other routers will initiate to elect a new DR.

Rendezvous point tree (RPT)

When a DR in a VLAN receives traffic for a particular multicast group from a source on that VLAN, the DR encapsulates the traffic and forwards it to the RP elected to support that multicast group. The RP decapsulates the traffic and forwards it on toward the multicast receivers requesting that group. This forms an RPT extending from the DR through any intermediate PIM-SM routers leading to the PIM-SM edge routers for the multicast receivers requesting the traffic. (If the RP has no current join requests for the group, the traffic is dropped at the RP.)

Shortest path tree (SPT)

SPTs are especially useful in high data-rate applications where reducing unnecessary traffic concentrations and throughput delays are significant. In the default PIM-SM configuration, SPT operation is automatically enabled.

In the default PIM-SM configuration, after an edge router receives the first packet of traffic for a multicast group requested by a multicast receiver on that router, it uses Reverse Path Forwarding (RPF) to learn the shortest path to the group source. The edge router then stops using the RPT and begins using the shortest path tree (SPT) connecting the multicast source and the multicast receiver. In this case, when the edge router begins receiving group traffic from the multicast source through the SPT, it

sends a prune message to the RP tree to terminate sending the requested group traffic on that route. (This results in entries for both the RP path and the STP in the routing table.) When completed, the switchover from the RPT to a shorter SPT can reduce unnecessary traffic concentrations in the network and reduce multicast traffic throughput delays.

The switchover from RPT to SPT is not instantaneous. For a short period, packets for a given multicast group may be received from both the RPT and the SPT. Also, in some topologies, the RPT and SPT to the same edge router may be identical.

Reverse Path Forward

Reverse Path Forward (RPF) checking is a core multicast routing mechanism that ensures that multicast traffic received arrived on the expected router interface before it is considered for further processing. If the RPF check fails for a multicast packet, the packet is discarded.

For traffic arriving on the SPT, the expected incoming interface for a given source/group multicast flow is the interface towards the source address of the traffic (as determined by the unicast routing system). For traffic arriving on the RP tree, the expected incoming interface is the interface towards the RP. PIM must be enabled on all paths where the unicast route points an ECMP path to the source.

RPF override is a feature that allows the override of the normal RPF lookup mechanism and indicates to the router that it may accept multicast traffic on an interface other than that which would be normally selected by the RPF lookup mechanism. This includes accepting traffic from a source directly connected to the router when the source IP address is invalid for the subnet or VLAN to which it is connected. Traffic may also be accepted from a valid PIM neighbor that is not on the reverse path towards the source of the received multicast traffic.

RPF checking is applied to all multicast traffic and is significant in preventing network loops. Up to eight manual RPF overrides can be specified.

The RPF-address indicates one of two distinct RPF candidates:

1. A valid PIM neighbor address from which forwarded multicast traffic is accepted with a source address of <*source-addr/src-mask*>. A valid PIM neighbor with should exists and mandatory for RPF-address option to work. PIM join will be sent towards that next-hop and data traffic will be forwaded from the upstream links. rpf-override may not work in absence of valid PIM neighbor. An alias CLI command 'ip mroute' to 'rpf-override' configuration command described in below section can also be used alternatively.
2. A local PIM-enabled interface to which <source-addr/src-mask> is directly connected. With this entry the local router will treat the flow as directly connected and route it if there are any joins. Interface name is typically used when a source from different subnet is directly connected to the given interface. The normal RPF lookup would otherwise fail for this and won't route it. Since the RPF entry doesn't point to any specific PIM neighbor under the interface, PIM will not send join towards upstream. So it must be noted that this option will work only when the source traffic is directly connected on same router where it is configured.

Enabling/disabling PIM-SM in an interface

Prerequisites

You must be in the interface configuration context, as indicated by the **switch(config-if)#** prompt, **switch(config-if-vlan)#** prompt, or **switch(config-lag-if)#** prompt.

Procedure

Enable or disable PIM-SM in an interface using the following command.

For example, the following command enables PIM-SM on interface vlan40:

For IPv4 configurations:

```
ip pim-sparse {enable|disable}
```

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip address 40.0.0.4/24
switch(config-if-vlan)# ip pim-sparse enable
```

For IPv6 configurations:

```
ipv6 pim6-sparse {enable|disable}
```

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip address 2001::01/64
switch(config-if-vlan)# ipv6 pim6-sparse enable
```

The `no` form of the command disables PIM-SM in an interface.

Configuring PIM-SM options in an interface

You can configure various PIM-SM options in an interface as described in the following steps.

Prerequisites

You mustce configuration context, as indicated by the `switch(config-if)#` prompt, `switch(config-if-vlan)#` prompt, or `switch(config-lag-if)#` prompt.

Procedure

1. Configure the frequency at which the router transmits PIM hello messages on the current interface using the following command.

   For IPv4 configurations:

   ```
   ip pim-sparse hello-interval <INTERVAL-VALUE>
   ```

   For example, the following command sets the V4 hello interval to 60 seconds on the 1/1/4 interface:

   ```
   switch(config)# interface 1/1/4
   switch(config-if)# ip pim-sparse hello-interval 60
   ```

   For IPv6 configurations:

   ```
   ipv6 pim6-sparse hello-interval <INTERVAL-VALUE>
   ```

   For example, the following command sets the V6 hello interval to 60 seconds on the 1/1/4 interface:

   ```
   switch(config)# interface 1/1/4
   switch(config-if)# ipv6 pim6-sparse hello-interval 60
   ```

2. Change the maximum time before the router transmits the initial PIM hello message on the interface using the following command.

For IPv4 configurations:

```
ip pim-sparse hello-delay <DELAY-VALUE>
```

For example, the following command sets the hello delay to 4 seconds on the VLAN40 interface:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip pim-sparse hello-delay 4
```

For IPv6 configurations:

```
ipv6 pim6-sparse hello-delay <DELAY-VALUE>
```

For example, the following command sets the hello delay to 4 seconds on the VLAN40 interface:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 pim6-sparse hello-delay 4
```

3. Specify the priority value to use on the interface in the Designated Router (DR) election process using the following command.

   For IPv4 configurations:

   ```
   ip pim-sparse dr-priority <PRIORITY-VALUE>
   ```

   For example, the following command sets the DR priority to 4444 on the VLAN40 interface:

   ```
   switch(config)# interface vlan40
   switch(config-if-vlan)# ip pim-sparse dr-priority 4444
   ```

   For IPv6 configurations:

   ```
   ipv6 pim6-sparse dr-priority <PRIORITY-VALUE>
   ```

   For example, the following command sets the DR priority to 4444 on the VLAN40 interface:

   ```
   switch(config)# interface vlan40
   switch(config-if-vlan)# ipv6 pim6-sparse dr-priority 4444
   ```

4. Enable the LAN prune delay option on the interface using the following command.

   For IPv4 configurations:

   ```
   ip pim-sparse lan-prune-delay
   ```

   For IPv6 configurations:

   ```
   ipv6 pim6-sparse lan-prune-delay
   ```

5. Configure the value inserted into the Override Interval field of a LAN Prune Delay option on the interface using the following command.

   For IPv4 configurations:

   ```
   ip pim-sparse override-interval <INTERVAL-VALUE>
   ```

   For example, the following command sets the override interval value to 4000 ms on interface VLAN40:

   ```
   switch(config)# interface vlan40
   switch(config-if-vlan)# ip pim-sparse override-interval 4000
   ```

   For IPv6 configurations:

```
ipv6 pim6-sparse override-interval <INTERVAL-VALUE>
```

For example, the following command sets the override interval value to 4000 ms on interface VLAN40:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 pim6-sparse override-interval 4000
```

6. Configure the propagation delay value inserted into the LAN Prune Delay option on the interface using the following command.

   For IPv4 configurations:

   ```
   ip pim-sparse propagation-delay <DELAY-VALUE>
   ```

   For example, the following command sets the propagation delay value to 400 ms on interface VLAN40:

   ```
   switch(config)# interface vlan40
   switch(config-if-vlan)# ip pim-sparse propagation-delay 400
   ```

   For IPv6 configurations:

   ```
   ipv6 pim6-sparse propagation-delay <DELAY-VALUE>
   ```

   For example, the following command sets the propagation delay value to 400 ms on interface VLAN40:

   ```
   switch(config)# interface vlan40
   switch(config-if-vlan)# ipv6 pim6-sparse propagation-delay 400
   ```

7. Configure the source IP address to be used in PIM packets transmitted from the interface using the following command.

   For IPv4 configurations:

   ```
   ip pim-sparse ip-addr {<IP-ADDR-VALUE> | any}
   ```

   For example, the following command specifies the IPv4 address 40.0.0.4:

   ```
   switch(config)# interface vlan40
   switch(config-if-vlan)# ip pim-sparse ip-addr 40.0.0.4
   ```

   For IPv6 configurations:

   ```
   ipv6 pim6-sparse ipv6-addr {<IPv6-ADDR-VALUE> | any}
   ```

   For example, the following command specifies the IPv6 address 2001::02:

   ```
   switch(config)# interface vlan40
   switch(config-if-vlan)# ipv6 pim6-sparse ipv6-addr 2001::02
   ```

Viewing PIM information

For some commands, you can specify viewing information by interface or VRF.

Prerequisites

Use these show commands from the Operator (>) or Manager (#) context.

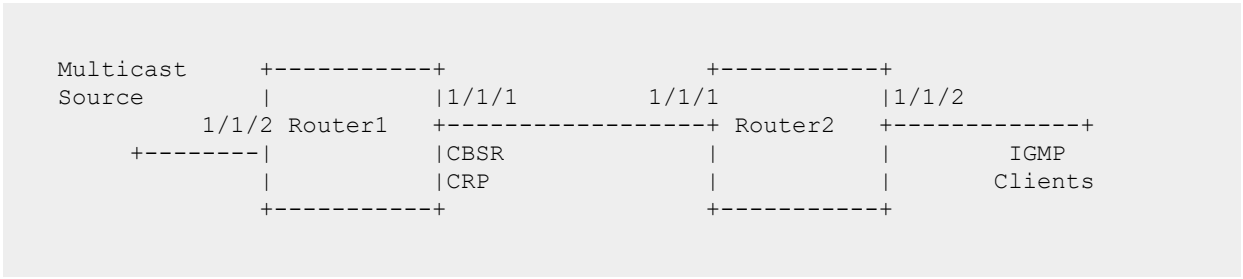
Procedure

1. To display PIM information for an IPv4 configuration, use the following show commands.
   - To view PIM router information, use: **show ip pim**.
   - To view information about the PIM interfaces configured on the router, use: **show ip pim interface**.
   - To view information about a PIM interface, use: **show ip pim interface <INTERFACE-NAME>**.
   - To view PIM packet counter information for an interface, use: **show ip pim interface <INTERFACE-NAME> counters**.
   - To view PIM neighbor information, use: **show ip pim neighbor**.
   - To view RP information, use: **show ip pim rp-set**.
   - To view information for statically configured RP assignments, use: **show ip pim rp-set static**.
   - To view information for dynamically learned RP assignments, use: **show ip pim rp-set learned**.
   - To view candidate RP information, use: **show ip pim rp-candidate**.
   - To view information about BSR candidates in the domain, use: **show ip pim bsr**.
   - To view information about BSR candidates on the local router, use: **show ip pim bsr local**.
   - To view information about the elected BSR in the domain, use: **show ip pim bsr elected**.
   - To view the RPF override configuration, use: **show ip pim rpf-override**.
   - To view RPF override configuration for a source, use: **show ip pim rpf-override source**.
   - To view pending joins on a PIM router, use: **show ip pim pending**.
   - To view multicast routing information, use: **show ip mroute** or use **show ip mroute brief**.
   - To view multicast routing information for a group address, use: **show ip mroute <GROUP-ADDR>**.
2. To display PIM information for an IPv6 configuration, use the following show commands.
   - To view PIM router information, use: **show ipv6 pim6**.
   - To view information about the PIM interfaces configured on the router, use: **show ipv6 pim6 interface**.
   - To view information about a PIM interface, use: **show ipv6 pimv6 interface <INTERFACE-NAME>**.
   - To view PIM neighbor information, use: **show ipv6 pim6 neighbor**.
   - To view RP information, use: **show ipv6 pim6 rp-set**.
   - To view information for statically configured RP assignments, use: **show ipv6 pim6 rp-set static**.
   - To view information for dynamically learned RP assignments, use: **show ipv6 pim6 rp-set learned**.
   - To view candidate RP information, use: **show ipv6 pim6 rp-candidate**.
   - To view information about BSR candidates in the domain, use: **show ipv6 pim6 bsr**.
   - To view information about BSR candidates on the local router, use: **show ipv6 pim6 bsr local**.
   - To view information about the elected BSR in the domain, use: **show ipv6 pim6 bsr elected**.
   - To view the RPF override configuration, use: **show ipv6 pim6 rpf-override**.
   - To view RPF override configuration for a source, use: **show ipv6 pim6 rpf-override source**.
   - To view pending joins on a PIM router, use: **show ipv6 pim6 pending**.

- To view multicast routing information, use: **show ipv6 mroute** or use **show ipv6 mroute brief**.
- To view multicast routing information for a group address, use: **show ipv6 mroute <GROUP-ADDR>**.

PIM-SM configuration example

The following is a sample topology diagram for a PIM-SM configuration.



In this topology, the multicast source is connected to Router1 and Clients are connected to Router2.

Router1 and Router2 are directly connected so you can verify the neighborship using the **show ip pim neighbor** command.

Router1 interface 1/1/1 is the BSR candidate and RP candidate in this domain. This information needs to be propagated across the network and needs to be consistent on all routers in the topology. To verify this, use the **show ip pim rp-set** command for group mapping information and the **show ip pim bsr** command for elected BSR information. If they show inconsistent information, you could see possible multicast outages.

If the joins are seen by the routers before the streams can flow, both routes will display those requests in the **show ip pim pending** command output.

Once the multicast source streams start to flow, each router in the path will add multicast router (mroute) entries, which can be verified using the `show ip mroute` command.

The output of the following **show running-config** command shows an example of PIM-SM configuration for IPv4.

```
switch# show running-config
Current configuration:
!
!
!
!
!
Router1
---------------

router ospf 1
    redistribute connected
    area 0.0.0.0
router pim
    enable
    bsr-candidate source-ip-interface 1/1/1
    rp-candidate source-ip-interface 1/1/1
    rp-candidate group-prefix 224.0.0.0/4
interface 1/1/1
    ip address 10.10.10.1/24
```

```
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface 1/1/2
    ip address 20.20.20.1/24
    ip pim-sparse enable


Router2
---------------
router ospf 1
    redistribute connected
    area 0.0.0.0
router pim
    enable
interface 1/1/1
    ip address 10.10.10.2/24
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface 1/1/2
    ip address 30.30.30.1/24
    ip pim-sparse enable
    ip igmp enable
```

The output of the following **show running-config** command shows an example of PIM-SM configuration for IPv6.

```
switch# show running-config
Current configuration:
!
!
!
!
!
Router1
---------------
router ospfv3 1
redistribute connected
area 0.0.0.0

router pim6
bsr-candidate source-ip-interface loopback1
rp-candidate source-ip-interface loopback1
rp-candidate group-prefix ff00::/8
enable


interface loopback 1
ipv6 address 1000::1000/64
ipv6 ospfv3 1 area 0.0.0.0
ipv6 pim6-sparse enable

interface 1/1/1
ipv6 address 2000::1/64
ipv6 ospfv3 1 area 0.0.0.0
ipv6 pim6-sparse enable

interface 1/1/2
ipv6 address 4000::1/64
ipv6 pim6-sparse enable

Router2
```

```
---------------
router ospfv3 1
redistribute connected
area 0.0.0.0

router pim6
enable

interface 1/1/1
ipv6 address 2000::2/64
ipv6 ospfv3 1 area 0.0.0.0
ipv6 pim6-sparse enable

interface 1/1/2
ipv6 address 5000::1/64
ipv6 pim-sparse enable
ipv6 mld enable
```

PIM-SM configuration task list

Tasks at a glance.

Required Commands

- Enabling or Disabling PIM Globally
- Enabling/disabling PIM-SM in an interface
- Configuring an RP
- Configuring a BSR

Optional Commands

- Configuring BFD on all interfaces
- Configuring BFD on a single interface
- Configuring IP multicast boundary
- Configuring Join/Prune Interval
- Configuring RPF Override
- Enabling/disabling multicast traffic to SPT
- Enabling/Disabling PIM-SM in an Interface
- Configuring PIM-SM Options in an Interface
- Removing all PIM-SM related configurations on an interface
- Viewing PIM information
- PIM VSX active-active

Enabling or disabling PIM globally

Prerequisites

You must be in the PIM configuration context, as indicated by the **switch(config-pim)#** prompt for IPv4 or the **switch(config-pim6)#** prompt for IPv6.

Procedure

Enable PIM globally on a router using the following command.

```
enable
```

For example, the following command enables PIM globally:

For IPv4 configurations:

```
switch# configure terminal
switch(config)# router pim
switch(config-pim)#
```

For IPv6 configurations:

```
switch# configure terminal
switch(config)# router pim6
switch(config-pim6)# enable
```

You can enable PIM globally and enable PIM-SM at the interface level. When PIM-SM is not enabled on the interface, irrespective of the global PIM status, unknown multicast traffic does not get routed. When PIM-SM is enabled on the interface, multicast traffic is routed to the interface where there are clients joined, provided PIM is enabled globally.

Use the **disable** command to disable PIM globally on a router. You could use this command to temporarily disable PIM globally without removing the individual interface configuration.

Configuring join/prune interval

Configure the interval at which the router will send periodic PIM-SM join or prune interval messages.

Prerequisites

You must be in the PIM configuration context, as indicated by the `switch(config-pim)#` prompt for IPv4 or the **switch(config-pim6)#** prompt for IPv6.

Procedure

Configure the join/prune interval using the **join-prune-interval *<INTERVAL-VALUE>*** command.

For example, the following commands set the join/prune interval to 400 seconds:

For IPv4 configurations:

```
switch# configure terminal
switch(config)# router pim
switch(config-pim)# join-prune-interval 400
```

For IPv6 configurations:

```
switch# configure terminal
switch(config)# router pim6
switch(config-pim6)# join-prune-interval 400
```

The **no** form of the command sets the interval to the default of 60 seconds.

Enabling/disabling multicast traffic to SPT

Switching to SPT is enabled by default.

Prerequisites

You must be in the PIM configuration context, as indicated by the **switch(config-pim)#** prompt for IPv4 or the **switch(config-pim6)#** prompt for IPv6.

Procedure

Enable or disable the router's ability to switch multicast traffic flows to the Shortest Path Tree (SPT) using the **spt-threshold** command.

For example, the following command enables switching traffic flows to the SPT:

For IPv4 configurations:

```
switch(config)# router pim
switch(config-pim)#
```

For IPv6 configurations:

```
switch(config)# router pim6
switch(config-pim6)# spt-threshold
```

Configuring an RP

An RP can be manually configured (static RP) or dynamically elected through the Bootstrap Router (BSR) mechanism (Candidate RP or C-RP).

Prerequisites

You must be in the PIM configuration context, as indicated by the **switch(config-pim)#** prompt for IPv4 or the **switch(config-pim6)#** prompt for IPv6.

- A Rendezvous Point (RP) can provide services for multiple or all multicast groups. However, only one RP can forward multicast traffic for a multicast group at a time.
- For a large-scaled PIM network, configuring static RPs is a tedious job. Generally, static RPs are backups for dynamic RPs to enhance the robustness and operational manageability on a multicast network.
- When configuring a static RP, you must configure the same static RP on all routers in the PIM-SM domain.
- When you configure a Candidate RP (C-RP), reserve a relatively large bandwidth between the C-RP and other devices in the PIM-SM domain.

Procedure

1. Configure a static RP using the following command.

   ```
   rp-address <IP-ADDR> [<GRP-ADDR/GRP-MASK>] [override]
   ```

   For example, the following command configures a static RP of 40.0.0.8 for the multicast group:

   For IPv4 configurations:

   ```
   switch(config)# router pim
   switch(config-pim)# rp-address 40.0.0.8 226.0.0.4/24
   ```

For IPv6 configurations:

```
switch(config)# router pim6
switch(config-pim6)# rp-address 2002::02 ff08::1:4/64
```

2. Configure a C-RP using the following command.

   `rp-candidate source-ip-interface <INTERFACE-NAME> [group-prefix <GRP-ADDR/GRP-MASK>]`

   For example, the following command configures a C-RP using loopback1 as the source for the C-RP router IP address and associates the multicast group with the C-RP router:

   For IPv4 configurations:

   ```
   switch(config)# router pim
   switch(config-pim)# rp-candidate source-ip-interface loopback1 group-prefix
   230.0.0.4/24
   ```

   For IPv6 configurations:

   ```
   switch(config)# router pim6
   switch(config-pim6)# rp-candidate source-ip-interface loopback1 group-prefix
   ff08::1:3/64
   ```

   For a C-RP, you can configure various options as shown in the following steps. C-RP can be configured on an SVI or ROP interface also.

3. Add or remove multicast groups for the C-RP, as needed, using the following command.

   `rp-candidate group-prefix <GRP-ADDR/GRP-MASK>`

   For example, the following commands configure a C-RP using VLAN 40 as the source for the C-RP router IP address and then adds the multicast group to the C-RP:

   For IPv4 configurations:

   ```
   switch(config)# router pim
   switch(config-pim)# rp-candidate source-ip-interface vlan40
   switch(config-pim)# rp-candidate group-prefix 230.0.0.4/24
   ```

   For IPv6 configurations:

   ```
   switch(config)# router pim6
   switch(config-pim6)# rp-candidate source-ip-interface vlan40
   switch(config-pim6)# rp-candidate group-prefix ff08::1:3/64
   ```

4. Configure the hold-time a C-RP includes in its advertisements to the BSR using the following command.

   `rp-candidate hold-time <TIME-VALUE>`

   For example, the following command sets the hold-time to 250 seconds:

   For IPv4 configurations:

```
switch(config)# router pim
switch(config-pim)# rp-candidate hold-time 250
```

For IPv6 configurations:

```
switch(config)# router pim6
switch(config-pim6)# rp-candidate hold-time 250
```

4. Set the priority for a C-RP using the following command.

   `rp-candidate priority <PRIORITY-VALUE>`

   For example, the following command sets the priority to 250:

   For IPv4 configurations:

   ```
   switch(config)# router pim
   switch(config-pim)# rp-candidate priority 250
   ```

   For IPv6 configurations:

   ```
   switch(config)# router pim6
   switch(config-pim6)# rp-candidate priority 250
   ```

Configuring a BSR

Configure the router to advertise itself as the Candidate Bootstrap Router (Candidate-BSR) for the PIM-SM domain.

Prerequisites

You must be in the PIM configuration context, as indicated by the **switch(config-pim)#** prompt for IPv4 or the **switch(config-pim6)#** prompt for IPv6.

PIM-SM must be enabled on the interface used as the source IP interface.

Procedure

1. Configure a Candidate-BSR using the following command.

   `bsr-candidate source-ip-interface <INTERFACE-NAME>`

   For example, the following command configures a Candidate-BSR using interface 1/1/4 as the source for the router IP address. This command can also be applied to an L3 VLAN or L3 LAG. (L3 LAG is not supported on the Aruba 6200 Switch Series.)

   For IPv4 configurations:

   ```
   switch(config)# router pim
   switch(config-pim)# bsr-candidate source-ip-interface 1/1/4
   ```

For IPv6 configurations:

```
switch(config)# router pim6
switch(config-pim6)# bsr-candidate source-ip-interface 1/1/4
```

Candidate-BSR can be enabled on a loopback interface as well. For a Candidate-BSR, you can configure various options as shown in the following steps.

2. Configure the bootstrap message (BSM) interval for sending periodic RP-Set messages using the following command.

   ```
   bsr-candidate bsm-interval <INTERVAL-VALUE>
   ```

   For example, the following command configures a bootstrap message interval of 150 seconds:

   For IPv4 configurations:

   ```
   switch(config)# router pim
   switch(config-pim)# bsr-candidate bsm-interval 150
   ```

   For IPv6 configurations:

   ```
   switch(config)# router pim6
   switch(config-pim6)# bsr-candidate bsm-interval 150
   ```

3. Set the priority to apply to the router when a BSR election process occurs in the PIM-SM domain using the following command.

   ```
   bsr-candidate priority <PRIORITY-VALUE>
   ```

   For example, the following command configures the priority as 250:

   For IPv4 configurations:

   ```
   switch(config)# router pim
   switch(config-pim)# bsr-candidate priority 250
   ```

   For IPv6 configurations:

   ```
   switch(config)# router pim6
   switch(config-pim6)# bsr-candidate priority 250
   ```

2. Configure the length (in bits) of the hash-mask using the following command. Used to control the distribution of multicast groups among the C-RP in a domain where there is overlapping coverage of the groups among the RPs.

   ```
   bsr-candidate hash-mask-length <LENGTH-VALUE>
   ```

   For example, the following command configures the hash-mask length to 4:

   For IPv4 configurations:

   ```
   switch(config)# router pim
   switch(config-pim)# bsr-candidate hash-mask-length 4
   ```

For IPv6 configurations:

```
switch(config)# router pim6
switch(config-pim6)# bsr-candidate hash-mask-length 4
```

Configuring RPF override

Configure Reverse Path Forward (RPF) override to allow the override of the normal RPF lookup mechanism, indicating to the router that it may accept multicast traffic on an interface other than the one that would normally be selected by the RPF lookup mechanism.

RPF checking ensures that multicast traffic received arrived on the expected router interface before it is considered for further processing. If the RPF check fails for a multicast packet, the packet is discarded.

RPF override entry gets precedence over routes learned from routing protocols or static routes. It must also be noted that PIM will not switch to an alternate path if the configured RPF neighbor is not reachable.

Prerequisites

You must be in the PIM configuration context, as indicated by the **switch(config-pim)#** prompt for IPv4 or the **switch(config-pim6)#** prompt for IPv6.

Procedure

Add, edit, or delete RPF overrides using the following command.

`rpf-override <SRC-ADDR/SRC-MASK><RPF-ADDR|INTERFACE-NAME>`

For IPv4 configurations:

```
switch(config)# router pim
switch(config-pim)# rpf-override 40.0.0.4/24 30.0.0.4
```

For IPv6 configurations:

```
switch(config)# router pim6
switch(config-pim6)# rpf-override 50::4/24 40::1
```

Removing all PIM-SM related configurations on an interface

Prerequisites

You must be in the interface configuration context, as indicated by the **switch(config-if)#** prompt, **switch(config-if-vlan)#** prompt, or **switch(config-lag-if)#** prompt.

Procedure

Remove all PIM-SM related configurations for the interface using the following command.

For IPv4 configurations:

`no ip pim-sparse`

For IPv6 configurations:

`no ipv6 pim6-sparse`

PIM VSX active-active

Not supported on the 6200 and 6300 Switch Series.

The PIM active-active solution makes one of the VSX devices act as DR and other device as proxy-DR for each of the downstream VLANs. Both the VSX peers behave the same as far as the protocol is concerned with only the DR forwarding the multicast traffic to downstream routers. The PIM active-active feature is enabled on VSX devices connected to access switches on one side with hosts behind the access switches. The DR election depends on the IP address and a single VSX device doesn't be the DR for all of the downstream VLANs.

When a VSX device which is acting as DR for some of the downstream VLANs starts rebooting, traffic loss would be seen for the multicast streams in those downstream VLANs for few seconds. The VSX software upgrade process involves rebooting each VSX device with new software. The secondary VSX device is upgraded before primary VSX device. If the secondary is acting as DR for some of downstream VLANs then after the VSX software upgrade is triggered multicast traffic loss will be seen twice for the streams present in those VLANs; once during secondary VSX device reboot and then during primary VSX device reboot.

With VSX graceful shutdown, traffic loss is not seen for any of multicast streams. Instead, some duplicates are expected for 1-3 seconds for each stream.

The sequence of events during each VSX device upgrade is outlined below:

1. The first step is based on device role and is applicable only to the primary device. According to VSX software upgrade process, the device upgrade is triggered in the primary after the secondary upgrade. The secondary should already have all the multicast routes before taking over the DR role from the primary. After the secondary device reboots the primary device waits for few minutes so that the secondary learns the multicast routes and is ready to take over the DR role. The wait time in primary device depends on the number of multicast routes present.
2. DR roles of all the downstream VLANs are offloaded to its peer. At the end of this step the device which is going to reboot will be a proxy-DR for all the downstream VLANs.
3. After the interface role change, each multicast flow in the hardware is changed simultaneously in both the DR and proxy-DR based on the new roles they have taken. The new DR converts bridge entries to route entries and the proxy-DR converts route entries to bridge entries in the hardware.

The wait times for the primary upgrade before multicast graceful shutdown process starts are listed below:

Number of MRoutes	Timer value
0	0
< 1024	120 seconds
< 2048	150 seconds
< 4096	210 seconds
< 8192	300 seconds
< 16284	360 seconds
> 16384	480 seconds

The recommended configurations for VSX graceful shutdown are as follows:

1. The VSX graceful shutdown feature is only applicable when PIM active-active is enabled.
2. If OSPF v2/v3 is enabled, it is recommended not to configure the VSX device as OSPF v2/v3 DR for any of the interfaces. Use following commands to configure the other routers as DR for an interface:
   ```
   ip ospf priority <0-255>
   ipv6 ospfv3 priority <0-255>
   ```
3. If BGP is enabled, it is recommended to increase BGP graceful restart timer for every BGP-enabled interface. The recommended value of BGP graceful restart timer should be the same as the wait time in the primary before the multicast graceful shutdown process starts. Refer to the table in previous section which mentions the wait times. Use following command to reconfigure the BGP graceful restart timer:
   ```
   bgp graceful restart restart-time <1-3600>
   ```
4. During VSX upgrade or querier reboot, traffic loss is seen due to the querier and joins time-out. To prevent this traffic loss, mgmd querier-offload feature must be enabled. Use the following command to configure the mgmd querier-offload feature. This feature is enabled by default.
   ```
   mgmd querier-offload
   ```

For information on this feature, see the related video on the Aruba AirHeads Broadcasting Channel.

PIM Active-Active configuration is not recommended when downstream connectivity is not via a VSX LAG.

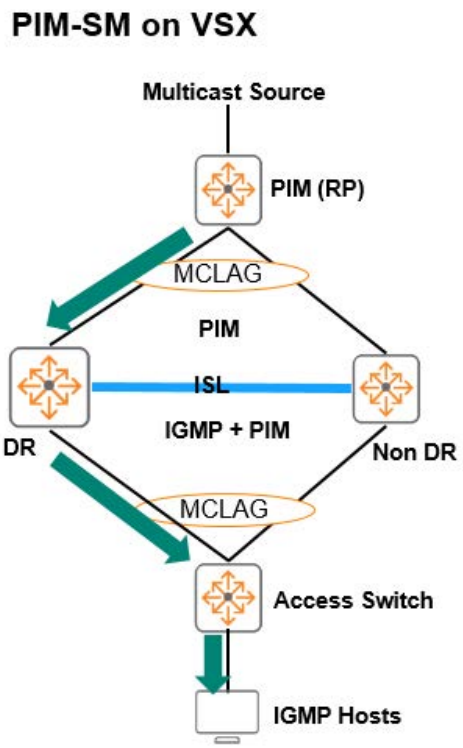
PIM Active-Active is not supported on overlay VXLAN SVIs.

PIM-SM Active-Active with VSX

Traditional PIM-SM and VSX

Similar to VLANs, PIM can also be enabled on a VSX pair. In a VSX deployment, both the Routers in a VSX pair operate as independent PIM Routers and share the same VLAN segment. Hosts are typically connected on the client VLANs, with one functioning as the Designated Router (DR) and the other remaining as a Non-DR. DRs are responsible for sending the respective PIM Joins towards the RP and then to the Source. Next, the DR receives the data via the RP Tree (RPT) and, subsequently, via the Source Tree (SPT). The DR then forwards the traffic downstream. Figure 1, Traditional PIM-SM with VSX shows the DR Joins interacting with the Source Tree by sending PIM Joins towards the upstream Route. This causes traffic to flow from the Source to the DR, with the exception of the Non-DR router.

Figure 1 *Traditional PIM-SM with VSX*



When the DR goes down, the peer VSX router takes on the DR role for the default 105-second neighbor hold time value. Once the time expires, the new DR router joins the SPT and sends PIM Joins towards the source.

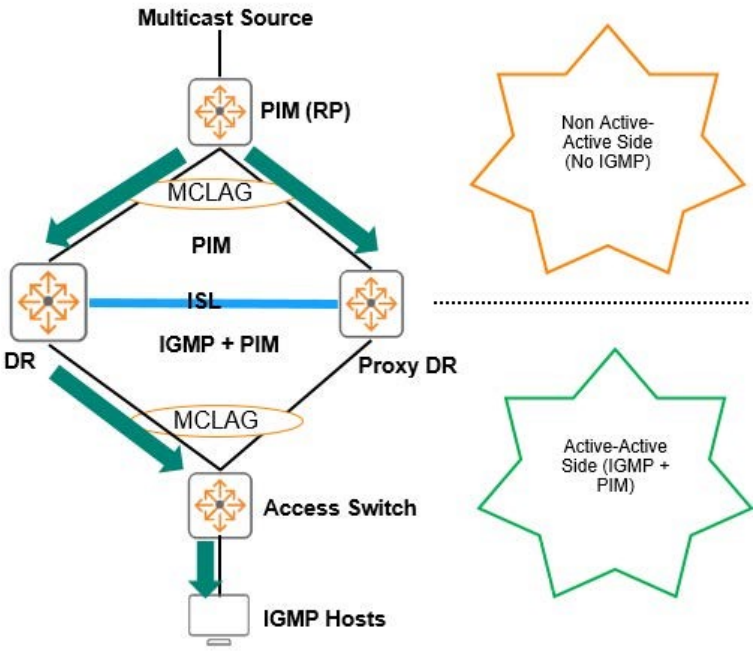
Delays are probable if multiple hops are required to reach the source or if there are multiple streams to send joins.

During a delay, the new DR router takes on the neighbor's expired time along with additional SPT time that was built to serve the clients. Total rebuild time to get traffic flowing normally is approximately two minutes. To improve traffic recovery time, enable Active-Active.

PIM Active-Active DR and Proxy DR

With Active-Active support, both the VSX Joins - RPT and SPT improve the traffic recovery time for device/ISL failure. Both routers internally operate as the DR router and pre-build the RPT and SPT towards the source, The router then receives the traffic via the RPT's and SPT's respective upstream link. The difference is that only one of the routers forwards the traffic to the downstream clients, while the other router receives the data on its upstream interface but will not forward to the clients. This is called the Proxy DR router.

Figure 2 *PIM VSX DR and ProxyDR*



In Figure 2, PIM VSX DR and ProxyDR, traffic is received via two streams: 1) DR and Proxy DR, and 2) Router Joins and RPT/SPT when the IGMP hosts requests the stream. Make sure to enable the PIM Active-Active feature per every VRF and IP version. The DR and Proxy DR roles are only applicable to the downstream VLANS that are connected to the Host side.Enable the PIM and IGMP (ip igmp) on both pairs of the VSX router's VLANs towards the clients.

The VLAN's towards the source side (non-Active-Active side) does not run the Active-Active feature, thus, the ProxyDR role is not applicable.

Additional bandwidth is required when the upstream is connected via ROP instead of MCLAG due to both routers potentially selecting different upstream interfaces. For this reason, ROP and ECMP uplinks require total availability for both VSX pairs traveling upstream to assist with possible router and/or uplink failures.

Active-Active feature is only available for Hosts on downstream MCLAGs and not for Sources.

The purpose of Active-Active is to build first hop redundancy for the Hosts. Active-Active is often confused with Active Forwarding of unicast and is enabled at all the legs of a multicast network.

The Active-Forwarding feature should only be applied when DR and Non-DR streams are consistent, which is solely the case for First Hop Routers.

PIM DR Failure

The Proxy DR router monitors the ISL state and can identify DR router failure. Because the Proxy DR router is pre-equipped with the source tree, when failure happens, the Proxy DR router takes over the DR role and immediately begins flowing traffic to the hosts via the SPT uplinks. Traffic then starts flowing from the Proxy DR router, maintaining potential outage at a minimal.

Minimal, subsecond outage is expected due to adjustment period required for the new DR router to detect the ISL down state.

When the failed router returns to normalcy, it then take the Proxy DR role and builds its respective RPT and SPT. There won't be any traffic outage if the failed router is the Proxy DR, since the DR router is taking on its actual role.

There will not be a role change again when the failed DR comes back online.

Figure 3 *PIM DR Failure*

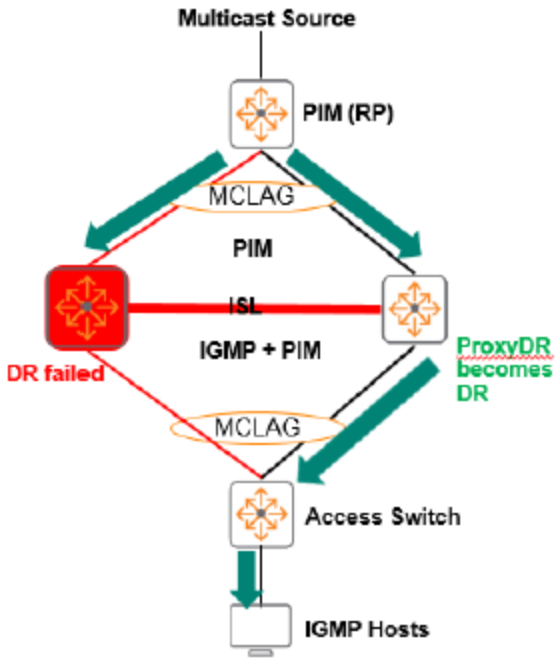
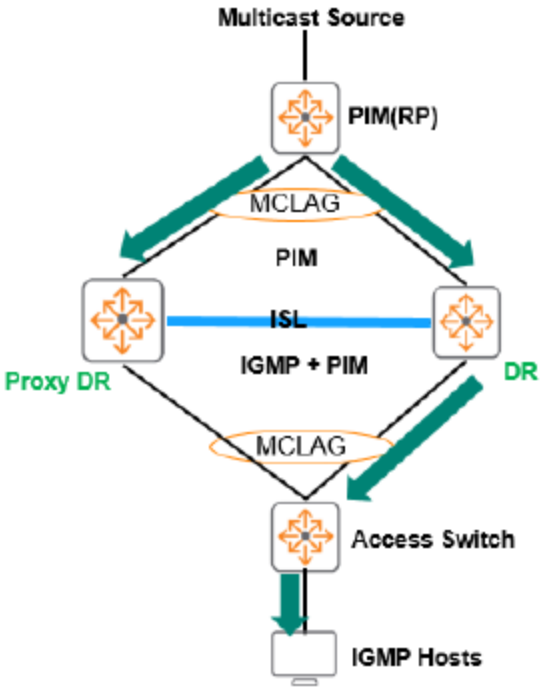


Figure 4 *ProxyDR takes DR role*



Traffic impact during ISL Failure

When the ISL link fails, the VSX uses Keepalive (a split detect mechanism) to detect ISL failure and block the MCLAG links on the secondary switch. PIM-specific examples:

1. Primary functions as DR and Secondary as Proxy DR.

   As the ISL goes out of sync, the Proxy DR router takes the DR role. In this scenario, both Primary and Secondary switches operate as independent split routers and forward the traffic to hosts, functioning as the DR router. Two traffic streams are visbile during this time. However, VSX uses the Keepalive mechanism to detect and block the secondary link. The secondary router then blocks both its uplinks and downlinks, becoming isolated. When the ISL returns, the Primary switch continues to use the DR role and the secondary assumes the Proxy DR role.
2. Primary functions as Proxy DR and Secondary as DR.

   Both Primary and Secondary take the DR role until the Keepalive mechanism takes effect and blocks the secondary links. Two traffic streams are visbile during this time. Similar to example 1, when the ISL returns, the Primary retains the Proxy DR role and Secondary takes the DR role.

KeepAlive link

Do not enable PIM on Keepalive links if Active-Active is in use. When PIM is enabled on Keepalive links, the Proxy DR or DR router may select the Keepalive link as its uplink towards the source, depending on the unicast path, and cause router or link failure.

IGMP and active-active

The PIM Active-Active feature is applicable to the VSX pairs where the clients are directly attached. DR and ProxyDR roles are only applicable on the VLANS where IGMP is enabled. Any other upstream router failures towards the source recovers at a normal rate.

DR Roles on VSX multi-tier deployments

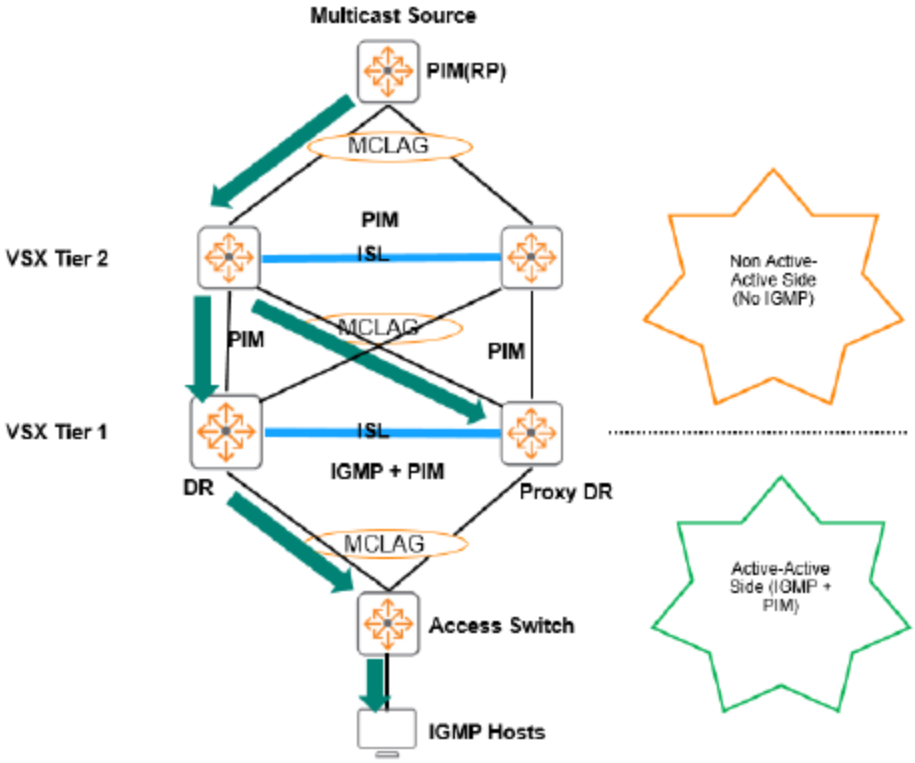
Some VSX deployments consist of multitier, interconnected VSX to act as aggregation pairs where the source and hosts are present. PIM Active-Active can be enabled on hosts, however, the feature runs only on the client VLANs with attached Hosts.



DR and Proxy DR roles run only on Tier 1. Only Tier 1 router failures are covered.

PIM recovers at a normal rate when router failure occurs due to the Tier 1 router selecting the same uplink router for sending PIM Joins. Despite feature enablement on both VSX tiers, the router covers only the failure of the DR and Proxy DR routers where the hosts are connected.

Figure 5 *DR, ProxyDR in Multitier VSX (with MCLAG towards Source)*



In Figure 4, both the DR and Proxy DR select the same router on VSX Tier 2 as their uplink (router in the non-Active-Active side Tier 2), and the traffic is served by the same uplink router. When the router fails, both the DR and Proxy DR resend the Join to the other router in Tier 2. Regular PIM convergence and minimal outage is expected. The second router at Tier 2 does not forward any traffic in this case and its failure has no effect on traffic.

When the DR and ProxyDR select distinct Tier 2 routers than their uplink towards the source, traffic is also served by different Tier 2 routers. In this case, the Tier 2 router that is feeding stream to the ProxyDR failure does not cause any outage since the DR is served by the other Tier 2 router. However, if the Tier 2 router that is sourcing the DR router fails, traffic outage is expected.

Figure 6 *DR, ProxyDR in Multitier VSX (with ROP towards Source)*

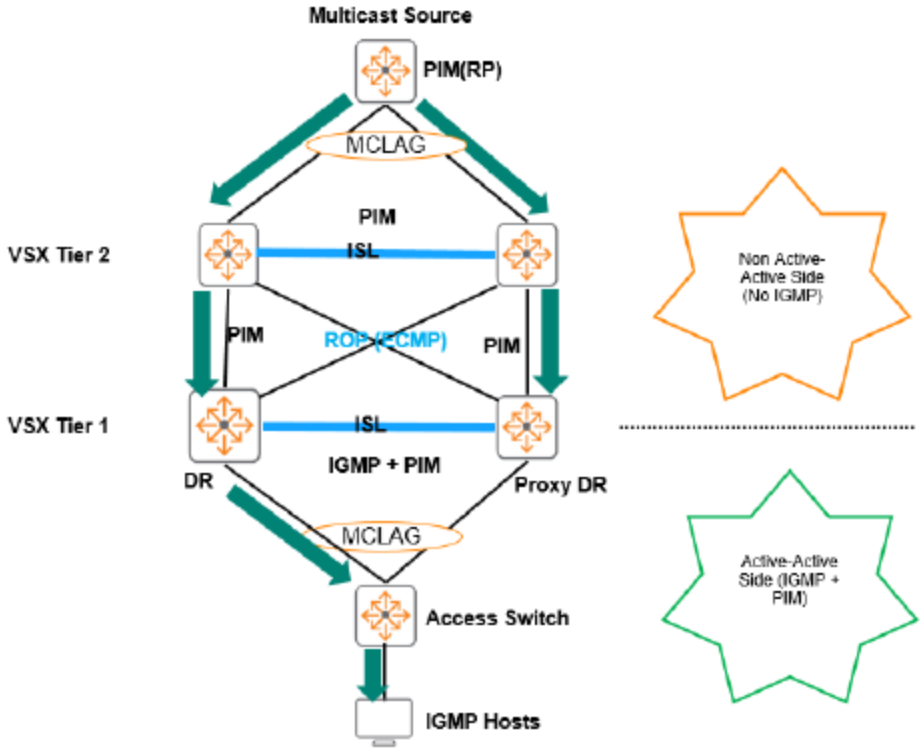
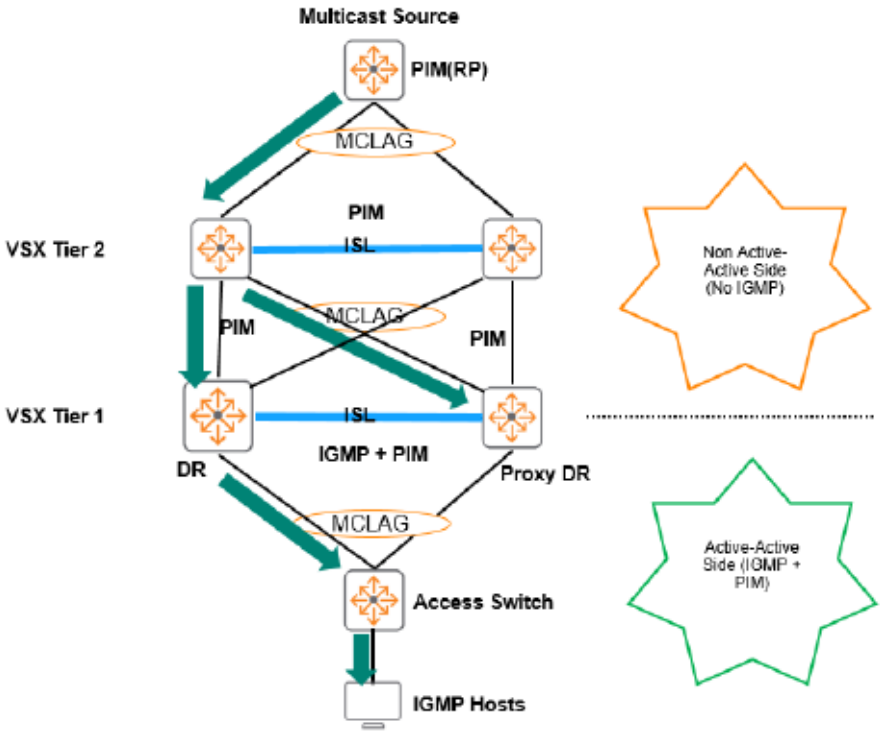


Figure 7 *DR, ProxyDR in Multitier VSX (with ROP towards Source)*



RP in PIM active-active topology

The peer router takes on the RP role when DR or Proxy DR failure occurs due to RP configuration on VSX Active-Active-enabled devices. A Bootstrap message informs the source router about the RP failure,

affecting the recovery of traffic. For this reason, it is recommended to configure RP on a non-Active-Active router near the source stream. If not possible, configure Anycast RP with MSDP.

Only iPv4 is supported with MSDP.

To configure Anycast RP with MSDP, design Anycast RP with VSX pairs and MSDP with other Anycast RP routers. RP redundancy is achieved with Anycast RP on VSX pairs, so failure of one router does not impact RP reachability. Figure 5 shows two different deployment scenarios where Anycast RP and MSDP can be used to provide RP redundancy. Traffic is expected if a failed Tier 2 router is used to forward traffic to Tier1 and not because of the RP failure.

Figure 8 *RP redundancy with Anycast RP + MSDP*

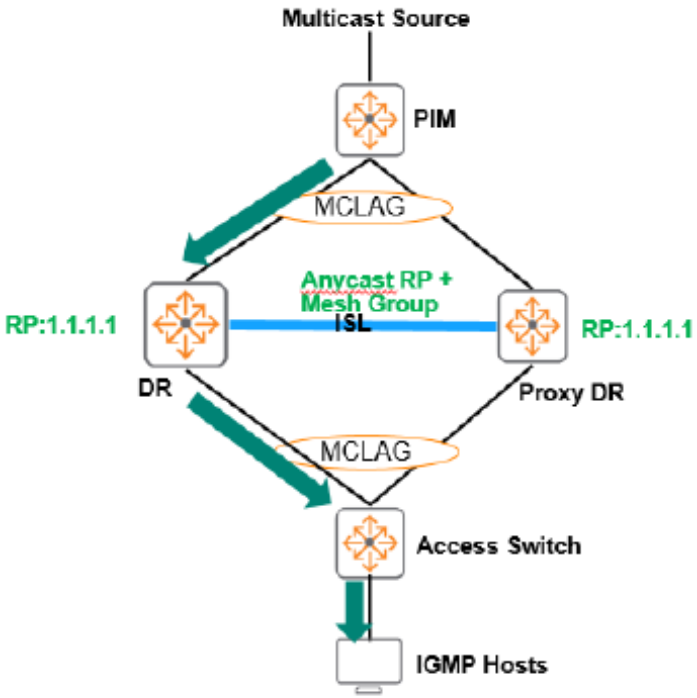
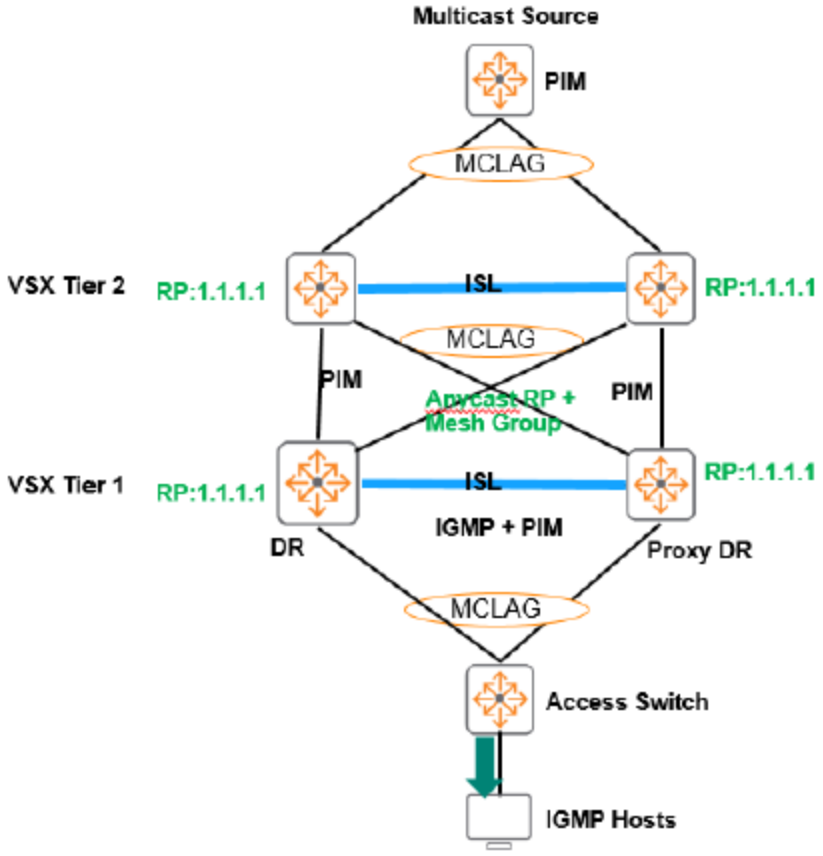


Figure 9 *RP redundancy with Anycast RP + MSDP*

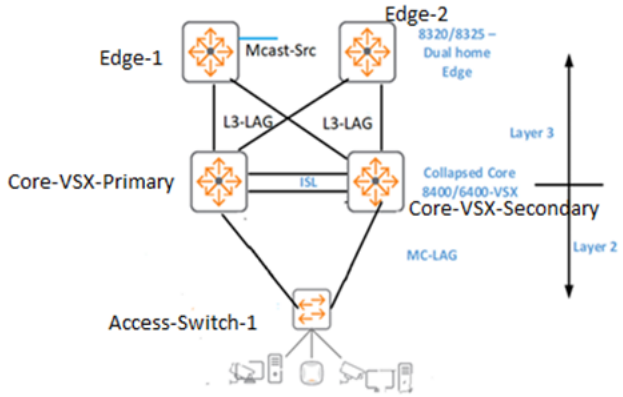


BSR in PIM active-active topology

BSR and RP share the same time limitation when electing the new EBSR during device failure. To avoid outage due to BSR convergence time, configure BSR on a non-VSX router.

Use case 1: IPv4 Collapsed Core Scenario 1

Figure 1 *Use case 1: IPv4 Collapsed Core Scenario 1*



Configuration and verification details for the devices in this use case are provided in the following sections:

- Access-Switch-1
- Core VSX Primary Configuration
- Core VSX Secondary Configuration
- Edge 1
- Edge 2
- Logs

Access-Switch-1

```
hostname 6300-Access-switch
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vsf secondary-member 3
vsf member 1
       type r8s89a
       link 1 1/1/27-1/1/28
vsf member 3
       type r8s92a
       link 1 3/1/27-3/1/28
vlan 1
vlan 20
       ip igmp snooping enable
       ipv6 mld snooping enable
vlan 24
       ip igmp snooping enable
       ipv6 mld snooping enable
spanning-tree
interface mgmt
       no shutdown
       ip dhcp

interface lag 1
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
       lag 1
interface 1/1/2
       no shutdown
       lag 1
interface 1/1/3
       no shutdown
       no routing
       vlan trunk native 1
```

```
       vlan trunk allowed 20,24
interface 1/1/4
       no shutdown
       no routing
       vlan access 1
interface 1/1/5
       no shutdown
       no routing
       vlan access 1
interface 1/1/6
       no shutdown
       no routing
       vlan access 1
interface 1/1/7
       no shutdown
       no routing
       vlan access 1
interface 1/1/8
       no shutdown
       no routing
       vlan access 1
interface 1/1/9
       no shutdown
       no routing
       vlan access 1
interface 1/1/10
       no shutdown
       no routing
       vlan access 1
interface 1/1/11
       no shutdown
       no routing
       vlan access 1
interface 1/1/12
       no shutdown
       no routing
       vlan access 1
interface 1/1/13
       no shutdown
       no routing
       vlan access 1
interface 1/1/14
       no shutdown
       no routing
       vlan access 1
interface 1/1/15
       no shutdown
       no routing
       vlan access 1
interface 1/1/16
       no shutdown
       no routing
       vlan access 1
interface 1/1/17
       no shutdown
       no routing
       vlan access 1
interface 1/1/18
       no shutdown
       no routing
       vlan access 1
interface 1/1/19
```

```
       no shutdown
       no routing
       vlan access 1
interface 1/1/20
       no shutdown
       no routing
       vlan access 1
interface 1/1/21
       no shutdown
       no routing
       vlan access 1
interface 1/1/22
       no shutdown
       no routing
       vlan access 1
interface 1/1/23
       no shutdown
       no routing
       vlan access 1
interface 1/1/24
       no shutdown
       no routing
       vlan access 1
interface 1/1/25
       no shutdown
       no routing
       vlan access 1
interface 1/1/26
       no shutdown
       no routing
       vlan access 1
interface 1/1/27
       no shutdown
interface 1/1/28
       no shutdown
interface 3/1/1
       no shutdown
       lag 1
interface 3/1/2
       no shutdown
       lag 1
interface 3/1/3
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
interface 3/1/4
       no shutdown
       no routing
       vlan access 1
interface 3/1/5
       no shutdown
       no routing
       vlan access 1
interface 3/1/6
       no shutdown
       no routing
       vlan access 1
interface 3/1/7
       no shutdown
       no routing
       vlan access 1
```

```
interface 3/1/8
       no shutdown
       no routing
       vlan access 1
interface 3/1/9
       no shutdown
       no routing
       vlan access 1
interface 3/1/10
       no shutdown
       no routing
       vlan access 1
interface 3/1/11
       no shutdown
       no routing
       vlan access 1
interface 3/1/12
       no shutdown
       no routing
       vlan access 1
interface 3/1/13
       no shutdown
       no routing
       vlan access 1
interface 3/1/14
       no shutdown
       no routing
       vlan access 1
interface 3/1/15
       no shutdown
       no routing
       vlan access 1
interface 3/1/16
       no shutdown
       no routing
       vlan access 1
interface 3/1/17
       no shutdown
       no routing
       vlan access 1
interface 3/1/18
       no shutdown
       no routing
       vlan access 1
interface 3/1/19
       no shutdown
       no routing
       vlan access 1
interface 3/1/20
       no shutdown
       no routing
       vlan access 1
interface 3/1/21
       no shutdown
       no routing
       vlan access 1
interface 3/1/22
       no shutdown
       no routing
       vlan access 1
interface 3/1/23
       no shutdown
```

```
       no routing
       vlan access 1
interface 3/1/24
       no shutdown
       no routing
       vlan access 1
interface 3/1/25
       no shutdown
       no routing
       vlan access 1
interface 3/1/26
       no shutdown
       no routing
       vlan access 1
interface 3/1/27
       no shutdown
interface 3/1/28
       no shutdown
interface vlan 1
       ip dhcp
!
!
!
!
!
https-server vrf default
https-server vrf mgmt
```

Core VSX Primary Configuration

```
hostname Core-VSX-Primary
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 20
       ip igmp snooping enable
vlan 24
       ip igmp snooping enable
vlan 28
interface mgmt
       no shutdown
       ip dhcp
interface lag 1 multi-chassis
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
       lacp mode active
interface lag 6
       no shutdown
       ip address 56.1.1.2/24
       lacp mode active
```

```
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
interface lag 9
       no shutdown
       ip address 59.1.1.2/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
interface lag 100
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 20,24,28
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
       lag 100
interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
       description KA
       no shutdown
       ip address 2.1.1.1/24
interface 1/1/45
       no shutdown
       lag 6
interface 1/1/46
       no shutdown
       lag 9
interface 1/1/47
       no shutdown
       lag 1
interface 1/1/48
       no shutdown
       lag 1
interface vlan 20
       ip address 20.1.1.5/24
       active-gateway ip mac aa:aa:00:00:00:fe
       active-gateway ip 20.1.1.1
       ip ospf 1 area 0.0.0.0
       ip ospf passive
       ip igmp enable
       ip pim-sparse enable

interface vlan 24
       ip address 20.1.5.5/24
       active-gateway ip mac aa:aa:00:00:00:fe
       active-gateway ip 20.1.5.1
       ip ospf 1 area 0.0.0.0
       ip ospf passive
       ip igmp enable
       ip pim-sparse enable
```

```
interface vlan 28
       ip address 20.1.9.1/24
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

vsx
       inter-switch-link lag 100
       role primary
       keepalive peer 2.1.1.2 source 2.1.1.1
!
!
!
!
!
router ospf 1
       router-id 3.3.3.3
       redistribute connected
       area 0.0.0.0

router pim
       enable
       active-active
https-server vrf mgmt
```

Core VSX Secondary Configuration

```
hostname Core-VSX-Secondary
bfd
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 20
       ip igmp snooping enable

vlan 24
       ip igmp snooping enable

vlan 28
interface mgmt
       no shutdown
       ip dhcp

interface lag 1 multi-chassis
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24,28
       lacp mode active
interface lag 7
       description mtraced - 58
       no shutdown
       ip address 57.1.1.2/24
```

```
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
interface lag 10
       description mtraced - 59
       no shutdown
       ip address 60.1.1.2/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
interface lag 100
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 20-28
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
       lag 100
interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
       description KA
       no shutdown
       ip address 2.1.1.1/24
interface 1/1/19
       no shutdown
       lag 7
interface 1/1/20
       no shutdown
       lag 10
interface 1/1/21
       no shutdown
       lag 1
interface 1/1/22
       no shutdown
       lag 1
interface vlan 20
       ip address 20.1.1.6/24
       active-gateway ip mac aa:aa:00:00:00:fe
       active-gateway ip 20.1.1.1
       ip ospf 1 area 0.0.0.0
       ip ospf passive
       ip igmp enable
       ip pim-sparse enable

interface vlan 24
       ip address 20.1.5.6/24
       active-gateway ip mac aa:aa:00:00:00:fe
       active-gateway ip 20.1.5.1
       ip ospf 1 area 0.0.0.0
       ip ospf passive
       ip igmp enable
```

```
       ip pim-sparse enable

interface vlan 28
       ip address 20.1.9.2/24
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

vsx
       inter-switch-link lag 100
       role secondary
       keepalive peer 2.1.1.2 source 2.1.1.1
!
!
!
!
!
router ospf 1
       router-id 4.4.4.4
       redistribute connected
       area 0.0.0.0
router pim
       enable
       active-active

https-server vrf mgmt
```

Edge 1

```
hostname Edge1
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1,602
interface mgmt
       no shutdown
       ip dhcp
interface lag 6
       no shutdown
       ip address 56.1.1.1/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
interface lag 7
       no shutdown
       ip address 57.1.1.1/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
```

```
       ip pim-sparse bfd
interface 1/1/5
       no shutdown
       lag 6
interface 1/1/6
       no shutdown
       lag 7
interface 1/1/23
       no shutdown
       no routing
       vlan access 602
interface loopback 1
       ip address 120.1.20.1/32
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable
       ipv6 pim6-sparse enable
interface vlan 602
       ip address 62.1.1.1/24
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable
       ipv6 pim6-sparse enable
!
!
!
!
!
router ospf 1
       router-id 2.2.2.2
       area 0.0.0.0
router pim
       enable
       rp-candidate source-ip-interface loopback1 group-prefix 224.0.0.0/4

https-server vrf mgmt
```

Edge 2

```
cli-session
       timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1,604
interface mgmt
       no shutdown
       ip dhcp
interface lag 9
       description mtraced - 75
       no shutdown
       ip address 59.1.1.1/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
interface lag 10
```

```
       description mtraced - 76
       no shutdown
       ip address 60.1.1.1/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
interface 1/1/1
       no shutdown
       lag 9
interface 1/1/2
       no shutdown
       lag 10
interface 1/1/3
       no shutdown
       no routing
       vlan access 604
interface loopback 1
       ip address 120.1.30.1/32
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface vlan 604
       ip address 64.1.1.1/24
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

!
!
!
!
!
router ospf 1
       router-id 10.10.10.10
       area 0.0.0.0
router pim
       enable
       rp-candidate source-ip-interface loopback1 group-prefix 224.0.0.0/4
       bsr-candidate source-ip-interface loopback1

https-server vrf mgmt
```

Logs

```
Edge1(config)# show ip pim bsr elected

Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                       : default
E-BSR Address             : 120.1.30.1
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 1 hour 31 mins 42 secs
Next Bootstrap Message    : 1 mins 38 secs

Edge1(config)# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information
```

```
VRF                       : default
E-BSR Address             : 120.1.30.1
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 1 hour 31 mins 43 secs
Next Bootstrap Message    : 1 mins 37 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : 120.1.20.1
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 192
C-RP Source IP Interface  : loopback1

Group Address    Group Mask
---------------  ---------------
224.0.0.0        240.0.0.0

Edge1(config)# show ip mroute 230.1.1.1

IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      :
Incoming interface            : vlan602
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 00:59:46
Downstream Interface
Interface       State
-----------     ----------
lag7            forwarding
lag6            forwarding


================================================================================
Core-VSX-Primary(config)# show ip pim bsr elected

Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                       : default
E-BSR Address             : 120.1.30.1
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 1 hour 32 mins 57 secs
Next Bootstrap Message    : 1 mins 24 secs

Core-VSX-Primary(config)# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information

VRF                       : default
E-BSR Address             : 120.1.30.1
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
```

```
E-BSR Up Time             : 1 hour 33 mins 2 secs
Next Bootstrap Message    : 1 mins 19 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

Core-VSX-Primary(config)# show ip pim rp-set

VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        120.1.30.1       150        91           192
224.0.0.0        240.0.0.0        120.1.20.1       150        91           192

Core-VSX-Primary(config)# show ip igmp interface vlan 20

IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Querier
Querier IP [this switch]   : 20.1.1.5
Querier Uptime             : 2h 38m
Querier Expiration Time    : 0m 23s
IGMP Snoop Enabled on VLAN : True
Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
230.1.1.1              2         1h 1m     2m 38s

Core-VSX-Primary(config)# show ip igmp interface vlan24

IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Querier
Querier IP [this switch]   : 20.1.5.5
Querier Uptime             : 2h 43m
Querier Expiration Time    : 1m 42s
IGMP Snoop Enabled on VLAN : True
Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
230.1.1.1              2         1h 6m     4m 3s

Core-VSX-Primary(config)# show ip igmp snooping vlan 20 group 230.1.1.1

IGMP ports and group information for group 230.1.1.1

VLAN ID   : 20
VLAN Name : VLAN20

Group Address : 230.1.1.1
Last Reporter : 20.1.1.11
Group Type    : Filter

                                                 V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires   Timer     Timer     Forwarded
Blocked
-------------- ---------- ---- ---- --------- --------- --------- --------- -------
-
lag1            2    EXC  1h 1m     2m 29s              2m 29s    0         0
```

```
Core-VSX-Primary(config)# show ip igmp snooping vlan 24 group 230.1.1.1

IGMP ports and group information for group 230.1.1.1

VLAN ID   : 24
VLAN Name : VLAN24

Group Address : 230.1.1.1
Last Reporter : 20.1.5.11
Group Type    : Filter

                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires     Timer     Timer     Forwarded
Blocked
------------------------ ---- ---- --------- --------- --------- --------- -------
-
lag1            2    EXC  1h 7m     3m 36s              3m 36s    0         0

Core-VSX-Primary(config)#

Core-VSX-Primary(config)# show ip mroute 230.1.1.1

IP Multicast Route Entries

VRF : default
Total number of entries : 3

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      : 56.1.1.1
Incoming interface            : lag6
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 01:01:51
Downstream Interface
Interface       State          VSX Role
-----------     ----------     --------
vlan20          forwarding     Proxy DR
vlan24          forwarding     Proxy DR

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      : 56.1.1.1
Incoming interface            : vlan24
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 01:01:51

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      : 56.1.1.1
Incoming interface            : vlan20
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 01:01:51
```

```
Core-VSX-Primary(config)#

================================================================================
Core-VSX-Secondary(config)# show ip pim bsr elected

Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                       : default
E-BSR Address             : 120.1.30.1
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 1 hour 35 mins 32 secs
Next Bootstrap Message    : 1 mins 48 secs

Core-VSX-Secondary(config)# show ip pim rp-set

VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        120.1.30.1       150        121          192
224.0.0.0        240.0.0.0        120.1.20.1       150        121          192

Core-VSX-Secondary(config)# show ip igmp interface vlan 20

IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Non-Querier
Querier IP                 : 20.1.1.5
Querier Uptime             : 2h 40m
Querier Expiration Time    : 4m 10s
IGMP Snoop Enabled on VLAN : True
Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
230.1.1.1              2         1h 4m     4m 17s

Core-VSX-Secondary(config)# show ip igmp interface vlan 24

IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Non-Querier
Querier IP                 : 20.1.5.5
Querier Uptime             : 2h 44m
Querier Expiration Time    : 2m 19s
IGMP Snoop Enabled on VLAN : True
Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
230.1.1.1              2         1h 8m     2m 30s


Core-VSX-Secondary(config)# show ip igmp snooping vlan 20 group 230.1.1.1

IGMP ports and group information for group 230.1.1.1

VLAN ID   : 20
VLAN Name : VLAN20
```

```
Group Address : 230.1.1.1
Last Reporter : 20.1.1.11
Group Type    : Filter

                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires   Timer     Timer     Forwarded
Blocked
----------------------- ---- ---- --------- --------- --------- --------- -------
-
lag1            2    EXC  1h 4m     3m 48s              3m 48s    0         0

Core-VSX-Secondary(config)# show ip igmp snooping vlan 24 group 230.1.1.1

IGMP ports and group information for group 230.1.1.1

VLAN ID   : 24
VLAN Name : VLAN24

Group Address : 230.1.1.1
Last Reporter : 20.1.5.11
Group Type    : Filter

V1        V2        Sources   Sources
Port                    Vers Mode Uptime    Expires   Timer     Timer
Forwarded Blocked
----------------------- ---- ---- --------- --------- --------- --------- -------
-- --------
lag1                    2    EXC  1h 8m     4m 4s               4m 4s     0
  0

Core-VSX-Secondary(config)# show ip mroute 230.1.1.1

IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                : 230.1.1.1
Source Address               : 62.1.1.2
Neighbor                     : 57.1.1.1
Incoming interface           : lag7
Multicast Routing Protocol   : PIM-SM
Unicast Routing Protocol     : OSPF
Metric                       : 200
Metric  Pref                 : 110
Uptime (HH:MM:SS)            : 01:04:29
Downstream Interface
Interface       State          VSX Role
-----------     ----------     --------
vlan20          forwarding     DR
vlan24          forwarding     DR
Core-VSX-Secondary(config)#

================================================================================
=

6300-Access-switch(config)# show ip igmp snooping vlan 20
IGMP Snooping Protocol Info

Total VLANs with IGMP enabled             : 8
Current count of multicast groups joined  : 10
```

```
IGMP Drop Unknown Multicast               : Global
VLAN ID : 20
VLAN Name : VLAN20
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 20.1.1.5
Querier Port : lag1
Querier UpTime :2h 47m
Querier Expiration Time :3m 30s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
230.1.1.1              Filter    2         1h 11m    3m 36s

6300-Access-switch(config)# show ip igmp snooping vlan 20 group 230.1.1.1

IGMP ports and group information for group 230.1.1.1

VLAN ID   : 20
VLAN Name : VLAN20

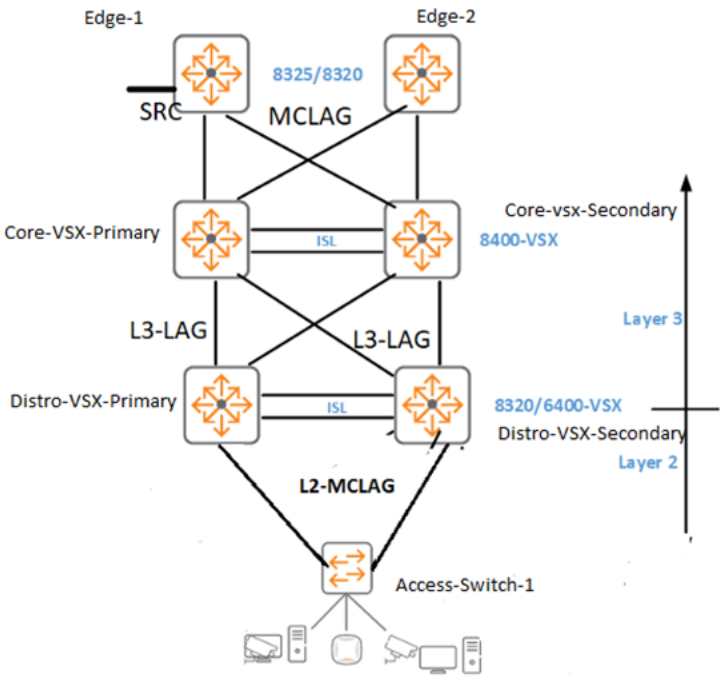
Group Address : 230.1.1.1
Last Reporter : 20.1.1.11
Group Type    : Filter

                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires   Timer     Timer     Forwarded
Blocked
-------------- ---------- ---- ---- --------- --------- --------- --------- -------
-
1/1/3           2    EXC  1h 12m    2m 26s              2m 26s    0         0

6300-Access-switch(config)#
```

Use case 2: IPv4 MSDP configurations

Figure 1 *Use case 2: IPv4 MSDP Configurations*



Configuration and verification details for the devices in this use case are provided in the following sections:

- Core VSX Primary Configuration
- Core VSX Secondary Configuration
- Distro VSX Primary Configuration
- Distro VSX Secondary Configuration
- Edge 2
- Edge Configuration
- Logs
- Snooping Switch Configuration

Core VSX Primary Configuration

```
hostname Core-VSX-Primary
bfd
no ip icmp redirect
profile aggregation-leaf
vrf green
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1,500
vlan 601,603
       vsx-sync
interface mgmt
```

```
no shutdown
       ip dhcp

interface lag 6
       no shutdown
       ip address 56.1.1.1/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
interface lag 7
       no shutdown
       ip address 57.1.1.1/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

interface lag 16 multi-chassis
       no shutdown
       no routing
       vlan access 601
       lacp mode active
interface lag 17 multi-chassis
       no shutdown
       no routing
       vlan access 603
       lacp mode active
interface lag 100
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 1,601,603
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
       lag 100
interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
       description KA
       no shutdown
       ip address 140.1.1.1/24
interface 1/1/17
       no shutdown
       lag 6
interface 1/1/18
       no shutdown
       lag 7
interface 1/1/22
       no shutdown
       lag 16
interface 1/1/23
       no shutdown
       lag 17
```

```
interface loopback 1
       ip address 120.1.20.1/32
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface loopback 2
       ip address 120.1.1.21/32
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface vlan 500
       ip address 50.1.1.1/24
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface vlan 601
       vsx active-forwarding
       ip address 61.1.1.2/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

interface vlan 603
       vsx active-forwarding
       ip address 63.1.1.2/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
vsx
       inter-switch-link lag 100
       role primary
       keepalive peer 140.1.1.2 source 140.1.1.1
       vsx-sync mclag-interfaces
!
!
!
!
!
router ospf 1
       router-id 2.2.2.2
       area 0.0.0.0

router pim
       enable
       rp-candidate source-ip-interface loopback1 group-prefix 224.0.0.0/4

router msdp
       enable
       ip msdp peer 120.1.1.22
              connect-source loopback2
              enable
              mesh-group mesh1

https-server vrf mgmt
```

Core VSX Secondary Configuration

```
hostname Core-VSX-Secondary
```

```
bfd
no ip icmp redirect
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1,501-502
vlan 601,603
       vsx-sync
interface mgmt
       no shutdown
       ip dhcp

interface lag 9
       description mtraced - 75
       no shutdown
       ip address 59.1.1.1/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

interface lag 10
       description mtraced - 76
       no shutdown
       ip address 60.1.1.1/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

interface lag 16 multi-chassis
       no shutdown
       no routing
       vlan access 601
       lacp mode active
interface lag 17 multi-chassis
       no shutdown
       no routing
       vlan access 603
       lacp mode active
interface lag 100
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 1,601,603
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
       lag 100
```

```
interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
       description KA
       no shutdown
       ip address 140.1.1.2/24
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface 1/1/9
       no shutdown
       lag 9
interface 1/1/10
       no shutdown
       lag 10
interface 1/1/11
       no shutdown
       lag 16
interface 1/1/12
       no shutdown
lag 17
       interface loopback 1
       ip address 120.1.20.1/32
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface loopback 2
       ip address 120.1.1.22/32
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface vlan 601
       vsx active-forwarding
       ip address 61.1.1.4/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

interface vlan 603
       vsx active-forwarding
       ip address 63.1.1.3/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

vsx
       inter-switch-link lag 100
       role secondary
       keepalive peer 140.1.1.1 source 140.1.1.2
       vsx-sync mclag-interfaces
!
!
!
!
!
router ospf 1
       router-id 10.10.10.10
       area 0.0.0.0
```

```
router pim
       enable
       rp-candidate source-ip-interface loopback1 group-prefix 224.0.0.0/4

https-server vrf mgmt
router msdp
       enable
       ip msdp peer 120.1.1.21
              connect-source loopback2
              enable
              mesh-group mesh1
```

Distro VSX Primary Configuration

```
hostname Core-VSX-Primary
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 20
       ip igmp snooping enable

vlan 24
       ip igmp snooping enable

vlan 28

interface mgmt
       no shutdown
       ip dhcp

interface lag 1 multi-chassis
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
       lacp mode active
interface lag 6
       no shutdown
       ip address 56.1.1.2/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
interface lag 9
       no shutdown
       ip address 59.1.1.2/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
```

```
       ip pim-sparse enable
       ip pim-sparse bfd

interface lag 100
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 20,24,28
       lacp mode active
       lacp rate fast

interface 1/1/1
       no shutdown
       lag 100
interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
       description KA
       no shutdown
       ip address 2.1.1.1/24
interface 1/1/45
       no shutdown
       lag 6
interface 1/1/46
       no shutdown
       lag 9
interface 1/1/47
       no shutdown
       lag 1
interface 1/1/48
       no shutdown
       lag 1
interface vlan 20
       ip address 20.1.1.5/24
       active-gateway ip mac aa:aa:00:00:00:fe
       active-gateway ip 20.1.1.1
       ip ospf 1 area 0.0.0.0
       ip ospf passive
       ip igmp enable
       ip pim-sparse enable

interface vlan 24
       ip address 20.1.5.5/24
       active-gateway ip mac aa:aa:00:00:00:fe
       active-gateway ip 20.1.5.1
       ip ospf 1 area 0.0.0.0
       ip ospf passive
       ip igmp enable
       ip pim-sparse enable

interface vlan 28
       ip address 20.1.9.1/24
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

vsx
       inter-switch-link lag 100
       role primary
       keepalive peer 2.1.1.2 source 2.1.1.1
!
```

```
!
!
!
!
router ospf 1
       router-id 3.3.3.3
       redistribute connected
       area 0.0.0.0

router pim
       enable
       active-active
https-server vrf mgmt
```

Distro VSX Secondary Configuration

```
hostname Core-VSX-Secondary
bfd
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 20
       ip igmp snooping enable

vlan 24
       ip igmp snooping enable

vlan 28
interface mgmt
       no shutdown
       ip dhcp

interface lag 1 multi-chassis
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24,28
       lacp mode active
interface lag 7
       description mtraced - 58
       no shutdown
       ip address 57.1.1.2/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
interface lag 10
       description mtraced - 59
       no shutdown
       ip address 60.1.1.2/24
```

```
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

interface lag 100
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 20-28
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
       lag 100
interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
       description KA
       no shutdown
       ip address 2.1.1.1/24
interface 1/1/19
       no shutdown
       lag 7
interface 1/1/20
       no shutdown
       lag 10
interface 1/1/21
       no shutdown
       lag 1
interface 1/1/22
       no shutdown
       lag 1
interface vlan 20
       ip address 20.1.1.6/24
       active-gateway ip mac aa:aa:00:00:00:fe
       active-gateway ip 20.1.1.1
       ip ospf 1 area 0.0.0.0
       ip ospf passive
       ip igmp enable
       ip pim-sparse enable

interface vlan 24
       ip address 20.1.5.6/24
       active-gateway ip mac aa:aa:00:00:00:fe
       active-gateway ip 20.1.5.1
       ip ospf 1 area 0.0.0.0
       ip ospf passive
       ip igmp enable
       ip pim-sparse enable

interface vlan 28
       ip address 20.1.9.2/24
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

vsx
       inter-switch-link lag 100
```

```
       role secondary
       keepalive peer 2.1.1.2 source 2.1.1.1
!
!
!
!
!
router ospf 1
       router-id 4.4.4.4
       redistribute connected
       area 0.0.0.0

router pim
       enable
       active-active

https-server vrf mgmt
```

Edge 2

```
hostname Edge2
profile l3-core
cli-session
       timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1,603-604
interface mgmt
       no shutdown
       ip dhcp
interface lag 17
       no shutdown
       no routing
       vlan access 603
       lacp mode active
       lacp rate fast
interface 1/1/8
       no shutdown
       lag 17
interface 1/1/9
       no shutdown
       no routing
       vlan access 604
interface 1/1/11
       no shutdown
       lag 17

interface loopback 1
       ip address 120.10.10.1/32
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface vlan 603
       ip address 63.1.1.1/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
```

```
       ip pim-sparse enable

interface vlan 604
       ip address 64.1.1.1/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
!
!
!
!
router ospf 1
       router-id 102.100.100.100
       area 0.0.0.0

router pim
       enable

https-server vrf mgmt
```

Edge Configuration

```
hostname Edge
profile l3-core
cli-session
       timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1,601-602
interface mgmt
       no shutdown
       ip dhcp
interface lag 16
       no shutdown
       no routing
       vlan access 601
       lacp mode active
       lacp rate fast
interface 1/1/8
       no shutdown
       lag 16
interface 1/1/9
       no shutdown
       no routing
       vlan access 602
interface 1/1/11
       no shutdown
       lag 16
interface loopback 1
       ip address 120.1.10.1/32
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface vlan 601
       ip address 61.1.1.1/24
       ip ospf 1 area 0.0.0.0
```

```
       ip ospf bfd
       ip pim-sparse enable

interface vlan 602
       ip address 62.1.1.1/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable

!
!
!
!
!
router ospf 1
       router-id 100.100.100.100
       area 0.0.0.0

router pim
       enable
       bsr-candidate source-ip-interface loopback1

https-server vrf mgmt
```

Logs

```
Edge(config)# show ip pim rp-candidate
Edge(config)# show ip pim rp-set

VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        120.1.20.1       150        107          192

Edge(config)# show ip pim bsr elected

Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                       : default
E-BSR Address             : 120.1.10.1
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 4 hour 45 mins 39 secs
Next Bootstrap Message    : 49 secs

Edge(config)# show ip mroute 230.1.1.1

IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      :
Incoming interface            : vlan602
```

```
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 00:13:47
Downstream Interface
Interface       State
-----------     ----------
vlan601         forwarding

================================================================================
=

Core-VSX-Primary(config)# show ip pim rp-set

VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        120.1.20.1       150        116          192
Core-VSX-Primary(config)# show running-config msdp
router msdp
enable
ip msdp peer 120.1.1.22
connect-source loopback2
enable
mesh-group mesh1
Core-VSX-Primary(config)# show ip msdp summary

VRF: default

MSDP Peer Status Summary
Peer address    State    Uptime(Downtime)    Reset Count    SA Count
120.1.1.22      up       15m 27s             0              3

Core-VSX-Primary(config)# show ip msdp sa-cache

VRF: default
Total entries: 40

(62.1.1.2, 230.1.1.1)  RP: 120.1.20.1  Peer: 120.1.1.22

Core-VSX-Primary(config)# show ip mroute 230.1.1.1

IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      : 61.1.1.1
Incoming interface            : vlan601
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 00:14:55
Downstream Interface
```

```
Interface       State
-----------     ----------
lag7            forwarding
lag6            forwarding

================================================================================
=


Core-VSX-Secondary(config)# show ip pim rp-candidate
Status and Counters- PIM-SM Candidate-RP Information

VRF                       : default
C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : 120.1.20.1
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 192
C-RP Source IP Interface  : loopback1

Group Address    Group Mask
---------------  ---------------
224.0.0.0        240.0.0.0

Core-VSX-Secondary(config)# show ip pim rp-set

VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        120.1.20.1       150        116          192
Core-VSX-Secondary(config)# show running-config msdp
router msdp
enable
ip msdp peer 120.1.1.21
connect-source loopback2
enable
mesh-group mesh1
Core-VSX-Secondary(config)# show ip msdp summary

VRF: default

MSDP Peer Status Summary
Peer address     State    Uptime(Downtime)     Reset Count     SA Count
120.1.1.21       up       16m 43s              1               21

Core-VSX-Secondary# show ip msdp sa-cache

VRF: default
No SA cache entries found.


Core-VSX-Secondary(config)# show ip pim bsr elected

Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                       : default
E-BSR Address             : 120.1.10.1
E-BSR Priority            : 0
```

```
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 4 hour 48 mins 17 secs
Next Bootstrap Message    : 1 mins 10 secs

Core-VSX-Secondary(config)# show ip mroute 230.1.1.1

IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                : 230.1.1.1
Source Address               : 62.1.1.2
Neighbor                     :
Incoming interface           : vlan601
Multicast Routing Protocol   : PIM-SM
Unicast Routing Protocol     : OSPF
Metric                       : 200
Metric  Pref                 : 110
Uptime (HH:MM:SS)            : 00:16:11

Core-VSX-Secondary(config)#

================================================================================
=


Distro-VSX-Primary(config)# show ip pim rp-candidate
Distro-VSX-Primary(config)# show ip pim rp-set

VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        120.1.20.1       150        105          192
Distro-VSX-Primary(config)# show ip pim bsr elected

Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                       : default
E-BSR Address             : 120.1.10.1
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 4 hour 49 mins 56 secs
Next Bootstrap Message    : 1 mins 21 secs

Distro-VSX-Primary(config)#
Distro-VSX-Primary(config)#
Distro-VSX-Primary(config)# show ip igmp interface vlan 20

IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Querier
Querier IP [this switch]   : 20.1.1.5
Querier Uptime             : 5h 55m
Querier Expiration Time    : 0m 27s
IGMP Snoop Enabled on VLAN : True

Active Group Address   Vers Mode Uptime    Expires
```

```
---------------------- ---- ---- --------- ---------
230.1.1.1              2         5h 19m    2m 46s

Distro-VSX-Primary(config)# show ip igmp snooping vlan 20 group 230.1.1.1

IGMP ports and group information for group 230.1.1.1

VLAN ID   : 20
VLAN Name : VLAN20

Group Address : 230.1.1.1
Last Reporter : 20.1.1.11
Group Type    : Filter

                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires   Timer     Timer     Forwarded
Blocked
-------------- --------- ---- ---- --------- --------- --------- --------- -------
-
lag1            2    EXC  5h 20m    2m 23s              2m 23s    0         0

Distro-VSX-Primary(config)# show ip mroute 230.1.1.1

IP Multicast Route Entries

VRF : default
Total number of entries : 3

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      :
Incoming interface            : vlan20
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 300
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 04:48:57

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      : 56.1.1.1
Incoming interface            : lag6
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 300
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 00:18:41
Downstream Interface
Interface       State          VSX Role
-----------     -----------     --------
vlan20          forwarding     Proxy DR
vlan24          forwarding     Proxy DR

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      :
Incoming interface            : vlan24
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 300
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 04:48:57
```

```
Distro-VSX-Primary(config)#


================================================================================
=

distro-VSX-Secondary(config)# show ip pim rp-set

VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        120.1.20.1       150        125          192
distro-VSX-Secondary(config)# show ip pim rp-candidate
distro-VSX-Secondary(config)# show ip pim bsr elected

Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                       : default
E-BSR Address             : 120.1.10.1
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 4 hour 51 mins 58 secs
Next Bootstrap Message    : 1 mins 36 secs

distro-VSX-Secondary(config)# show ip igmp interface vlan 20

IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Non-Querier
Querier IP                 : 20.1.1.5
Querier Uptime             : 5h 57m
Querier Expiration Time    : 3m 2s
IGMP Snoop Enabled on VLAN : True

Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
230.1.1.1              2         5h 21m    3m 16s

distro-VSX-Secondary(config)# show ip igmp snooping vlan 20 group 230.1.1.1

IGMP ports and group information for group 230.1.1.1

VLAN ID   : 20
VLAN Name : VLAN20

Group Address : 230.1.1.1
Last Reporter : 20.1.1.11
Group Type    : Filter

                                              V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires   Timer     Timer     Forwarded
Blocked
------------------------ ---- ---- --------- --------- --------- --------- -------
-
lag1            2    EXC  5h 22m    2m 50s              2m 50s    0

distro-VSX-Secondary(config)# show ip mroute 230.1.1.1
```

```
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      : 57.1.1.1
Incoming interface            : lag7
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 300
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 00:20:37
Downstream Interface
Interface       State          VSX Role
-----------     ----------     --------
vlan24          forwarding     DR
vlan20          forwarding     DR

distro-VSX-Secondary(config)#


======================================================================

Snooping-Switch(config)# show ip igmp snooping vlan 20
IGMP Snooping Protocol Info

Total VLANs with IGMP enabled             : 8
Current count of multicast groups joined  : 10

IGMP Drop Unknown Multicast               : Global
VLAN ID : 20
VLAN Name : VLAN20
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 20.1.1.5
Querier Port : lag1
Querier UpTime :5h 53m
Querier Expiration Time :3m 25s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
230.1.1.1              Filter    2         5h 23m    3m 31s

Snooping-Switch(config)# show ip igmp snooping vlan 20 group 230.1.1.1

IGMP ports and group information for group 230.1.1.1

VLAN ID   : 20
VLAN Name : VLAN20

Group Address : 230.1.1.1
Last Reporter : 20.1.1.11
Group Type    : Filter

                                              V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires   Timer     Timer     Forwarded
Blocked
--------------- -------- ---- ---- --------- --------- --------- --------- --------
1/1/12          2    EXC  5h 23m    3m 9s               3m 9s     0         0
```

Snooping Switch Configuration

```
hostname Snooping-Switch
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vsf secondary-member 3
vsf member 1
       type r8s89a
       link 1 1/1/27-1/1/28
vsf member 3
       type r8s90a
       link 1 3/1/51-3/1/52
vlan 1
vlan 20
       ip igmp snooping enable

vlan 24
       ip igmp snooping enable

vlan 25

interface mgmt
       no shutdown
       ip dhcp

interface lag 1
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
       no routing
       vlan access 1
interface 1/1/2
       no shutdown
       no routing
       vlan access 1
interface 1/1/3
       no shutdown
       no routing
       vlan access 1
interface 1/1/4
       no shutdown
       no routing
       vlan access 1
interface 1/1/5
       no shutdown
       no routing
       vlan access 1
interface 1/1/6
       no shutdown
       no routing
```

```
       vlan access 1
interface 1/1/7
       no shutdown
       no routing
       vlan access 1
interface 1/1/8
       no shutdown
       no routing
       vlan access 1
interface 1/1/9
       no shutdown
       no routing
       vlan access 1
interface 1/1/10
       no shutdown
       lag 1
interface 1/1/11
       no shutdown
       lag 1
interface 1/1/12
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
interface 1/1/13
       no shutdown
       no routing
       vlan access 1
interface 1/1/14
       no shutdown
       no routing
       vlan access 1
interface 1/1/15
       no shutdown
       no routing
       vlan access 1
interface 1/1/16
       no shutdown
       no routing
       vlan access 1
interface 1/1/17
       no shutdown
       no routing
       vlan access 1
interface 1/1/18
       no shutdown
       no routing
       vlan access 1
interface 1/1/19
       no shutdown
       no routing
       vlan access 1
interface 1/1/20
       no shutdown
       no routing
       vlan access 1
interface 1/1/21
       no shutdown
       no routing
       vlan access 1
interface 1/1/22
       no shutdown
```

```
       no routing
       vlan access 1
interface 1/1/23
       no shutdown
       no routing
       vlan access 1
interface 1/1/24
       no shutdown
       no routing
       vlan access 1
interface 1/1/25
       no shutdown
       no routing
       vlan access 1
interface 1/1/26
       no shutdown
       no routing
       vlan access 1
interface 1/1/27
       no shutdown
interface 1/1/28
       no shutdown
interface 3/1/1
       no shutdown
       lag 1
interface 3/1/2
       no shutdown
       lag 1
interface 3/1/3
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
interface 3/1/4
       no shutdown
       no routing
       vlan access 1
interface 3/1/5
       no shutdown
       no routing
       vlan access 1
interface 3/1/6
       no shutdown
       no routing
       vlan access 1
interface 3/1/7
       no shutdown
       no routing
       vlan access 1
interface 3/1/8
       no shutdown
       no routing
       vlan access 1
interface 3/1/9
       no shutdown
       no routing
       vlan access 1
interface 3/1/10
       no shutdown
       no routing
       vlan access 1
interface 3/1/11
```

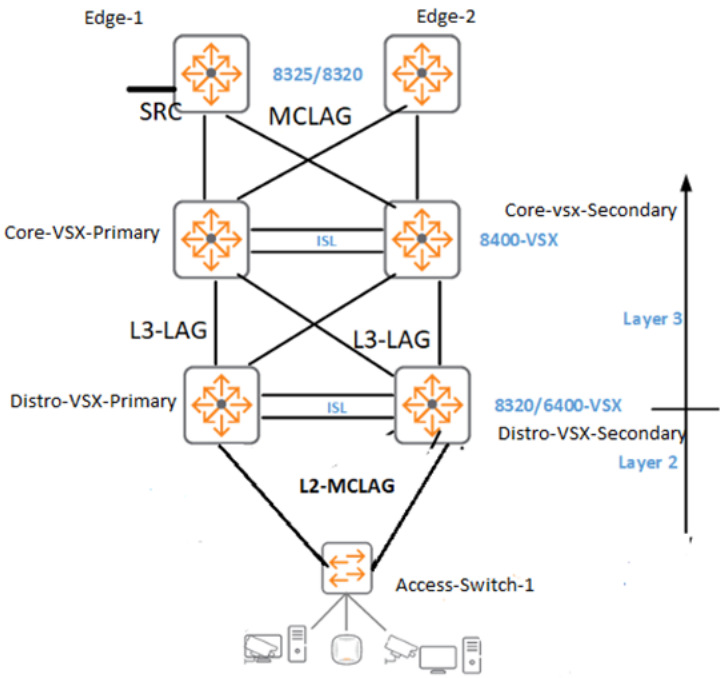
```
       no shutdown
       no routing
       vlan access 1
interface 3/1/12
       no shutdown
       no routing
       vlan access 1
interface 3/1/13
       no shutdown
       no routing
       vlan access 1
interface 3/1/14
       no shutdown
       no routing
       vlan access 1
interface 3/1/15
       no shutdown
       no routing
       vlan access 1
interface 3/1/16
       no shutdown
       no routing
       vlan access 1
interface 3/1/17
       no shutdown
       no routing
       vlan access 1
interface 3/1/18
       no shutdown
       no routing
       vlan access 1
interface 3/1/19
       no shutdown
       no routing
       vlan access 1
interface 3/1/20
       no shutdown
       no routing
       vlan access 1
interface 3/1/21
       no shutdown
       no routing
       vlan access 1
interface 3/1/22
       no shutdown
       no routing
       vlan access 1
interface 3/1/23
       no shutdown
       no routing
       vlan access 1
interface 3/1/24
       no shutdown
       no routing
       vlan access 1
interface 3/1/25
       no shutdown
       no routing
       vlan access 1
interface 3/1/26
       no shutdown
       no routing
```

```
       vlan access 1
interface 3/1/27
       no shutdown
       no routing
       vlan access 1
interface 3/1/28
       no shutdown
       no routing
       vlan access 1
interface 3/1/29
       no shutdown
       no routing
       vlan access 1
interface 3/1/30
       no shutdown
       no routing
       vlan access 1
interface 3/1/31
       no shutdown
       no routing
       vlan access 1
interface 3/1/32
       no shutdown
       no routing
       vlan access 1
interface 3/1/33
       no shutdown
       no routing
       vlan access 1
interface 3/1/34
       no shutdown
       no routing
       vlan access 1
interface 3/1/35
       no shutdown
       no routing
       vlan access 1
interface 3/1/36
       no shutdown
       no routing
       vlan access 1
interface 3/1/37
       no shutdown
       no routing
       vlan access 1
interface 3/1/38
       no shutdown
       no routing
       vlan access 1
interface 3/1/39
       no shutdown
       no routing
       vlan access 1
interface 3/1/40
       no shutdown
       no routing
       vlan access 1
interface 3/1/41
       no shutdown
       no routing
       vlan access 1
interface 3/1/42
```

```
       no shutdown
       no routing
       vlan access 1
interface 3/1/43
       no shutdown
       no routing
       vlan access 1
interface 3/1/44
       no shutdown
       no routing
       vlan access 1
interface 3/1/45
       no shutdown
       no routing
       vlan access 1
interface 3/1/46
       no shutdown
       no routing
       vlan access 1
interface 3/1/47
       no shutdown
       no routing
       vlan access 1
interface 3/1/48
       no shutdown
       no routing
       vlan access 1
interface 3/1/49
       no shutdown
       no routing
       vlan access 1
interface 3/1/50
       no shutdown
       no routing
       vlan access 1
interface 3/1/51
       no shutdown
interface 3/1/52
       no shutdown
interface vlan 1
       ip dhcp
!
!
!
!
!
https-server vrf default
https-server vrf mgmt
```

Use case 3: 2-Tier IPv4 VSX Configurations

Figure 1 *Use case 3: 2-Tier IPv4 VSX Configurations*



Configuration and verification details for the devices in this use case are provided in the following sections:

- Core VSX Primary Configuration
- Core VSX Secondary Configuration
- Distro VSX Primary Configuration
- Distro VSX Secondary Configuration
- Edge 2
- Edge Configuration
- Multi-Site-VSX-IPv4 Logs
- Snooping Switch Configuration

Core VSX Primary Configuration

```
hostname Core-VSX-Primary
bfd
no ip icmp redirect
profile aggregation-leaf
vrf green
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1,500
vlan 601,603
       vsx-sync
interface mgmt
```

```
no shutdown
       ip dhcp

interface lag 6
       no shutdown
       ip address 56.1.1.1/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
interface lag 7
       no shutdown
       ip address 57.1.1.1/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

interface lag 16 multi-chassis
       no shutdown
       no routing
       vlan access 601
       lacp mode active
interface lag 17 multi-chassis
       no shutdown
       no routing
       vlan access 603
       lacp mode active
interface lag 100
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 1,601,603
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
       lag 100
interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
       description KA
       no shutdown
       ip address 140.1.1.1/24
interface 1/1/17
       no shutdown
       lag 6
interface 1/1/18
       no shutdown
       lag 7
interface 1/1/22
       no shutdown
       lag 16
interface 1/1/23
       no shutdown
       lag 17
```

```
interface loopback 1
       ip address 120.1.20.1/32
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface vlan 500
       ip address 50.1.1.1/24
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface vlan 601
       vsx active-forwarding
       ip address 61.1.1.2/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

interface vlan 603
       vsx active-forwarding
       ip address 63.1.1.2/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
vsx
inter-switch-link lag 100
       role primary
       keepalive peer 140.1.1.2 source 140.1.1.1
       vsx-sync mclag-interfaces
!
!
!
!
!
router ospf 1
       router-id 2.2.2.2
       area 0.0.0.0

router pim
       enable
       rp-candidate source-ip-interface loopback1 group-prefix 224.0.0.0/4
https-server vrf mgmt
```

Core VSX Secondary Configuration

```
hostname Core-VSX-Secondary
bfd
no ip icmp redirect
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1,501-502
```

```
vlan 601,603
       vsx-sync
interface mgmt
       no shutdown
       ip dhcp

interface lag 9
       description mtraced - 75
       no shutdown
       ip address 59.1.1.1/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

interface lag 10
       description mtraced - 76
       no shutdown
       ip address 60.1.1.1/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

interface lag 16 multi-chassis
       no shutdown
       no routing
       vlan access 601
       lacp mode active
       interface lag 17 multi-chassis
       no shutdown
       no routing
       vlan access 603
       lacp mode active
       interface lag 100
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 1,601,603
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
       lag 100
interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
       description KA
       no shutdown
       ip address 140.1.1.2/24
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface 1/1/9
       no shutdown
       lag 9
```

```
interface 1/1/10
       no shutdown
       lag 10
interface 1/1/11
       no shutdown
       lag 16
interface 1/1/12
       no shutdown
       lag 17
interface loopback 1
       ip address 120.1.20.2/32
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface vlan 601
       vsx active-forwarding
       ip address 61.1.1.4/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

interface vlan 603
       vsx active-forwarding
       ip address 63.1.1.3/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

vsx
       inter-switch-link lag 100
       role secondary
       keepalive peer 140.1.1.1 source 140.1.1.2
       vsx-sync mclag-interfaces
!
!
!
!
!
router ospf 1
       router-id 10.10.10.10
       area 0.0.0.0

router pim
       enable
       rp-candidate source-ip-interface loopback1 group-prefix 224.0.0.0/4
```

Distro VSX Primary Configuration

```
hostname Core-VSX-Primary
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
!
!
!
```

```
ssh server vrf mgmt
vlan 1
vlan 20
       ip igmp snooping enable

vlan 24
       ip igmp snooping enable

vlan 28

interface mgmt
       no shutdown
       ip dhcp

interface lag 1 multi-chassis
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
       lacp mode active
interface lag 6
       no shutdown
       ip address 56.1.1.2/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
interface lag 9
       no shutdown
       ip address 59.1.1.2/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

interface lag 100
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 20,24,28
       lacp mode active
       lacp rate fast

interface 1/1/1
       no shutdown
       lag 100
interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
       description KA
       no shutdown
       ip address 2.1.1.1/24
interface 1/1/45
       no shutdown
       lag 6
interface 1/1/46
```

```
       no shutdown
       lag 9
interface 1/1/47
       no shutdown
       lag 1
interface 1/1/48
       no shutdown
       lag 1
interface vlan 20
       ip address 20.1.1.5/24
       active-gateway ip mac aa:aa:00:00:00:fe
       active-gateway ip 20.1.1.1
       ip ospf 1 area 0.0.0.0
       ip ospf passive
       ip igmp enable
       ip pim-sparse enable

interface vlan 24
       ip address 20.1.5.5/24
       active-gateway ip mac aa:aa:00:00:00:fe
       active-gateway ip 20.1.5.1
       ip ospf 1 area 0.0.0.0
       ip ospf passive
       ip igmp enable
       ip pim-sparse enable

interface vlan 28
       ip address 20.1.9.1/24
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

vsx
       inter-switch-link lag 100
       role primary
       keepalive peer 2.1.1.2 source 2.1.1.1
!
!
!
!
!
router ospf 1
       router-id 3.3.3.3
       redistribute connected
       area 0.0.0.0

router pim
       enable
       active-active
https-server vrf mgmt
```

Distro VSX Secondary Configuration

```
hostname Core-VSX-Secondary
bfd
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
```

```
!
!
!
ssh server vrf mgmt
vlan 1
vlan 20
       ip igmp snooping enable

vlan 24
       ip igmp snooping enable

vlan 28
interface mgmt
       no shutdown
       ip dhcp

interface lag 1 multi-chassis
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24,28
       lacp mode active
interface lag 7
       description mtraced - 58
       no shutdown
       ip address 57.1.1.2/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd
interface lag 10
       description mtraced - 59
       no shutdown
       ip address 60.1.1.2/24
       lacp mode active
       lacp rate fast
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
       ip pim-sparse bfd

interface lag 100
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 20-28
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
       lag 100
interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
       description KA
       no shutdown
       ip address 2.1.1.1/24
interface 1/1/19
```

```
       no shutdown
       lag 7
interface 1/1/20
       no shutdown
       lag 10
interface 1/1/21
       no shutdown
       lag 1
interface 1/1/22
       no shutdown
       lag 1
interface vlan 20
       ip address 20.1.1.6/24
       active-gateway ip mac aa:aa:00:00:00:fe
       active-gateway ip 20.1.1.1
       ip ospf 1 area 0.0.0.0
       ip ospf passive
       ip igmp enable
       ip pim-sparse enable

interface vlan 24
       ip address 20.1.5.6/24
       active-gateway ip mac aa:aa:00:00:00:fe
       active-gateway ip 20.1.5.1
       ip ospf 1 area 0.0.0.0
       ip ospf passive
       ip igmp enable
       ip pim-sparse enable

interface vlan 28
       ip address 20.1.9.2/24
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

vsx
       inter-switch-link lag 100
       role secondary
       keepalive peer 2.1.1.2 source 2.1.1.1
!
!
!
!
!
router ospf 1
       router-id 4.4.4.4
       redistribute connected
       area 0.0.0.0

router pim
       enable
       active-active

https-server vrf mgmt
```

Edge 2

```
hostname Edge2
profile l3-core
cli-session
       timeout 0
```

```
!
!
!
!
!
ssh server vrf mgmt
vlan 1,603-604
interface mgmt
       no shutdown
       ip dhcp
interface lag 17
       no shutdown
       no routing
       vlan access 603
       lacp mode active
       lacp rate fast
interface 1/1/8
       no shutdown
       lag 17
interface 1/1/9
       no shutdown
       no routing
       vlan access 604
interface 1/1/11
       no shutdown
       lag 17

interface loopback 1
       ip address 120.10.10.1/32
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface vlan 603
       ip address 63.1.1.1/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable

interface vlan 604
       ip address 64.1.1.1/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable
!
!
!
!
router ospf 1
       router-id 102.100.100.100
       area 0.0.0.0

router pim
       enable

https-server vrf mgmt
```

Edge Configuration

```
hostname Edge
profile l3-core
```

```
cli-session
       timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1,601-602
interface mgmt
       no shutdown
       ip dhcp
interface lag 16
       no shutdown
       no routing
       vlan access 601
       lacp mode active
       lacp rate fast
interface 1/1/8
       no shutdown
       lag 16
interface 1/1/9
       no shutdown
       no routing
       vlan access 602
interface 1/1/11
       no shutdown
       lag 16
interface loopback 1
       ip address 120.1.10.1/32
       ip ospf 1 area 0.0.0.0
       ip pim-sparse enable

interface vlan 601
       ip address 61.1.1.1/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable

interface vlan 602
       ip address 62.1.1.1/24
       ip ospf 1 area 0.0.0.0
       ip ospf bfd
       ip pim-sparse enable

!
!
!
!
!
router ospf 1
       router-id 100.100.100.100
       area 0.0.0.0

router pim
       enable
       bsr-candidate source-ip-interface loopback1

https-server vrf mgmt
```

Multi-Site-VSX-IPv4 Logs

```
Edge(config)# show ip pim rp-candidate
Edge(config)# show ip pim rp-set

VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        120.1.30.1       150        98           192
224.0.0.0        240.0.0.0        120.1.20.1       150        98           192

Edge(config)# show ip pim bsr elected

Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                       : default
E-BSR Address             : 120.1.10.1
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 3 hour 46 mins 19 secs
Next Bootstrap Message    : 1 secs

Edge(config)# show ip mroute 230.1.1.1

IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      :
Incoming interface            : vlan602
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 00:20:56
Downstream Interface
Interface       State
-----------     ----------
vlan601         forwarding

================================================================================
Core-VSX-Primary(config)# show ip pim rp-candidate
Status and Counters- PIM-SM Candidate-RP Information

VRF                       : default
C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : 120.1.20.1
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 192
C-RP Source IP Interface  : loopback1

Group Address    Group Mask
---------------  ---------------
224.0.0.0        240.0.0.0

Core-VSX-Primary(config)# show ip pim rp-set
```

```
VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        120.1.20.1       150        137          192
224.0.0.0        240.0.0.0        120.1.30.1       150        137          192
Core-VSX-Primary(config)# show ip mroute 230.1.1.1

IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                : 230.1.1.1
Source Address               : 62.1.1.2
Neighbor                     : 61.1.1.1
Incoming interface           : vlan601
Multicast Routing Protocol   : PIM-SM
Unicast Routing Protocol     : OSPF
Metric                       : 200
Metric  Pref                 : 110
Uptime (HH:MM:SS)            : 00:21:51
Downstream Interface
Interface       State
-----------     ----------
lag7            forwarding
lag6            forwarding


================================================================================
=


Core-VSX-Secondary(config)#
Core-VSX-Secondary(config)#  show ip pim rp-candidate
Status and Counters- PIM-SM Candidate-RP Information

VRF                      : default
C-RP Admin Status        : This system is a Candidate-RP
C-RP Address             : 120.1.30.1
C-RP Hold Time           : 150
C-RP Advertise Period    : 60
C-RP Priority            : 192
C-RP Source IP Interface  : loopback1

Group Address    Group Mask
---------------  ---------------
224.0.0.0        240.0.0.0

Core-VSX-Secondary(config)# show ip pim rp-set

VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
```

```
224.0.0.0        240.0.0.0        120.1.30.1       150        135          192
224.0.0.0        240.0.0.0        120.1.20.1       150        135          192
Core-VSX-Secondary(config)# show ip mroute 230.1.1.1

IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      :
Incoming interface            : vlan601
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 00:23:52

================================================================================
=


Distro-VSX-Primary(config)# show ip pim rp-candidate
Distro-VSX-Primary(config)# show ip pim rp-set

VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        120.1.20.1       150        117          192
224.0.0.0        240.0.0.0        120.1.30.1       150        117          192
Distro-VSX-Primary(config)# show ip igmp snooping vlan 20
IGMP Snooping Protocol Info

Total VLANs with IGMP enabled             : 8
Current count of multicast groups joined  : 10

IGMP Drop Unknown Multicast               : Global
VLAN ID : 20
VLAN Name : VLAN20
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address [this switch] : 20.1.1.5
Querier Port :
Querier UpTime :6h 59m
Querier Expiration Time :1m 21s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
230.1.1.1              Filter    2         1h 35m    3m 45s

Distro-VSX-Primary(config)# show ip igmp snooping vlan 20 group 230.1.1.1

IGMP ports and group information for group 230.1.1.1

VLAN ID   : 20
VLAN Name : VLAN20
```

```
Group Address : 230.1.1.1
Last Reporter : 20.1.1.11
Group Type    : Filter


                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires     Timer     Timer     Forwarded
Blocked
------------------------ ---- ---- --------- --------- --------- --------- -------
-
lag1            2    EXC  1h 35m    3m 24s              3m 24s    0         0

Distro-VSX-Primary(config)# show ip mroute 230.1.1.1

IP Multicast Route Entries

VRF : default
Total number of entries : 3

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      : 56.1.1.1
Incoming interface            : vlan24
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 300
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 00:27:03

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      : 56.1.1.1
Incoming interface            : lag6
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 300
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 00:27:03
Downstream Interface
Interface       State          VSX Role
-----------     ----------     --------
vlan24          forwarding     Proxy DR
vlan20          forwarding     Proxy DR

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      : 56.1.1.1
Incoming interface            : vlan20
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 300
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 00:27:03


==============================================================================


distro-VSX-Secondary(config)# show ip pim rp-candidate
distro-VSX-Secondary(config)# show ip pim rp-set

VRF: default
```

```
Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        120.1.30.1       150        98           192
224.0.0.0        240.0.0.0        120.1.20.1       150        98           192
distro-VSX-Secondary(config)# show ip igmp snooping vlan 20
IGMP Snooping Protocol Info

Total VLANs with IGMP enabled             : 8
Current count of multicast groups joined  : 10

IGMP Drop Unknown Multicast               : Global
VLAN ID : 20
VLAN Name : VLAN20
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 20.1.1.5
Querier Port : lag100
Querier UpTime :6h 27m
Querier Expiration Time :3m 17s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
230.1.1.1              Filter    2         1h 37m    3m 23s

distro-VSX-Secondary(config)# show ip mroute 230.1.1.1

IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                 : 230.1.1.1
Source Address                : 62.1.1.2
Neighbor                      : 57.1.1.1
Incoming interface            : lag7
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 300
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 00:29:05
Downstream Interface
Interface       State          VSX Role
-----------     ----------     --------
vlan24          forwarding     DR
vlan20          forwarding     DR

================================================================================


6300(config)# show ip igmp snooping vlan 20
IGMP Snooping Protocol Info

Total VLANs with IGMP enabled             : 8
Current count of multicast groups joined  : 10

IGMP Drop Unknown Multicast               : Global
VLAN ID : 20
VLAN Name : VLAN20
```

```
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 20.1.1.5
Querier Port : lag1
Querier UpTime :4h 28m
Querier Expiration Time :4m 14s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
230.1.1.1              Filter    2         1h 39m    2m 13s

6300(config)# show ip igmp snooping vlan 20 group 230.1.1.1

IGMP ports and group information for group 230.1.1.1

VLAN ID   : 20
VLAN Name : VLAN20

Group Address : 230.1.1.1
Last Reporter : 20.1.1.11
Group Type    : Filter

                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires    Timer     Timer     Forwarded
Blocked
--------------- --------- ---- ---- --------- --------- --------- --------- -------
-
1/1/2           2    EXC  1h 39m    4m 1s               4m 1s     0         0
```

Snooping Switch Configuration

```
hostname Snooping-Switch
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vsf secondary-member 3
vsf member 1
       type r8s89a
       link 1 1/1/27-1/1/28
vsf member 3
       type r8s90a
       link 1 3/1/51-3/1/52
vlan 1
vlan 20
       ip igmp snooping enable

vlan 24
       ip igmp snooping enable

vlan 25

interface mgmt
       no shutdown
```

```
       ip dhcp

interface lag 1
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
       no routing
       vlan access 1
interface 1/1/2
       no shutdown
       no routing
       vlan access 1
interface 1/1/3
       no shutdown
       no routing
       vlan access 1
interface 1/1/4
       no shutdown
       no routing
       vlan access 1
interface 1/1/5
       no shutdown
       no routing
       vlan access 1
interface 1/1/6
       no shutdown
       no routing
       vlan access 1
interface 1/1/7
       no shutdown
       no routing
       vlan access 1
interface 1/1/8
       no shutdown
       no routing
       vlan access 1
interface 1/1/9
       no shutdown
       no routing
       vlan access 1
interface 1/1/10
       no shutdown
       lag 1
interface 1/1/11
       no shutdown
       lag 1
interface 1/1/12
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
interface 1/1/13
       no shutdown
       no routing
       vlan access 1
interface 1/1/14
       no shutdown
```

```
       no routing
       vlan access 1
interface 1/1/15
       no shutdown
       no routing
       vlan access 1
interface 1/1/16
       no shutdown
       no routing
       vlan access 1
interface 1/1/17
       no shutdown
       no routing
       vlan access 1
interface 1/1/18
       no shutdown
       no routing
       vlan access 1
interface 1/1/19
       no shutdown
       no routing
       vlan access 1
interface 1/1/20
       no shutdown
       no routing
       vlan access 1
interface 1/1/21
       no shutdown
       no routing
       vlan access 1
interface 1/1/22
       no shutdown
       no routing
       vlan access 1
interface 1/1/23
       no shutdown
       no routing
       vlan access 1
interface 1/1/24
       no shutdown
       no routing
       vlan access 1
interface 1/1/25
       no shutdown
       no routing
       vlan access 1
interface 1/1/26
       no shutdown
       no routing
       vlan access 1
interface 1/1/27
       no shutdown
interface 1/1/28
       no shutdown
interface 3/1/1
       no shutdown
       lag 1
interface 3/1/2
       no shutdown
       lag 1
interface 3/1/3
       no shutdown
```

```
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
interface 3/1/4
       no shutdown
       no routing
       vlan access 1
interface 3/1/5
       no shutdown
       no routing
       vlan access 1
interface 3/1/6
       no shutdown
       no routing
       vlan access 1
interface 3/1/7
       no shutdown
       no routing
       vlan access 1
interface 3/1/8
       no shutdown
       no routing
       vlan access 1
interface 3/1/9
       no shutdown
       no routing
       vlan access 1
interface 3/1/10
       no shutdown
       no routing
       vlan access 1
interface 3/1/11
       no shutdown
       no routing
       vlan access 1
interface 3/1/12
       no shutdown
       no routing
       vlan access 1
interface 3/1/13
       no shutdown
       no routing
       vlan access 1
interface 3/1/14
       no shutdown
       no routing
       vlan access 1
interface 3/1/15
       no shutdown
       no routing
       vlan access 1
interface 3/1/16
       no shutdown
       no routing
       vlan access 1
interface 3/1/17
       no shutdown
       no routing
       vlan access 1
interface 3/1/18
       no shutdown
       no routing
```

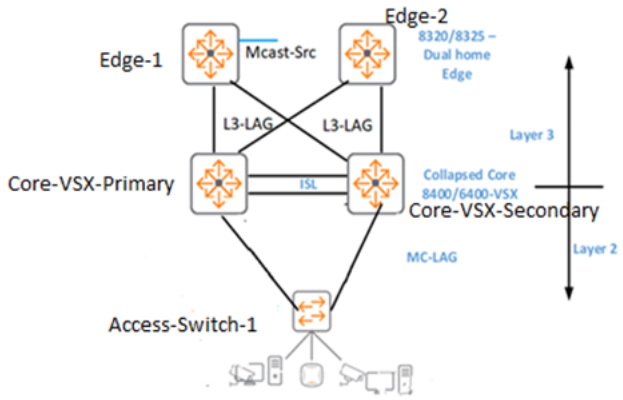
```
       vlan access 1
interface 3/1/19
       no shutdown
       no routing
       vlan access 1
interface 3/1/20
       no shutdown
       no routing
       vlan access 1
interface 3/1/21
       no shutdown
       no routing
       vlan access 1
interface 3/1/22
       no shutdown
       no routing
       vlan access 1
interface 3/1/23
       no shutdown
       no routing
       vlan access 1
interface 3/1/24
       no shutdown
       no routing
       vlan access 1
interface 3/1/25
       no shutdown
       no routing
       vlan access 1
interface 3/1/26
       no shutdown
       no routing
       vlan access 1
interface 3/1/27
       no shutdown
       no routing
       vlan access 1
interface 3/1/28
       no shutdown
       no routing
       vlan access 1
interface 3/1/29
       no shutdown
       no routing
       vlan access 1
interface 3/1/30
       no shutdown
       no routing
       vlan access 1
interface 3/1/31
       no shutdown
       no routing
       vlan access 1
interface 3/1/32
       no shutdown
       no routing
       vlan access 1
interface 3/1/33
       no shutdown
       no routing
       vlan access 1
interface 3/1/34
```

```
       no shutdown
       no routing
       vlan access 1
interface 3/1/35
       no shutdown
       no routing
       vlan access 1
interface 3/1/36
       no shutdown
       no routing
       vlan access 1
interface 3/1/37
       no shutdown
       no routing
       vlan access 1
interface 3/1/38
       no shutdown
       no routing
       vlan access 1
interface 3/1/39
       no shutdown
       no routing
       vlan access 1
interface 3/1/40
       no shutdown
       no routing
       vlan access 1
interface 3/1/41
       no shutdown
       no routing
       vlan access 1
interface 3/1/42
       no shutdown
       no routing
       vlan access 1
interface 3/1/43
       no shutdown
       no routing
       vlan access 1
interface 3/1/44
       no shutdown
       no routing
       vlan access 1
interface 3/1/45
       no shutdown
       no routing
       vlan access 1
interface 3/1/46
       no shutdown
       no routing
       vlan access 1
interface 3/1/47
       no shutdown
       no routing
       vlan access 1
interface 3/1/48
       no shutdown
       no routing
       vlan access 1
interface 3/1/49
       no shutdown
       no routing
```

```
       vlan access 1
interface 3/1/50
       no shutdown
       no routing
       vlan access 1
interface 3/1/51
       no shutdown
interface 3/1/52
       no shutdown
interface vlan 1
       ip dhcp
!
!
!
!
!
https-server vrf default
https-server vrf mgmt
```

Use case 4: IPv6 Collapsed Core Scenario 1

Figure 1 *Use case 4: IPv6 Collapsed Core Scenario 1*



Configuration and verification details for the devices in this use case are provided in the following sections:

- Access-Switch 1
- Core VSX Primary Configurations
- Core VSX Secondary Configuration
- Edge 1
- Edge 2
- IPv6 Logs

Access-Switch-1

```
hostname 6300-Access-switch
```

```
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vsf secondary-member 3
vsf member 1
       type r8s89a
       link 1 1/1/27-1/1/28
vsf member 3
       type r8s92a
       link 1 3/1/27-3/1/28
vlan 1
vlan 20
       ip igmp snooping enable
       ipv6 mld snooping enable
vlan 24
       ip igmp snooping enable
       ipv6 mld snooping enable
spanning-tree
interface mgmt
       no shutdown
       ip dhcp

interface lag 1
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
       lag 1
interface 1/1/2
       no shutdown
       lag 1
interface 1/1/3
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
interface 1/1/4
       no shutdown
       no routing
       vlan access 1
interface 1/1/5
       no shutdown
       no routing
       vlan access 1
interface 1/1/6
       no shutdown
       no routing
       vlan access 1
interface 1/1/7
       no shutdown
       no routing
```

```
       vlan access 1
interface 1/1/8
       no shutdown
       no routing
       vlan access 1
interface 1/1/9
       no shutdown
       no routing
       vlan access 1
interface 1/1/10
       no shutdown
       no routing
       vlan access 1
interface 1/1/11
       no shutdown
       no routing
       vlan access 1
interface 1/1/12
       no shutdown
       no routing
       vlan access 1
interface 1/1/13
       no shutdown
       no routing
       vlan access 1
interface 1/1/14
       no shutdown
       no routing
       vlan access 1
interface 1/1/15
       no shutdown
       no routing
       vlan access 1
interface 1/1/16
       no shutdown
       no routing
       vlan access 1
interface 1/1/17
       no shutdown
       no routing
       vlan access 1
interface 1/1/18
       no shutdown
       no routing
       vlan access 1
interface 1/1/19
       no shutdown
       no routing
       vlan access 1
interface 1/1/20
       no shutdown
       no routing
       vlan access 1
interface 1/1/21
       no shutdown
       no routing
       vlan access 1
interface 1/1/22
       no shutdown
       no routing
       vlan access 1
interface 1/1/23
```

```
       no shutdown
       no routing
       vlan access 1
interface 1/1/24
       no shutdown
       no routing
       vlan access 1
interface 1/1/25
       no shutdown
       no routing
       vlan access 1
interface 1/1/26
       no shutdown
       no routing
       vlan access 1
interface 1/1/27
       no shutdown
interface 1/1/28
       no shutdown
interface 3/1/1
       no shutdown
       lag 1
interface 3/1/2
       no shutdown
       lag 1
interface 3/1/3
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
interface 3/1/4
       no shutdown
       no routing
       vlan access 1
interface 3/1/5
       no shutdown
       no routing
vlan access 1
       interface 3/1/6
       no shutdown
       no routing
       vlan access 1
interface 3/1/7
       no shutdown
       no routing
       vlan access 1
interface 3/1/8
       no shutdown
       no routing
       vlan access 1
interface 3/1/9
       no shutdown
       no routing
       vlan access 1
interface 3/1/10
       no shutdown
       no routing
       vlan access 1
interface 3/1/11
       no shutdown
       no routing
       vlan access 1
```

```
interface 3/1/12
       no shutdown
       no routing
       vlan access 1
interface 3/1/13
       no shutdown
       no routing
       vlan access 1
interface 3/1/14
       no shutdown
       no routing
       vlan access 1
interface 3/1/15
       no shutdown
       no routing
       vlan access 1
interface 3/1/16
       no shutdown
       no routing
       vlan access 1
interface 3/1/17
       no shutdown
       no routing
       vlan access 1
interface 3/1/18
       no shutdown
       no routing
       vlan access 1
interface 3/1/19
       no shutdown
       no routing
       vlan access 1
interface 3/1/20
       no shutdown
       no routing
       vlan access 1
interface 3/1/21
       no shutdown
       no routing
       vlan access 1
interface 3/1/22
       no shutdown
       no routing
       vlan access 1
interface 3/1/23
       no shutdown
       no routing
       vlan access 1
interface 3/1/24
       no shutdown
       no routing
       vlan access 1
interface 3/1/25
       no shutdown
       no routing
       vlan access 1
interface 3/1/26
       no shutdown
       no routing
       vlan access 1
interface 3/1/27
       no shutdown
```

```
interface 3/1/28
       no shutdown
interface vlan 1
       ip dhcp
!
!
!
!
!
https-server vrf default
https-server vrf mgmt
```

Core VSX Primary Configuration

```
hostname Core-VSX-Primary
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 20
       ipv6 mld snooping enable
vlan 24
       ipv6 mld snooping enable

vlan 28
interface mgmt
no shutdown
ip dhcp

interface lag 1 multi-chassis
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
       lacp mode active
interface lag 6
       no shutdown
       ipv6 address 56::1/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface lag 9
       no shutdown
       ipv6 address 50::2/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface lag 100
       description ISL
```

```
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 20,24,28
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
       lag 100
interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
       description KA
       no shutdown
       ip address 2.1.1.1/24
interface 1/1/45
       no shutdown
       lag 6
interface 1/1/46
       no shutdown
       lag 9
interface 1/1/47
       no shutdown
       lag 1
interface 1/1/48
       no shutdown
       lag 1
interface vlan 20
       ipv6 address 20:1:1::7/64
       active-gateway ipv6 mac aa:aa:00:00:11:fe
       active-gateway ipv6 20:1:1::1
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 ospfv3 passive
       ipv6 mld enable
       ipv6 pim6-sparse enable

interface vlan 24
       ipv6 address 20:1:5::7/64
       active-gateway ipv6 mac aa:aa:00:00:11:fe
       active-gateway ipv6 20:1:5::1
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 ospfv3 passive
       ipv6 mld enable
       ipv6 pim6-sparse enable

interface vlan 28
       ipv6 address 20:1:9::1/64
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable
vsx
       inter-switch-link lag 100
       role primary
       keepalive peer 2.1.1.2 source 2.1.1.1
!
!
!
!
!
router ospfV3 1
       router-id 3.3.3.3
       redistribute connected
```

```
       area 0.0.0.0
router pim6
       enable
       active-active

https-server vrf mgmt
```

Core VSX Secondary Configuration

```
hostname Core-VSX-Secondary
bfd
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 20
       ipv6 mld snooping enable

vlan 24
       ipv6 mld snooping enable

vlan 28
interface mgmt
       no shutdown
       ip dhcp

interface lag 1 multi-chassis
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
       lacp mode active
       lacp rate fast

interface lag 7
       description mtraced - 58
       no shutdown
       ipv6 address 57::2/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface lag 10
       description mtraced - 59
       no shutdown
       ipv6 address 60::2/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface lag 100
```

```
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 20,24,28
       lacp mode active
       lacp rate fast

interface 1/1/1
       no shutdown
       lag 100
interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
description KA
       no shutdown
       ip address 2.1.1.1/24
interface 1/1/19
       no shutdown
       lag 7
interface 1/1/20
       no shutdown
       lag 10
interface 1/1/21
       no shutdown
       lag 1
interface 1/1/22
       no shutdown
       lag 1
interface vlan 20
       ipv6 address 20:1:1::6/64
       active-gateway ipv6 mac aa:aa:00:00:11:fe
       active-gateway ipv6 20:1:1::1
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 ospfv3 passive
       ipv6 mld enable
       ipv6 pim6-sparse enable

interface vlan 24
       ipv6 address 20:1:5::6/64
       active-gateway ipv6 mac aa:aa:00:00:11:fe
       active-gateway ipv6 20:1:5::1
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 ospfv3 passive
       ipv6 mld enable
       ipv6 pim6-sparse enable

interface vlan 28
       ipv6 address 20:1:9::2/64
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable
vsx
       inter-switch-link lag 100
       role secondary
       keepalive peer 2.1.1.2 source 2.1.1.1
!
!
!
!
!
```

```
router ospfv3 1
       router-id 4.4.4.4
       area 0.0.0.0
router pim6
       enable
       active-active
https-server vrf mgmt
```

Edge 1

```
Edge1(config)# show running-config
Current configuration:
!
!Version ArubaOS-CX LL.10.12.0001AR
!export-password: default
hostname Edge1
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1,602
interface mgmt
       no shutdown
       ip dhcp
interface lag 6
       no shutdown
       ipv6 address 56::2/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface lag 7
       no shutdown
       ipv6 address 57::10/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface 1/1/5
       no shutdown
       lag 6
interface 1/1/6
       no shutdown
       lag 7
interface 1/1/23
       no shutdown
       no routing
       vlan access 602
interface loopback 1
       ipv6 address a000:1:1:2::1/128
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable
```

```
interface vlan 602
       ipv6 address 62::1/64
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable
!
!
!
!
!

router ospfv3 1
       router-id 2.2.2.2
       area 0.0.0.0

router pim6
       enable
       rp-candidate source-ip-interface loopback1 group-prefix ff00::/8
       bsr-candidate source-ip-interface loopback1
https-server vrf mgmt
```

Edge 2

```
cli-session
       timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1,604
interface mgmt
       no shutdown
       ip dhcp
interface lag 9
       description mtraced - 75
       no shutdown
       ipv6 address 59::1/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface lag 10
       description mtraced - 76
       no shutdown
       ipv6 address 60::1/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface 1/1/1
       no shutdown
       lag 9
interface 1/1/2
       no shutdown
       lag 10
interface 1/1/3
       no shutdown
```

```
       no routing
       vlan access 604
interface loopback 1
       ipv6 address a000:1:1:3::1/128
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable
interface vlan 604
       ipv6 address 64::1/64
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable
!
!
!
!
!

router ospfv3 1
       router-id 10.10.10.10
       area 0.0.0.0
router pim6
       enable
       rp-candidate source-ip-interface loopback1 group-prefix ff00::/8
       bsr-candidate source-ip-interface loopback1
https-server vrf mgmt
```

IPv6 Logs

```
Edge1(config)# show ipv6 pim6 bsr elected all-vrfs

Status and Counters - PIM-SM(IPv6) Elected Bootstrap Router Information

VRF                       : default
E-BSR Address             : a000:1:1:3::1
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 126
E-BSR Up Time             : 2 hour 14 mins 3 secs
Next Bootstrap Message    : 1 mins 17 secs

Edge1(config)# show ipv6 pim6 all-vrfs

PIM Global Parameters

VRF                              :  default
PIM Status                       :  Enabled
PIM SSM Status                   :  Disabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
PIM is not enabled for VRF mgmt
Edge1(config)# show ipv6 pim6 bsr elected all-vrfs

Status and Counters - PIM-SM(IPv6) Elected Bootstrap Router Information

VRF                       : default
E-BSR Address             : a000:1:1:3::1
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 126
E-BSR Up Time             : 2 hour 14 mins 13 secs
```

```
Next Bootstrap Message    : 2 mins 7 secs

Edge1(config)# show ipv6 pim6 rp-set

VRF: default

Status and Counters - PIM-SM(IPv6) Learned RP-Set Information

Group Prefix       : ff00::/8
RP Address         : a000:1:1:3::1
Hold Time (sec)    : 150
Expire Time (sec)  : 136
Priority           : 192

Group Prefix       : ff00::/8
RP Address         : a000:1:1:2::1
Hold Time (sec)    : 150
Expire Time (sec)  : 136
Priority           : 192

Edge1(config)# show ipv6 mroute ff1e::1

IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                 : ff1e::1
Source Address                : 62::2
Neighbor                      :
Incoming interface            : vlan602
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 01:42:41
Downstream Interface
Interface       State
-----------     ----------
lag7            forwarding
lag6            forwarding

================================================================================

Core-VSX-Primary(config)# show ipv6 pim6 bsr elected

Status and Counters - PIM-SM(IPv6) Elected Bootstrap Router Information

VRF                       : default
E-BSR Address             : a000:1:1:3::1
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 126
E-BSR Up Time             : 2 hour 15 mins 18 secs
Next Bootstrap Message    : 2 mins 3 secs

Core-VSX-Primary(config)# show ip pim rp-set

VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
```

```
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        120.1.30.1       150        127          192
224.0.0.0        240.0.0.0        120.1.20.1       150        127          192
Core-VSX-Primary(config)#
Core-VSX-Primary(config)# show ipv6 mld interface vlan 20

MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Non-Querier
Querier IP                 : fe80::fd:4580:1467:5c0
Querier Uptime             : 3h 20m
Querier Expiration Time    : 4m 7s
MLD Snoop Enabled on VLAN  : True

Active Group Address                          Vers Mode Uptime    Expires
--------------------------------------------- ---- ---- --------- ---------
ff1e::1                                       1         1h 44m    4m 14s

Core-VSX-Primary(config)# show ipv6 mld snooping vlan 20 group ff1e::1

MLD ports and group information for group ff1e::1

VLAN ID   : 20
VLAN Name : VLAN20

Group Address : ff1e::1
Last Reporter : fe80::212:1ff:fe00:1
Group Type    : Filter

V1        Sources   Sources
Port                     Vers Mode Uptime    Expires   Timer     Forwarded Blocked
------------------------ ---- ---- --------- --------- --------- --------- -------
-
lag1                     1    EXC  1h 45m    3m 21s    3m 21s    0         0

Core-VSX-Primary(config)# show ipv6 mld interface vlan24

MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Non-Querier
Querier IP                 : fe80::fd:4580:1867:5c0
Querier Uptime             : 6h 40m
Querier Expiration Time    : 3m 22s
MLD Snoop Enabled on VLAN  : True

Active Group Address                          Vers Mode Uptime    Expires
--------------------------------------------- ---- ---- --------- ---------
ff1e::1                                       1         5h 4m     3m 37s

Core-VSX-Primary(config)# show ipv6 mld snooping vlan 24 group ff1e::1

MLD ports and group information for group ff1e::1

VLAN ID   : 24
VLAN Name : VLAN24

Group Address : ff1e::1
Last Reporter : fe80::213:1ff:fe00:1
Group Type    : Filter

V1        Sources   Sources
```

```
Port                     Vers Mode Uptime    Expires   Timer     Forwarded Blocked
------------------------ ---- ---- --------- --------- --------- --------- -------
-
lag1                     1    EXC  5h 4m     3m 26s    3m 26s    0         0

Core-VSX-Primary(config)#

Core-VSX-Primary(config)# show ipv6 mroute ff1e::1

IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                 : ff1e::1
Source Address                : 62::2
Neighbor                      : fe80::fd:4590:667:3880
Incoming interface            : lag6
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 01:44:57
Downstream Interface
Interface       State          VSX Role
-----------     -----------     --------
vlan20          forwarding     DR
vlan24          forwarding     DR

Core-VSX-Primary(config)#

=====================================================================

Core-VSX-Secondary(config)# show ipv6 pim6 bsr elected

Status and Counters - PIM-SM(IPv6) Elected Bootstrap Router Information

VRF                       : default
E-BSR Address             : a000:1:1:3::1
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 126
E-BSR Up Time             : 5 hour 37 mins 11 secs
Next Bootstrap Message    : 0 secs

Core-VSX-Secondary(config)# show ip pim rp-set

VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        120.1.30.1       150        127          192
224.0.0.0        240.0.0.0        120.1.20.1       150        127          192
Core-VSX-Secondary(config)# show ipv6 mld interface vlan 20

MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Querier
Querier IP [this switch]   : fe80::fd:4580:1467:5c0
Querier Uptime             : 6h 42m
```

```
Querier Expiration Time    : 1m 37s
MLD Snoop Enabled on VLAN  : True

Active Group Address                          Vers Mode Uptime    Expires
--------------------------------------------- ---- ---- --------- ---------
ff1e::1                                       1         5h 6m     3m 55s

Core-VSX-Secondary(config)# show ipv6 mld interface vlan 24

MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Querier
Querier IP [this switch]   : fe80::fd:4580:1867:5c0
Querier Uptime             : 6h 44m
Querier Expiration Time    : 0m 9s
MLD Snoop Enabled on VLAN  : True

Active Group Address                          Vers Mode Uptime    Expires
--------------------------------------------- ---- ---- --------- ---------
ff1e::1                                       1         5h 7m     2m 30s

Core-VSX-Secondary(config)# show ipv6 mld snooping vlan 20 group ff1e::1

MLD ports and group information for group ff1e::1

VLAN ID   : 20
VLAN Name : VLAN20

Group Address : ff1e::1
Last Reporter : fe80::212:1ff:fe00:1
Group Type    : Filter

V1        Sources   Sources
Port                    Vers Mode Uptime    Expires   Timer     Forwarded Blocked
----------------------- ---- ---- --------- --------- --------- --------- -------
-
lag1                    1    EXC  5h 8m     4m 18s    4m 18s    0         0

Core-VSX-Secondary(config)# show ipv6 mld snooping vlan 24 group ff1e::1

MLD ports and group information for group ff1e::1

VLAN ID   : 24
VLAN Name : VLAN24

Group Address : ff1e::1
Last Reporter : fe80::213:1ff:fe00:1
Group Type    : Filter

V1        Sources   Sources
Port                    Vers Mode Uptime    Expires   Timer     Forwarded Blocked
----------------------- ---- ---- --------- --------- --------- --------- -------
-
lag1                    1    EXC  5h 8m     4m 10s    4m 10s    0         0

Core-VSX-Secondary(config)#


Core-VSX-Secondary(config)# show ipv6 mroute ff1e::1

IP Multicast Route Entries
```

```
VRF : default
Total number of entries : 3

Group Address                 : ff1e::1
Source Address                : 62::2
Neighbor                      : fe80::fd:4590:767:3880
Incoming interface            : vlan24
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 05:07:57

Group Address                 : ff1e::1
Source Address                : 62::2
Neighbor                      : fe80::fd:4590:767:3880
Incoming interface            : vlan20
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 05:07:57

Group Address                 : ff1e::1
Source Address                : 62::2
Neighbor                      : fe80::fd:4590:767:3880
Incoming interface            : lag7
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 05:07:57
Downstream Interface
Interface       State          VSX Role
-----------     ----------     --------
vlan20          forwarding     Proxy DR
vlan24          forwarding     Proxy DR

Core-VSX-Secondary(config)#

================================================================================
=
6300-Access-switch(config)# show ipv6 mld snooping vlan 20
MLD Snooping Protocol Info

Total VLANs with MLD enabled              : 8
Current count of multicast groups joined  : 10

MLD Drop Unknown Multicast               : Global
VLAN ID : 20
VLAN Name : VLAN20
MLD Configured Version : 2
MLD Operating Version : 2
Querier Address : fe80::fd:4580:1467:5c0
Querier Port : lag1
Querier UpTime :6h 45m
Querier Expiration Time :2m 37s

Active Group Address                          Tracking Vers Mode  Uptime    Expires
--------------------------------------------- --------- ---- ----- --------- -------
-
ff1e::1                                       Filter    1         5h 9m     2m 52s
```

```
6300-Access-switch(config)# show ipv6 mld snooping vlan 24
MLD Snooping Protocol Info

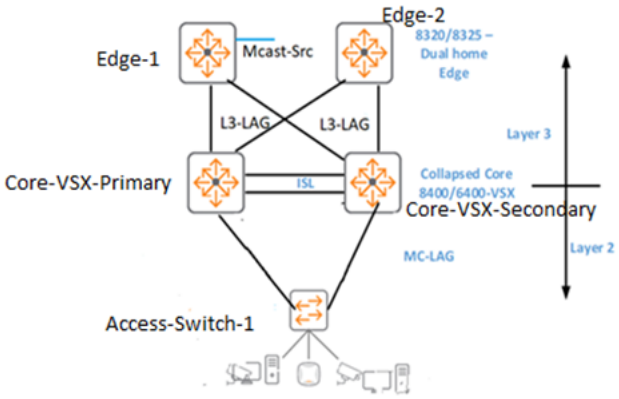
Total VLANs with MLD enabled              : 8
Current count of multicast groups joined  : 10

MLD Drop Unknown Multicast               : Global
VLAN ID : 24
VLAN Name : VLAN24
MLD Configured Version : 2
MLD Operating Version : 2
Querier Address : fe80::fd:4580:1867:5c0
Querier Port : lag1
Querier UpTime :6h 45m
Querier Expiration Time :2m 11s

Active Group Address                          Tracking Vers Mode  Uptime    Expires
--------------------------------------------- --------- ---- ----- --------- -------
-
ff1e::1                                       Filter    1         5h 9m     2m 25s
```

Use case 5: IPv6 2 Layer VSX Scenario 2

Figure 1 *Use case 5: IPv6 2 Layer VSX Scenario 2*



Configuration and verification details for the devices in this use case are provided in the following sections:

- Access-Switch 1
- Core VSX Primary Configuration
- Core VSX Secondary Configuration
- Distro VSX Primary Configuration
- Distro VSX Secondary Configuration
- Edge 1
- Edge 2
- IPv6 Multi-Layer VSX Logs

Access-Switch-1

```
6300(config)# show running-config
Current configuration:
!
!Version ArubaOS-CX FL.10.12.0001AO
!export-password: default
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vsf member 1
       type r8s90a
       link 1 1/1/51-1/1/52
vsf member 3
       type r8s91a
       link 1 3/1/51-3/1/52
vlan 1
vlan 20
       ip igmp snooping enable
       ipv6 mld snooping enable
vlan 21
       ip igmp snooping enable
       ipv6 mld snooping enable
vlan 22
       ip igmp snooping enable
       ipv6 mld snooping enable
vlan 23
       ip igmp snooping enable
       ipv6 mld snooping enable
vlan 24
       ip igmp snooping enable
       ipv6 mld snooping enable
vlan 25
       ip igmp snooping enable
       ipv6 mld snooping enable
vlan 26
       ip igmp snooping enable
       ipv6 mld snooping enable
vlan 27
       ip igmp snooping enable
       ipv6 mld snooping enable
spanning-tree
interface mgmt
       no shutdown
       ip dhcp
system interface-group 1 member 1 speed 10g
       !interface group 1 contains ports 1/1/51-1/1/52
interface lag 1
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20-27
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
```

```
       lag 1
interface 1/1/2
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20-27
interface 1/1/3
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20-27
interface 1/1/4
       no shutdown
       no routing
       vlan access 1
interface 1/1/5
       no shutdown
       no routing
       vlan access 1
interface 1/1/6
       no shutdown
       no routing
       vlan access 1
interface 1/1/7
       no shutdown
       no routing
       vlan access 1
interface 1/1/8
       no shutdown
       no routing
       vlan access 1
interface 1/1/9
       no shutdown
       no routing
       vlan access 1
interface 1/1/10
       no shutdown
       no routing
       vlan access 1
interface 1/1/11
       no shutdown
       no routing
       vlan access 1
interface 1/1/12
       no shutdown
       no routing
       vlan access 1
interface 1/1/13
       no shutdown
       no routing
       vlan access 1
interface 1/1/14
       no shutdown
       no routing
       vlan access 1
interface 1/1/15
       no shutdown
       no routing
       vlan access 1
interface 1/1/16
       no shutdown
       no routing
```

```
       vlan access 1
interface 1/1/17
       no shutdown
       no routing
       vlan access 1
interface 1/1/18
       no shutdown
       no routing
       vlan access 1
interface 1/1/19
       no shutdown
       no routing
       vlan access 1
interface 1/1/20
       no shutdown
       no routing
       vlan access 1
interface 1/1/21
       no shutdown
       no routing
       vlan access 1
interface 1/1/22
       no shutdown
       no routing
       vlan access 1
interface 1/1/23
       no shutdown
       no routing
       vlan access 1
interface 1/1/24
       no shutdown
       no routing
       vlan access 1
interface 1/1/25
       no shutdown
       no routing
       vlan access 1
interface 1/1/26
       no shutdown
       no routing
       vlan access 1
interface 1/1/27
       no shutdown
       no routing
       vlan access 1
interface 1/1/28
       no shutdown
       no routing
       vlan access 1
interface 1/1/29
       no shutdown
       no routing
       vlan access 1
interface 1/1/30
       no shutdown
       no routing
       vlan access 1
interface 1/1/31
       no shutdown
       no routing
       vlan access 1
interface 1/1/32
```

```
       no shutdown
       no routing
       vlan access 1
interface 1/1/33
       no shutdown
       no routing
       vlan access 1
interface 1/1/34
       no shutdown
       no routing
       vlan access 1
interface 1/1/35
       no shutdown
       no routing
       vlan access 1
interface 1/1/36
       no shutdown
       no routing
       vlan access 1
interface 1/1/37
       no shutdown
       no routing
       vlan access 1
interface 1/1/38
       no shutdown
       no routing
       vlan access 1
interface 1/1/39
       no shutdown
       no routing
       vlan access 1
interface 1/1/40
       no shutdown
       no routing
       vlan access 1
interface 1/1/41
       no shutdown
       no routing
       vlan access 1
interface 1/1/42
       no shutdown
       no routing
       vlan access 1
interface 1/1/43
       no shutdown
       no routing
       vlan access 1
interface 1/1/44
       no shutdown
       no routing
       vlan access 1
interface 1/1/45
       no shutdown
       no routing
       vlan access 1
interface 1/1/46
       no shutdown
       no routing
       vlan access 1
interface 1/1/47
       no shutdown
       no routing
```

```
       vlan access 1
interface 1/1/48
       no shutdown
       no routing
       vlan access 1
interface 1/1/49
       no shutdown
       no routing
       vlan access 1
interface 1/1/50
       no shutdown
       no routing
       vlan access 1
interface 1/1/51
       no shutdown
interface 1/1/52
       no shutdown
interface 3/1/1
       no shutdown
       lag 1
interface 3/1/2
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20-27
interface 3/1/3
       no shutdown
       no routing
       vlan access 1
interface 3/1/4
       no shutdown
       no routing
       vlan access 1
interface 3/1/5
       no shutdown
       no routing
       vlan access 1
interface 3/1/6
       no shutdown
       no routing
       vlan access 1
interface 3/1/7
       no shutdown
       no routing
       vlan access 1
interface 3/1/8
       no shutdown
       no routing
       vlan access 1
interface 3/1/9
       no shutdown
       no routing
       vlan access 1
interface 3/1/10
       no shutdown
       no routing
       vlan access 1
interface 3/1/11
       no shutdown
       no routing
       vlan access 1
interface 3/1/12
```

```
       no shutdown
       no routing
       vlan access 1
interface 3/1/13
       no shutdown
       no routing
       vlan access 1
interface 3/1/14
       no shutdown
       no routing
       vlan access 1
interface 3/1/15
       no shutdown
       no routing
       vlan access 1
interface 3/1/16
       no shutdown
       no routing
       vlan access 1
interface 3/1/17
       no shutdown
       no routing
       vlan access 1
interface 3/1/18
       no shutdown
       no routing
       vlan access 1
interface 3/1/19
       no shutdown
       no routing
       vlan access 1
interface 3/1/20
       no shutdown
       no routing
       vlan access 1
interface 3/1/21
       no shutdown
       no routing
       vlan access 1
interface 3/1/22
       no shutdown
       no routing
       vlan access 1
interface 3/1/23
       no shutdown
       no routing
       vlan access 1
interface 3/1/24
       no shutdown
       no routing
       vlan access 1
interface 3/1/25
       no shutdown
       no routing
       vlan access 1
interface 3/1/26
       no shutdown
       no routing
       vlan access 1
interface 3/1/27
       no shutdown
       no routing
```

```
       vlan access 1
interface 3/1/28
       no shutdown
       no routing
       vlan access 1
interface 3/1/29
       no shutdown
       no routing
       vlan access 1
interface 3/1/30
       no shutdown
       no routing
       vlan access 1
interface 3/1/31
       no shutdown
       no routing
       vlan access 1
interface 3/1/32
       no shutdown
       no routing
       vlan access 1
interface 3/1/33
       no shutdown
       no routing
       vlan access 1
interface 3/1/34
       no shutdown
       no routing
       vlan access 1
interface 3/1/35
       no shutdown
       no routing
       vlan access 1
interface 3/1/36
       no shutdown
       no routing
       vlan access 1
interface 3/1/37
       no shutdown
       no routing
       vlan access 1
interface 3/1/38
       no shutdown
       no routing
       vlan access 1
interface 3/1/39
       no shutdown
       no routing
       vlan access 1
interface 3/1/40
       no shutdown
       no routing
       vlan access 1
interface 3/1/41
       no shutdown
       no routing
       vlan access 1
interface 3/1/42
       no shutdown
       no routing
       vlan access 1
interface 3/1/43
```

```
       no shutdown
       no routing
       vlan access 1
interface 3/1/44
       no shutdown
       no routing
       vlan access 1
interface 3/1/45
       no shutdown
       no routing
       vlan access 1
interface 3/1/46
       no shutdown
       no routing
       vlan access 1
interface 3/1/47
       no shutdown
       no routing
       vlan access 1
interface 3/1/48
       no shutdown
       no routing
       vlan access 1
interface 3/1/49
       no shutdown
       no routing
       vlan access 1
interface 3/1/50
       no shutdown
       no routing
       vlan access 1
interface 3/1/51
       no shutdown
interface 3/1/52
       no shutdown
interface vlan 1
       ip dhcp
!
!
!
!
!
https-server vrf default
https-server vrf mgmt
```

Core VSX Primary Configuration

```
hostname Core-VSX-Primary
bfd
no ip icmp redirect
profile aggregation-leaf
vrf green
cli-session
       timeout 0
!
!
!
!
!
!
```

```
ssh server vrf mgmt
vlan 1
vlan 601,603
       vsx-sync
interface mgmt
       no shutdown
       ip dhcp

interface lag 6
       no shutdown
       ipv6 address 56::2/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface lag 7
       no shutdown
       ipv6 address 57::10/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface lag 16 multi-chassis
       no shutdown
       no routing
       vlan access 601
       lacp mode active
interface lag 17 multi-chassis
       no shutdown
       no routing
       vlan access 603
       lacp mode active
interface lag 100
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 1,601,603
       lacp mode active
       lacp rate fast
interface 1/1/1
       no shutdown
       lag 100
interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
       description KA
       no shutdown
       ip address 140.1.1.1/24
interface 1/1/17
       no shutdown
       lag 6
interface 1/1/18
       no shutdown
       lag 7
interface 1/1/22
       no shutdown
       lag 16
interface 1/1/23
```

```
       no shutdown
       lag 17
interface loopback 1
       ipv6 address a000:1:1:2::1/128
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface vlan 601
       vsx active-forwarding
       ipv6 address 61::1/64
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface vlan 603
       vsx active-forwarding
       ipv6 address 63::1/64
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

vsx
       inter-switch-link lag 100
       role primary
       keepalive peer 140.1.1.2 source 140.1.1.1
       vsx-sync mclag-interfaces
!
!
!
!
!

router ospfv3 1
       router-id 2.2.2.2
       area 0.0.0.0

router pim6
       enable
       rp-candidate source-ip-interface loopback1 group-prefix ff00::/8
       bsr-candidate source-ip-interface loopback1
https-server vrf mgmt
```

Core VSX Secondary Configuration

```
hostname Core-VSX-Secondary
module 1/2 product-number jl363a
bfd
no ip icmp redirect
cli-session
       timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1,501-502
vlan 601
       vsx-sync
interface mgmt
       no shutdown
       ip dhcp
```

```
interface lag 9
       description mtraced - 75
       no shutdown
       ipv6 address 59::1/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable
interface lag 10
       description mtraced - 76
       no shutdown
       ipv6 address 60::1/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface lag 16 multi-chassis
       no shutdown
       no routing
       vlan access 601
       lacp mode active
interface lag 100
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 1,601
       lacp mode active
       lacp rate fast
interface 1/1/9
       no shutdown
       lag 9
interface 1/1/10
       no shutdown
       lag 10
interface 1/1/1
       no shutdown
       lag 100
interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
       description KA
       no shutdown
       ipv6 address 140::2/64
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface 1/1/11
       no shutdown
       lag 16
interface loopback 1
       ipv6 address a000:1:1:3::1/128
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface vlan 601
       vsx active-forwarding
       ipv6 address 61::2/64
       ipv6 ospfv3 1 area 0.0.0.0
```

```
       ipv6 pim6-sparse enable

vsx
       inter-switch-link lag 100
       role secondary
       keepalive peer 140.1.1.1 source 140.1.1.2
       vsx-sync mclag-interfaces
!
!
!
!
!

router ospfv3 1
       router-id 10.10.10.10
       area 0.0.0.0

router pim6
       enable
       rp-candidate source-ip-interface loopback1 group-prefix ff00::/8
https-server vrf mgmt
```

Distro VSX Primary Configuration

```
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 20
       ip igmp snooping enable
       ipv6 mld snooping enable

vlan 24
       ip igmp snooping enable
       ipv6 mld snooping enable

vlan 28-29
interface mgmt
       no shutdown
       ip dhcp

interface lag 1 multi-chassis
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
       lacp mode active

interface lag 6
       no shutdown
       ipv6 address 56::1/64
       lacp mode active
       lacp rate fast
```

```
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface lag 9
       no shutdown
       ipv6 address 50::2/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface lag 100
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 20,24,28
       lacp mode active
       lacp rate fast

interface 1/1/1
       no shutdown
       lag 100
       interface 1/1/2
       no shutdown
       lag 100
interface 1/1/3
       description KA
       no shutdown
       ip address 2.1.1.1/24
       interface 1/1/45
       no shutdown
       lag 6
interface 1/1/46
       no shutdown
       lag 9
       interface 1/1/47
       no shutdown
       lag 1
interface 1/1/48
       no shutdown
       lag 1
interface vlan 20
       ipv6 address 20:1:1::7/64
       active-gateway ipv6 mac aa:aa:00:00:11:fe
       active-gateway ipv6 20:1:1::1
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 ospfv3 passive
       ipv6 mld enable
       ipv6 pim6-sparse enable

interface vlan 24
       ipv6 address 20:1:5::7/64
       active-gateway ipv6 mac aa:aa:00:00:11:fe
       active-gateway ipv6 20:1:5::1
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 ospfv3 passive
       ipv6 mld enable
       ipv6 pim6-sparse enable

interface vlan 28
       ipv6 address 20:1:9::1/64
```

```
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

vsx
       inter-switch-link lag 100
       role primary
       keepalive peer 2.1.1.2 source 2.1.1.1
!
!
!
!
!

router ospfv3 1
       router-id 3.3.3.3
       area 0.0.0.0

router pim6
       enable
       active-active
https-server vrf mgmt
```

Distro VSX Secondary Configuration

```
distro-VSX-Secondary(config)# show running-config
Current configuration:
!
!Version ArubaOS-CX LL.10.12.0001AO
!export-password: default
hostname distro-VSX-Secondary
bfd
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 20
       ipv6 mld snooping enable

vlan 24
       ipv6 mld snooping enable

vlan 28
interface mgmt
       no shutdown
       ip dhcp

interface lag 1 multi-chassis
       no shutdown
       no routing
       vlan trunk native 1
       vlan trunk allowed 20,24
       lacp mode active
interface lag 7
```

```
       description mtraced - 58
       no shutdown
       ipv6 address 57::2/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface lag 10
       description mtraced - 59
       no shutdown
       ipv6 address 60::2/64
       lacp mode active
       lacp rate fast
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface lag 100
       description ISL
       no shutdown
       no routing
       vlan trunk native 1 tag
       vlan trunk allowed 20,24,28
       lacp mode active
       lacp rate fast

interface 1/1/1
       no shutdown
       lag 100
interface 1/1/2
       no shutdown
       lag 100

interface 1/1/3
       description KA
       no shutdown
       ip address 2.1.1.1/24
interface 1/1/19
       no shutdown
       lag 7
interface 1/1/20
       no shutdown
       lag 10
interface 1/1/21
       no shutdown
       lag 1
interface 1/1/22
       no shutdown
       lag 1

interface vlan 20
       ipv6 address 20:1:1::6/64
       active-gateway ipv6 mac aa:aa:00:00:11:fe
       active-gateway ipv6 20:1:1::1
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 ospfv3 passive
       ipv6 mld enable
       ipv6 pim6-sparse enable

interface vlan 24
       ipv6 address 20:1:5::6/64
       active-gateway ipv6 mac aa:aa:00:00:11:fe
```

```
       active-gateway ipv6 20:1:5::1
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 ospfv3 passive
       ipv6 mld enable
       ipv6 pim6-sparse enable

interface vlan 28
       ipv6 address 20:1:9::2/64
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable
vsx
       inter-switch-link lag 100
       role secondary
       keepalive peer 2.1.1.2 source 2.1.1.1
!
!
!
!
!

router ospfv3 1
       router-id 4.4.4.4
       area 0.0.0.0

router pim6
       enable
       active-active
https-server vrf mgmt
```

Edge 1

```
hostname Edge
profile aggregation-leaf
cli-session
       timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1,601-602
interface mgmt
       no shutdown
       ip dhcp

interface lag 16
       no shutdown
       no routing
       vlan access 601
       lacp mode active
       lacp rate fast
interface 1/1/8
       no shutdown
       lag 16
interface 1/1/11
       no shutdown
       lag 16
interface 1/1/9
```

```
       no shutdown
       no routing
       vlan access 602
interface loopback 1
       ipv6 address a000:1:1:1::1/128
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface vlan 601
       ipv6 address 61::10/64
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface vlan 602
       ipv6 address 62::1/64
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable
!
!
!
!
!

router ospfv3 1
       router-id 101.101.101.101
       area 0.0.0.0

router pim6
       enable
       bsr-candidate source-ip-interface loopback1
https-server vrf mgmt
```

Edge 2

```
hostname Edge2
profile l3-core
cli-session
       timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1,603-604
interface mgmt
       no shutdown
       ip dhcp
interface lag 17
       no shutdown
       no routing
       vlan access 603
       lacp mode active
       lacp rate fast
interface 1/1/8
       no shutdown
       lag 17
interface 1/1/9
       no shutdown
       no routing
```

```
       vlan access 604
interface 1/1/11
       no shutdown
       lag 17
interface loopback 1
       ipv6 address a000:1:1:10::1/128
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable
       .
interface vlan 603
       ipv6 address 63::10/64
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable

interface vlan 604
       ipv6 address 64::1/64
       ipv6 ospfv3 1 area 0.0.0.0
       ipv6 pim6-sparse enable
!
!
!
!
!

router ospfv3 1
       router-id 103.101.101.101
       area 0.0.0.0

router pim6
       enable
https-server vrf mgmt
```

IPv6 Multi-Layer VSX Logs

```
Edge(config)# show ipv6 pim6 rp-candidate
Edge(config)# show ipv6 pim6 rp-set

VRF: default

Status and Counters - PIM-SM(IPv6) Learned RP-Set Information

Group Prefix       : ff00::/8
RP Address         : a000:1:1:2::1
Hold Time (sec)    : 150
Expire Time (sec)  : 150
Priority           : 192

Group Prefix       : ff00::/8
RP Address         : a000:1:1:3::1
Hold Time (sec)    : 150
Expire Time (sec)  : 150
Priority           : 192

Edge(config)# show ipv6 mroute ff1e::1

IP Multicast Route Entries

VRF : default
Total number of entries : 1
```

```
Group Address                 : ff1e::1
Source Address                : 62::2
Neighbor                      :
Incoming interface            : vlan602
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 00:23:18
Downstream Interface
Interface       State
-----------     ----------
vlan601         forwarding

================================================================================

Core-VSX-Primary(config)# show ipv6 pim6 rp-candidate
Status and Counters- PIM-SM(IPv6) Candidate-RP Information

VRF                       : default
C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : a000:1:1:2::1
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 192
C-RP Source IP Interface  : loopback1

Group Prefix   : ff00::/8

Core-VSX-Primary(config)# show ipv6 pim6 rp-set

VRF: default

Status and Counters - PIM-SM(IPv6) Learned RP-Set Information

Group Prefix       : ff00::/8
RP Address         : a000:1:1:2::1
Hold Time (sec)    : 150
Expire Time (sec)  : 133
Priority           : 192

Group Prefix       : ff00::/8
RP Address         : a000:1:1:3::1
Hold Time (sec)    : 150
Expire Time (sec)  : 133
Priority           : 192

Core-VSX-Primary(config)# show ipv6 mroute ff1e::1

IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                 : ff1e::1
Source Address                : 62::2
Neighbor                      :
Incoming interface            : vlan601
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 110
```

```
Uptime (HH:MM:SS)             : 00:24:12
================================================================================
=

Core-VSX-Secondary(config)# show ipv6 pim6 rp-candidate
Status and Counters- PIM-SM(IPv6) Candidate-RP Information

VRF                       : default
C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : a000:1:1:3::1
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 192
C-RP Source IP Interface  : loopback1

Group Prefix   : ff00::/8

Core-VSX-Secondary(config)#
Core-VSX-Secondary(config)#
Core-VSX-Secondary(config)#
Core-VSX-Secondary(config)# show ipv6 pim6 rp-set

VRF: default

Status and Counters - PIM-SM(IPv6) Learned RP-Set Information

Group Prefix       : ff00::/8
RP Address         : a000:1:1:3::1
Hold Time (sec)    : 150
Expire Time (sec)  : 132
Priority           : 192

Group Prefix       : ff00::/8
RP Address         : a000:1:1:2::1
Hold Time (sec)    : 150
Expire Time (sec)  : 132
Priority           : 192

Core-VSX-Secondary(config)# show ipv6 mroute ff1e::1

IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                 : ff1e::1
Source Address                : 62::2
Neighbor                      : fe80::fd:4582:5967:a440
Incoming interface            : vlan601
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 00:25:13
Downstream Interface
Interface       State
-----------     ----------
lag10           forwarding
lag9            forwarding

================================================================================
=
```

```
Distro-VSX-Primary(config)# show ipv6 pim6 rp-candidate
Distro-VSX-Primary(config)#
Distro-VSX-Primary(config)#
Distro-VSX-Primary(config)#
Distro-VSX-Primary(config)# show ipv6 pim6 rp-set

VRF: default

Status and Counters - PIM-SM(IPv6) Learned RP-Set Information

Group Prefix       : ff00::/8
RP Address         : a000:1:1:3::1
Hold Time (sec)    : 150
Expire Time (sec)  : 113
Priority           : 192

Group Prefix       : ff00::/8
RP Address         : a000:1:1:2::1
Hold Time (sec)    : 150
Expire Time (sec)  : 113
Priority           : 192


Distro-VSX-Primary(config)# show ipv6 mld interface vlan 20

MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Non-Querier
Querier IP                 : fe80::fd:4580:1467:f400
Querier Uptime             : 7h 10m
Querier Expiration Time    : 2m 16s
MLD Snoop Enabled on VLAN  : True

Active Group Address                          Vers Mode Uptime    Expires
--------------------------------------------- ---- ---- --------- ---------
ff1e::1                                       1         1h 45m    2m 29s

Distro-VSX-Primary(config)# show ipv6 mld snooping vlan 20 group ff1e::1

MLD ports and group information for group ff1e::1

VLAN ID   : 20
VLAN Name : VLAN20

Group Address : ff1e::1
Last Reporter : fe80::212:1ff:fe00:1
Group Type    : Filter


                                                    V1        Sources   Sources
Port                      Vers Mode Uptime    Expires   Timer     Forwarded Blocked
------------------------- ---- ---- --------- --------- --------- --------- -------
-
lag1                      1    EXC  1h 46m    4m 16s    4m 16s    0         0

Distro-VSX-Primary(config)# show ipv6 mroute ff1e::1

IP Multicast Route Entries

VRF : default
```

```
Total number of entries : 3

Group Address                  : ff1e::1
Source Address                 : 62::2
Neighbor                       : fe80::409:7390:962:2400
Incoming interface             : lag9
Multicast Routing Protocol     : PIM-SM
Unicast Routing Protocol       : OSPF
Metric                         : 300
Metric  Pref                   : 110
Uptime (HH:MM:SS)              : 00:27:16
Downstream Interface
Interface       State          VSX Role
-----------     ----------     --------
vlan20          forwarding     Proxy DR
vlan24          forwarding     Proxy DR

Group Address                  : ff1e::1
Source Address                 : 62::2
Neighbor                       : fe80::409:7390:962:2400
Incoming interface             : vlan24
Multicast Routing Protocol     : PIM-SM
Unicast Routing Protocol       : OSPF
Metric                         : 300
Metric  Pref                   : 110
Uptime (HH:MM:SS)              : 00:27:16

Group Address                  : ff1e::1
Source Address                 : 62::2
Neighbor                       : fe80::409:7390:962:2400
Incoming interface             : vlan20
Multicast Routing Protocol     : PIM-SM
Unicast Routing Protocol       : OSPF
Metric                         : 300
Metric  Pref                   : 110
Uptime (HH:MM:SS)              : 00:27:16

================================================================================


distro-VSX-Secondary(config)# show ipv6 pim6 rp-set

VRF: default

Status and Counters - PIM-SM(IPv6) Learned RP-Set Information

Group Prefix       : ff00::/8
RP Address         : a000:1:1:3::1
Hold Time (sec)    : 150
Expire Time (sec)  : 119
Priority           : 192

Group Prefix       : ff00::/8
RP Address         : a000:1:1:2::1
Hold Time (sec)    : 150
Expire Time (sec)  : 119
Priority           : 192

distro-VSX-Secondary(config)# show ipv6 mld interface vlan 20

MLD Configured Version   : 2
MLD Operating Version    : 2
```

```
Querier State              : Querier
Querier IP [this switch]   : fe80::fd:4580:1467:f400
Querier Uptime             : 6h 39m
Querier Expiration Time    : 0m 26s
MLD Snoop Enabled on VLAN  : True

Active Group Address                          Vers Mode Uptime    Expires
--------------------------------------------- ---- ---- --------- ---------
ff1e::1                                       1         1h 47m    2m 47s

distro-VSX-Secondary(config)# show ipv6 mld snooping vlan 20 group ff1e::1

MLD ports and group information for group ff1e::1

VLAN ID   : 20
VLAN Name : VLAN20

Group Address : ff1e::1
Last Reporter : fe80::212:1ff:fe00:1
Group Type    : Filter

                                                        V1        Sources   Sources
Port                     Vers Mode Uptime    Expires    Timer     Forwarded Blocked
------------------------ ---- ---- --------- ---------  --------- --------- -------
-
lag1                     1    EXC  1h 48m    2m 26s     2m 26s    0         0

distro-VSX-Secondary(config)# show ipv6 mroute ff1e::1

IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address                : ff1e::1
Source Address               : 62::2
Neighbor                     : fe80::409:7390:a62:2400
Incoming interface           : lag10
Multicast Routing Protocol   : PIM-SM
Unicast Routing Protocol     : OSPF
Metric                       : 300
Metric  Pref                 : 110
Uptime (HH:MM:SS)            : 00:29:07
Downstream Interface
Interface       State          VSX Role
-----------     ----------     --------
vlan24          forwarding     DR
vlan20          forwarding     DR

distro-VSX-Secondary(config)#
=================================================================

Access-Switch(config)# show ipv6 mld snooping vlan 20
MLD Snooping Protocol Info

Total VLANs with MLD enabled              : 8
Current count of multicast groups joined  : 10

MLD Drop Unknown Multicast               : Global
VLAN ID : 20
VLAN Name : VLAN20
MLD Configured Version : 2
```

```
MLD Operating Version : 2
Querier Address : fe80::fd:4580:1467:f400
Querier Port : lag1
Querier UpTime :4h 40m
Querier Expiration Time :3m 33s

Active Group Address                          Tracking Vers Mode  Uptime    Expires
--------------------------------------------- -------- ---- ----- --------- -------
-
ff1e::1                                       Filter    1         1h 48m    3m 42s

Access-Switch(config)# show ipv6 mld snooping vlan 20 group ff1e::1

MLD ports and group information for group ff1e::1

VLAN ID   : 20
VLAN Name : VLAN20

Group Address : ff1e::1
Last Reporter : fe80::212:1ff:fe00:1
Group Type    : Filter

                                                        V1        Sources   Sources
Port                     Vers Mode Uptime    Expires    Timer     Forwarded Blocked
------------------------ ---- ---- --------- ---------- --------- --------- -------
-
1/1/2                    1    EXC  1h 49m    3m 17s     3m 17s    0         0
```

PIM-SM commands for IPv4

Only the default VRF is supported on the Aruba 6200 Switch Series.

accept-register access-list

```
accept-register access-list <ACL-RULE>
no accept-register access-list <ACL-RULE>
```

Description

Configures ACL on RP to filter PIM Register packets from unauthorized sources. The ACL specified will contain the (S,G) traffic in register packets to permitted or denied.

The **no** form of this command removes the currently configured ACL rule.

Parameter	Description
<ACL-RULE>	Specifies the ACL rule name.

Usage

When register ACL is associated with a PIM Router, PIM protocol will store the source and destination address details along with the action (permit or deny). If there are any existing flows, the user will need to disable and enable PIM on the interface to apply the ACL.

Upon receiving the register messages, a look up is made to check if the S and G in the packet is in the permitted list. If there is no match or if there is a deny rule match, a register stop message is immediately sent and the packet is dropped and no further action is taken. Permitted packets will go through the normal flow.

Loopback interfaces are special interfaces where only unicast PIM messages are updated. This includes Register, Register Stop, and Candidate RP Advertisements.

When a loopback interface is configured as the RP, the ACL drop counters will be updated on the interface on which the packets are received.

Examples

Configuring ACL on RP with an ACL rule named **pim_reg_acl**:

```
switch(config)# access-list ip pim_reg_acl
switch(config-acl-ip)# 10 permit any 20.1.1.1 225.1.1.2
switch(config-acl-ip)# 20 deny any 30.1.1.1 225.1.1.3
switch(config)# router pim
switch(config-pim)# accept-register access-list pim_reg_acl
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

accept-rp

```
accept-rp <IP-ADDR> access-list <ACL-RULE>
no accept-rp <IP-ADDR> access-list <ACL-RULE>
```

Description

Enables PIM router to filter PIM join/prune messages destined for a specific RP and specific groups. The ACL specifies the group addresses which are allowed or denied. Up to 8 RP addresses and group ACL can be associated with the PIM router.

The **no** form of this command removes the currently configured ACL rule.

Parameter	Description
<IP-ADDR>	Specifies the IPv4 address of the static RP. Format: A.B.C.D
<ACL-RULE>	Specifies the ACL rule name.

Usage

PIM will store the accepted RP address and the associated group ACL. When a join or prune message is received, a RP look up is made for the packet. If the RP is in the configured list and if the group in the join/prune packet is allowed in the ACL, the packet is allowed. Otherwise the packet is dropped.

To allow join/prune message from any groups, group address in the ACL can be wild-carded. In this case, only RP address check is performed.

This command impacts only (*,G) join/prune messages. If there are any existing flows, the user will need to disable and enable PIM on the interface to apply the ACL.

Loopback interfaces are special interfaces where only unicast PIM messages are updated. This includes Register, Register Stop, and Candidate RP Advertisements.

When a loopback interface is configured as the RP, the ACL drop counters will be updated on the interface on which the packets are received.



If there is an active flow which is in the SPT, the traffic flow through the SPT will continue. Only (*,G) join/prune messages are dropped. (S,G) join/prune messages will not be impacted.

Examples

Configuring ACL on a RP with an ACL rule named **pim_rp_grp_acl** to filter join/prune messages:

```
switch(config)# access-list ip pim_rp_grp_acl
switch(config-acl-ip)# 10 permit any any 225.1.1.2/255.255.255.0
switch(config-acl-ip)# 20 permit any any 239.1.1.2/255.255.255.0
switch(config)-acl-ip# router pim
switch(config-pim)# accept-rp 30.1.1.1 access-list pim_rp_grp_acl
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400	`config-pim`	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
9300 10000		

active-active

```
active-active
no active-active
```

Description

Enables the PIM active-active mechanism per VRF on VSX. The default is disabled.

The **no** form of this command disables the PIM active-active mechanism.

Usage

PIM active-active keeps the multicast forwarding state synchronized on both VSX peer devices. Synchronization is achieved by electing the VSX peer that has the highest IP address as a designated router (DR) and the other as Proxy-DR.

If you want the multicast traffic to flow through VSX primary, assign higher IP addresses to the interfaces in VSX primary. When the VSX peer that is acting as the DR goes down, traffic is recovered faster since the multicast routes are synchronized.

Recommendations:

- Do not configure the DR priority of interfaces when **active-active** is enabled. The DR priority will be set to high on DR and default on Proxy-DR and any user-configured DR priority will be ignored.
- Always configure **keepalive** between VSX peers. If the ISL goes down when **keepalive** is not configured, both VSX peers start acting independently as DRs, resulting in duplicate traffic.
- Do not configure IGMP joins on transit VLANS.
- RP redundancy is not supported on the **active-active** mechanism. If one of the VSX peers is configured as RP and it goes down, the new traffic flows will not be converged until the RP is elected. For a static RP, new flows will never be converged until the VSX peer is back up.

Examples

Enabling the PIM active-active mechanism:

```
switch(config)# router pim
switch(config-pim)# active-active
```

Disabling the PIM active-active mechanism:

```
switch(config)# router pim
switch(config-pim)# no active-active
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim`	Administrators or local user group members with execution rights for this command.

anycast-rp source-directly-connected

```
anycast-rp source-directly-connected
[no] anycast-rp source-directly-connected
```

Description

Use this command with an Anycast rendezvous point (RP) solution (for example, with MSDP) when the same multicast source is directly connected to two or more Anycast RP routers.

Usage

When configured this command allows only one RP who is the Designated Router (DR) in the segment to own the generation of the MSDP SA (Source Active) messages. If this command is not enabled, all Anycast RP routers where the source is directly connected would start advertising SA messages and form a loop. For example. when the source is directly connected to an Anycast RP VSX pair via VSX-LAG. Therefore this configuration is recommended when VSX pairs act as Anycast RPs. This command is optional when the source is directly connected to a single Anycast RP router or when the source is at least one hop away from the RP.

Examples

The following examples configure directly connected sources with Anycast RP, then remove the configuration.

```
switch(config)# router pim
switch(config-pim)# anycast-rp source-directly-connected
switch(config-pim)#
switch(config-pim)# no anycast-rp source-directly-connected
```

Command History

Release	Modification
10.10	Command Introduced

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Users having admin privileges.

bfd all-interfaces

Not supported on the Aruba 6200 Switch Series.

```
bfd all-interfaces
no bfd all-interfaces
```

Description

Enables BFD on all PIM interfaces. BFD can be disabled at individual PIM interface using the **ip pim-sparse bfd disable** command.

The **no** form of this command disables BFD for all the interfaces.

Examples

Enabling and disabling BFD on all PIM interfaces:

```
switch(config)# router pim
switch(config-pim)# bfd all-interfaces
switch(config-pim)# no bfd all-interfaces
```

Command History

Release	Modification
10.12	Command introduced
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim`	Administrators or local user group members with execution rights for this command.

bsr-candidate bsm-interval

```
bsr-candidate bsm-interval <INTERVAL-VALUE>
no bsr-candidate bsm-interval
```

Description

Configures the interval in seconds to send periodic RP-Set messages to all PIM-SM interfaces on a router that operates as the BSR in a domain. This setting must be smaller than the **rp-candidate hold-time** settings (range of 30 to 255; default 150) configured in the RPs operating in the domain.

The **no** form of this command removes the currently configured value and sets it to the default of 60 seconds.

Parameter	Description
<INTERVAL-VALUE>	Specifies the BSR-candidate BSM interval in seconds. Default: 60 seconds. Range: 5-300.

Example

Configuring and removing BSR-candidate BSM-interval:

```
switch(config)# router pim
switch(config-pim)# bsr-candidate bsm-interval 150
switch(config-pim)# no bsr-candidate bsm-interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

bsr-candidate hash-mask-length

```
bsr-candidate hash-mask-length <LENGTH-VALUE>
no bsr-candidate hash-mask-length
```

Description

Controls the distribution of multicast groups among the C-RP, in a domain where there is overlapping coverage of the groups among the RPs. This value specifies the length (number of significant bits) when allocating this distribution. A longer hash-mask-length results in fewer multicast groups, for each block of group addresses assigned to the RPs. Multiple blocks of addresses assigned to each C-RP results in wider dispersal of addresses. Includes enhanced load-sharing for the multicast traffic for the different groups that are used in the domain at the same time.

The **no** form of this command removes currently configured value and sets to the default of 30.

Parameter	Description
<LENGTH-VALUE>	Specifies the length (in bits) of the hash mask. Default: 30. Range: 1-32.

Example

Configuring and removing the BSR-candidate hash-mask-length:

```
switch(config)# router pim
switch(config-pim)# bsr-candidate hash-mask-length 4
switch(config-pim)# no bsr-candidate hash-mask-length
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

bsr-candidate priority

```
bsr-candidate priority <PRIORITY-VALUE>
no bsr-candidate priority
```

Description

Configures the priority to apply to the router when a BSR election process occurs in the PIM-SM domain. The candidate with the highest priority becomes the BSR for the domain. If the highest priority is shared by multiple routers, the candidate having the highest IP address becomes the BSR of the domain. Zero (0) is the lowest priority. To make BSR selection easily predictable, use this command to assign a different priority to each candidate BSR in the PIM-SM domain.

The **no** form of this command removes currently configured value and sets to the default of 0.

Parameter	Description
<PRIORITY-VALUE>	Specifies the priority for the Candidate Bootstrap router. Default: 0. Range: 0-255

Example

Configuring and removing the BSR-candidate priority:

```
switch(config)# router pim
switch(config-pim)# bsr-candidate priority 250
switch(config-pim)# no bsr-candidate priority
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

bsr-candidate source-ip-interface

```
bsr-candidate source-ip-interface <INTERFACE-NAME>
no bsr-candidate source-ip-interface <INTERFACE-NAME>
```

Description

Configures the router to advertise itself as a candidate PIM-SM BSR on the interface specified, and enables BSR candidate operation. The result makes the router eligible to be elected as the BSR for the PIM-SM domain in which it operates. One BSR candidate interface is allowed per-router.

The **no** form of this command removes the Candidate BSR configuration.

Parameter	Description
<INTERFACE-NAME>	Specifies the interface to use as a source for Candidate-BSR router IP address. Interface can be a VLAN interface (such as vlan15) or routed interfaces (such as lag 1 or 1 / 1 / 19). PIM-SM must be

Parameter	Description
	enabled on this interface (use the **ip pim-sparse enable** command).

Example

On the 6400 Switch Series, interface identification differs.

Configuring and removing the BSR-candidate interface:

```
switch(config)# router pim
switch(config-pim)# bsr-candidate source-ip-interface 1/1/4
switch(config-pim)# bsr-candidate source-ip-interface vlan5
switch(config-pim)# no rp-candidate source-ip-interface 1/1/4
```

Configuring and removing sub-interface 1/1/4.10 as the BSR-candidate:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# router pim
switch(config-pim)# bsr-candidate source-ip-interface 1/1/4.10
switch(config-pim)#
switch(config-pim)# no rp-candidate source-ip-interface 1/1/4.10
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim`	Administrators or local user group members with execution rights for this command.

disable

`disable`

Description

Disables PIM globally on the router. PIM is disabled by default.



Using the **disable** command will cause all the multicast routes to be erased from hardware.

Example

Disabling PIM router:

```
switch(config)# router pim
switch(config-pim)# disable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim`	Administrators or local user group members with execution rights for this command.

enable

`enable`

Description

Enables PIM globally on the router.

Example

Enabling PIM router:

```
switch(config)# router pim
switch(config-pim)# enable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim`	Administrators or local user group members with execution rights for this command.

ip multicast boundary

```
ip multicast boundary access-list <acl_name>
no ip multicast boundary access-list <acl_name>
```

Description

This command configures administratively-scoped multicast boundaries on PIM-enabled Interfaces. A multicast boundary uses an Access Control List (ACL) to filter multicast traffic on the specified interface and prevent the routing of multicast traffic from that interface. This feature supports filtering based on IP, IGMP, and PIM protocols, and can filter both multicast data traffic and control packets, including **IGMP Join**, **PIM Join**, and **Prune** messages. The ACL can use the **any** filter to match traffic from any source to a specific IP multicast group (*,G), and can contain subnet masks to match a range of addresses.

Parameter	Description
`access-list <acl_name>`	Name of the boundary ACL to be applied on the interface.

Usage

When the multicast boundary is configured, MSDP is used to learn the multicast sources across the boundaries. Based on the ACL rules configured, the multicast traffic from one domain to other domain is permitted/denied. MSDP SA messages will always be forwarded across the boundaries regardless of multicast boundary ACL configurations. Anycast RP with MSDP mesh group across the boundaries is not supported. Multicast boundary feature is supported only for IPv4 currently. Multicast boundary feature is not supported on VXLAN based overlay networks. 6200 Series switches do not support MSDP, so a multicast boundary is supported only with PIM-SSM.

Examples

The following example creates a boundary that denies multicast group IP addresses in 239.0.0.0/8 and permits group addresses in 224.0.0.0/4. Since the source address is **any**, it matches traffic from any multicast source (*,G).

```
access-list ip boundary1
    10 deny any any 239.0.0.0/255.0.0.0
    20 permit any any 224.0.0.0/240.0.0.0
interface vlan 40
    ip address 40.1.1.1/24
```

```
    ip pim-sparse enable
    ip multicast boundary access-list boundary1
```

The following example creates a boundary which permits traffic for specific multicast sources and groups IP addresses, and implicitly denies all other traffic.

```
access-list ip boundary2
    10 permit any 192.168.1.1 225.1.1.0/255.255.255.0
    20 permit any 172.168.1.1 239.1.1.0/255.255.255.0
interface vlan 40
    ip address 40.1.1.1/24
    ip pim-sparse enable
    ip multicast boundary access-list boundary2
```

The following boundary ACL creates a boundary based on protocols. The **PIM**, **IGMP**, **and IP** packets from the specified (S,G) are denied and all other traffic for 239.1.1.0/24 is allowed.

```
access-list ip boundary3
    30 deny pim 192.168.1.1 239.1.1.5
    40 deny igmp 192.168.1.1 239.1.1.5
    41 deny any 192.168.1.1 239.1.1.5
    50 permit any any 239.1.1.0/255.255.255.0
interface vlan 40
    ip address 40.1.1.1/24
    ip pim-sparse enable
    ip multicast boundary access-list boundary3
```

Related Commands

Command	Description
show ip multicast boundary interface	Displays IP Multicast boundary ACL configurations and packet drop counters for the given interface.

Command History

Release	Modification
10.10	Command introduced

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
8400 9300 10000		

ip multicast multipath

```
ip multicast multipath {s-hash|s-g-hash}
no ip multicast multipath {s-hash|g-hash}
```

Description

This command configures the multipath hash mode, which allows the switch to determine the nexthop in the RPF path if there are multiple equal cost paths to a source address. PIM S,G join messages are sent to the selected nexthop which results in a multicast traffic flow in the selected paths. An even distribution of available nexthops across different multicast flows improves the utilization of ECMP paths.

Parameter	Description
`s-hash`	The hash to select the nexthop is based on only the source address. Flows originating from different sources will use different ECMP paths as the source is considered for selecting the nexthop. If the same source sends streams for multiple groups, then all the streams use only one of the ECMP paths. This is the default setting for this feature .
`s-g-hash`	This method uses both source and group address to select the nexthop. This allows better distribution of flows in scenarios where single source is streaming traffic for multiple groups.

Usage

Use this command only for route lookups for a source address and not for an Rendezvous Point (RP) address. The PIM *,G join messages which enable route lookup for the RP always uses the default **s-hash** mode, where nexthop is selected based on the RP IP address alone, and the group address is not part of the hash computation. Changes to the multipath has mode can result in traffic loss as the existing route cache is cleared and new route lookups are initiated. In topologies where PIM Assert messages are triggered, RPF lookups are not honored, and the packet forwarding path will be decided based on the assert winner.

Examples

Configuring the hash mode for an individual VRF:

```
switch(config)# vrf example
switch(config-vrf)# ip multicast multipath s-hash
```

Configuring the hash mode globally:

```
switch(config)# ip multicast multipath s-g-hash
```

Related Commands

Command History

Release	Modification
10.13	Command introduced

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-if` `config-vrf`	Administrators or local user group members with execution rights for this command.

ip mroute

`ip mroute` *<SRC-ADDR/SRC-MASK>* *<RPF-ADDRESS>* | *<INTERFACE-NAME>*

Description

Configures multicast reverse path (RPF) forwarding static routes. This command is an alias of the **rpf-override** command.

Parameter	Description
<SRC-ADDR>	Specifies the multicast source address in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255.
<SRC-MASK>	Specifies the number of bits in the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.
<RPF-ADDR>	Specifies the RPF address in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255.
<INTERFACE-NAME>	Specifies the RPF interface name.

Usage

Reverse Path Forward (RPF) checking is a core multicast routing mechanism. The RPF ensures that the multicast traffic received arrives on the expected router interface before further processing. If the RPF check fails for a multicast packet, the packet is discarded. For multicast traffic flow that arrives on the SPT, the expected incoming interface for a given source or group is the interface towards the source address of the traffic (determined by the unicast routing system). For traffic arriving on the RP tree, the expected incoming interface is the interface towards the RP.

Example

Configuring and removing an IP mroute:

```
switch(config)# router pim
switch(config-pim)# ip mroute 40.0.0.4/24 30.0.0.4
switch(config-pim)# no ip mroute 40.0.0.4/24 30.0.0.4
```

Configuring and removing an IP mroute for an IPv6 address:

```
switch(config-pim)# router pim6
switch(config-pim6)# ipv6 mroute 50::4/24 tunnel1
switch(config-pim6)# no ipv6 mroute 50::4/24 tunnel1
```

Command History

Release	Modification
10.10	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

ip pim-sparse

```
ip pim-sparse {enable|disable}
no ip pim-sparse [enable]
```

Description

Enables or disables PIM-SM in the current interface. PIM-SM is disabled by default on an interface. IP address must be configured on the interface to enable PIM-SM.

Parameter	Description
`enable`	Specifies PIM SM on the interface. IP address must be configured on the interface to enable PIM-SM.
`disable`	Disables PIM SM on the interface.

Examples

Enabling and disabling PIM-SM:

```
switch(config)# interface vlan 40
switch(config-if-vlan)# ip address 40.0.0.4/24
switch(config-if-vlan)# ip pim-sparse enable
switch(config-if-vlan)# ip pim-sparse disable
```

Configuring and disabling PIM-SM on the sub-interface:

Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config-if)# interface 1/1/10.10
switch(config-subif)# ip add 100.100.1.1/24
switch(config-subif)# ip pim-sparse enable
switch(config-subif)# switch(config-subif)# ip pim-sparse disable
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ip pim-sparse bfd

Not supported on the Aruba 6200 Switch Series.

```
ip pim-sparse bfd [disable]
no ip pim-sparse bfd
```

Description

Configures BFD on a per-interface basis for one interface associated with the PIM process.

The **no** form of this command removes the BFD configuration on the interface and sets it to the default configuration.

If BFD is enabled globally, it will be enabled by default on all interfaces. The only exception is when it is disabled specifically on an interface using the **ip pim-sparse bfd disable** command.
If BFD is disabled globally, it will be disabled by default on all interfaces. The only exception is when it is enabled specifically on an interface using the **ip pim-sparse bfd** command.

Parameter	Description
`disable`	Disables the BFD configuration on the interface.

Examples

Enabling the BFD configuration on the interface:

```
switch(config)# interface vlan 40
switch(config-if-vlan)# ip pim-sparse bfd
```

Removing the BFD configuration on the interface:

```
switch(config-if-vlan)# no ip pim-sparse bfd
```

Disabling the BFD configuration on the interface and overriding the global setting:

```
switch(config-if-vlan)# ip pim-sparse bfd disable
```

Command History

Release	Modification
10.12	Command introduced
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-if` `config-if-vlan`	Administrators or local user group members with execution rights for this command.

ip pim-sparse bsr-boundary

```
ip pim-sparse bsr-boundary
no ip pim-sparse bsr-boundary
```

Description

Prevent exchange of PIM Bootstrap messages across multicast boundaries.

Usage

Best practices is to avoid exchanging PIM Bootstrap messages across different multicast domains as it will lead to election of RP in a different domain. When this command is configured on a boundary interface, PIM BSMs originating from other domain will be dropped and PIM BSMs originated within this domain will not forwarded to other domain. Note that this command will filter only PIM BSMs and is recommended to be enabled along with ip multicast boundary.

Examples

Configuring and removing the BSR boundary:

```
switch(config-if)# interface 1/1/1
switch(config-if)# ip pim-sparse bsr-boundary
switch(config-if)# no ip pim-sparse bsr-boundary
```

Command History

Release	Modification
10.10	Command Introduced

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Users having admin privileges.

ip pim-sparse dr-priority

```
ip pim-sparse dr-priority <PRIORITY-VALUE>
no ip pim-sparse dr-priority
```

Description

Changes the router priority for the designated router (DR) election process in the current interface.

A numerically higher value means a higher priority. If multiple routes share the highest priority, the router with the highest IP address is selected as the DR.

The **no** form of this command removes currently configured value and sets to the default of 1.

Parameter	Description
<PRIORITY-VALUE>	Specifies the priority value to use on the interface in the DR election process. Required. Default: 1. Range: 0- to 0-4294967295.

Examples

Configuring and removing the interface priority value:

```
switch(config)# interface vlan 40
switch(config-if-vlan)# ip pim-sparse dr-priority 4444
switch(config-if-vlan)# no ip pim-sparse dr-priority
```

Configuring and removing the interface priority value in the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config-if)# interface 1/1/10.10
switch(config-subif)# ip pim-sparse dr-priority 1000
switch(config-subif)#
switch(config-subif)# no ip pim-sparse dr-priority
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

ip pim-sparse hello-delay

```
ip pim-sparse hello-delay <DELAY-VALUE>
no ip pim-sparse hello-delay
```

Description

Configures the maximum time in seconds before the router actually transmits the initial PIM hello message on the current interface.

The **no** form of this command removes currently configured value and sets to the default of 5 seconds.

Parameter	Description
<DELAY-VALUE>	Specifies the hello-delay in seconds, which is the maximum time before a triggered PIM Hello message is transmitted on this interface. Default: 5. Range: 0 to 5.

Usage

- In cases where a new interface activates connections with multiple routers. If all the connected routers sent hello packets at the same time, the receiving router could become momentarily overloaded.
- This command randomizes the transmission delay to a time between zero and the hello delay setting. Using zero means no delay. After the router sends the initial hello packet to a newly detected interface, it sends subsequent hello packets according to the current hello interval setting.

Example

Configuring and removing hello-delay interface:

```
switch(config)# interface vlan 40
switch(config-if-vlan)# ip pim-sparse hello-delay 4
switch(config-if-vlan)# no ip pim-sparse hello-delay
```

Configuring and removing hello-delay on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config-if)# interface 1/1/10.10
switch(config-subif)# ip pim-sparse hello-delay 4
switch(config-subif)#
switch(config-subif)# no ip pim-sparse hello-delay
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
8360 8400 9300 10000		

ip pim-sparse hello-interval

```
ip pim-sparse hello-interval <INTERVAL-VALUE>
no ip pim-sparse hello-interval
```

Description

Configures the frequency at which the router transmits PIM hello messages on the current interface.

The **no** form of this command removes the currently configured value and sets to the default of 30 seconds.

Parameter	Description
<INTERVAL-VALUE>	Specifies the frequency at which PIM Hello messages are transmitted on this interface. Range: 5 to 300. Default: 30.

Usage

- The router uses hello packets to inform neighbor routers of its presence.
- The router also uses this setting to compute the hello holdtime, which is included in hello packets sent to neighbor routers.
- Hello holdtime tells neighbor routers how long to wait for the next hello packet from the router. If another packet does not arrive within that time, the router removes the neighbor adjacency on that interface from the PIM adjacency table, which removes any flows running on that interface.
- Shortening the hello interval reduces the hello holdtime. If they do not receive a new hello packet when expected, it changes how quickly other routers stop sending traffic to the router.

Example

Configuring and removing sparse hello-interval:

```
switch(config)# interface vlan 20
switch(config-if-vlan)# ip pim-sparse hello-interval 60
switch(config-if-vlan)# no ip pim-sparse hello-interval
```

Configuring and removing sparse hello-interval on the sub-interface:



Applies only to the Aruba 6300, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config-if)# interface 1/1/10.10
switch(config-subif)# ip pim-sparse hello-interval 60
switch(config-subif)#
switch(config-subif)# no ip pim-sparse hello-interval
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ip pim-sparse ip-addr

```
ip pim-sparse ip-addr {<IP-ADDR-VALUE> | any}
no ip pim-sparse ip-addr
```

Description

Enables the router to dynamically determine the source IP address to use for PIM-SM packets sent from the interface or to use the specific IP address.

The **no** form of this command removes the currently configured value and sets to the default of **any**.

Parameter	Description
<IP-ADDR-VALUE>	Specifies an IP address as the source IP for the interface.
any	Specifies dynamically determining the source IP from the current IP address of the interface.

Examples

Configuring and removing source IP address:

```
switch(config)# interface vlan 40
switch(config-if-vlan)# ip pim-sparse ip-addr 40.0.0.4
switch(config-if-vlan)# no ip pim-sparse ip-addr
```

Configuring and removing source IP address on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config-if)# interface 1/1/10.10
switch(config-subif)# ip pim-sparse ip-addr 10.0.0.1
switch(config-subif)#
```

```
switch(config-subif)# no ip pim-sparse ip-addr
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ip pim-sparse lan-prune-delay

```
ip pim-sparse lan-prune-delay
no ip pim-sparse lan-prune-delay
```

Description

Enables the LAN prune delay option on the current interface. The default is enabled.

With LAN-prune-delay enabled, the router informs downstream neighbors how long it will wait before pruning a flow after receiving a prune request. Other downstream routers on the same interface must send a join to override the prune before the LAN-prune-delay time to continue the flow. Prompts any downstream neighbors with multicast receivers continuing to belong to the flow to reply with a join. If no joins are received after the LAN-prune-delay period, the router prunes the flow. The propagation-delay and override-interval settings determine the LAN-prune-delay setting.

The **no** form of this command disables the LAN prune delay option.

Example

Enabling and disabling the LAN prune delay:

```
switch(config)# interface vlan 40
switch(config-if-vlan)# ip pim-sparse lan-prune-delay
switch(config-if-vlan)# no ip pim-sparse lan-prune-delay
```

Enabling and disabling the LAN prune delay on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config-if)# interface 1/1/10.10
switch(config-subif)# no ip pim-sparse lan-prune-delay
switch(config-subif)#
switch(config-subif)# ip pim-sparse lan-prune-delay
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ip pim-sparse override-interval

```
ip pim-sparse override-interval <INTERVAL-VALUE>
no ip pim-sparse override-interval
```

Description

Configures the override interval that gets inserted into the Override Interval field of a LAN Prune Delay option.

The **no** form of this command removes the currently configured value and sets the value to the default of 2500 ms.

Parameter	Description
<INTERVAL-VALUE>	Specifies the override interval of a LAN Prune Delay option in ms. Range: 500 to 6000. Default: 2500.

Usage

A router sharing a VLAN with other multicast routers uses the override-interval value along with the propagation-delay value to compute the **lan-prune-delay** setting. The setting specifies how long to wait for a PIM-SM join after receiving a prune packet from downstream for a particular multicast group.

Example scenario:

A network may have multiple routers sharing VLAN X. When an upstream router is forwarding traffic from multicast group X to VLAN Y, if one of the routers on VLAN Y does not want this traffic, it issues a prune response to the upstream neighbor. The upstream neighbor then goes into a prune pending

state for group X on VLAN Y. During this period, the upstream neighbor continues to forward the traffic. During the pending period, another router on VLAN Y can send a group X join to the upstream neighbor. If this happens, the upstream neighbor drops the prune pending status and continues forwarding the traffic. But if no routers on the VLAN send a join, the upstream router prunes.

Example

Configuring and removing the override interval:

```
switch(config)# interface vlan 40
switch(config-if-vlan)# ip pim-sparse override-interval 4000
switch(config-if-vlan)# no ip pim-sparse override-interval
```

Configuring and removing the override interval on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config-if)# interface 1/1/10.10
switch(config-subif)# ip pim-sparse override-interval 4000
switch(config-subif)#
switch(config-subif)# no ip pim-sparse override-interval
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ip pim-sparse propagation-delay

```
ip pim-sparse propagation-delay <DELAY-VALUE>
no ip pim-sparse propagation-delay
```

Description

Configures the propagation delay that gets inserted into the LAN prune delay field of a LAN Prune Delay option.

The **no** form of this command removes currently configured value and sets to the default of 500 ms.

Parameter	Description
<DELAY-VALUE>	Specifies the propagation delay value in ms. Range: 250 to 2000. Default: 500.

Examples

Configuring and removing the propagation delay:

```
switch(config)# interface vlan 40
switch(config-if-vlan)# ip pim-sparse propagation-delay 400
switch(config-if-vlan)# no ip pim-sparse propagation-delay
```

Configuring and removing the propagation delay on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config-if)# interface 1/1/10.10
switch(config-subif)# ip pim-sparse propagation-delay 400
switch(config-subif)#
switch(config-subif)# no ip pim-sparse propagation-delay
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

join-prune-interval

```
join-prune-interval <INTERVAL-VALUE>
no join-prune-interval
```

Description

Configures the frequency at which the router will send periodic join or prune-interval messages.

The **no** form of this command sets the interval to the default value of 60 seconds.

Parameter	Description
<INTERVAL-VALUE>	Specifies the join-prune-interval in seconds. Range 5 to 65535 Default: 60.

Examples

Configuring join prune interval:

```
switch(config)# router pim
switch(config-pim)# join-prune-interval 400
switch(config-pim)# no join-prune-interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

multicast-route-limit

```
multicast-route-limit <limit>
no multicast-route-limit <limit>
```

Description

Configures the limit on the maximum number of multicast route entries that can be programmed. When the limit is configured, multicast route entries created because of IGMP or MLD membership reports, and multicast route entries created because of multicast streams are restricted to the configured limit.

The **no** form of this command removes the currently configured limit value.

Parameter	Description
<limit>	Specifies the value to be configured as the multicast route limit. Range: 1 to 4294967295.

Usage

Flows exceeding the configured multicast route limit will be programmed as a bridge entry and will not have the outgoing interfaces list populated. This configuration prevents creation of new multicast routes when limits are reached. At the time of configuration, if the device has more multicast routes than the configured limit, existing multicast routes continue to exist until they are removed.

The flows are programmed in the HW on a FCFS basis. There could be scenarios where the flow is forwarded in neighbor router, but it may not be forwarded on the current router because of exceeding the limits configured on the current router. In such cases, it is recommended to configure higher limits to avoid traffic outage.

Examples

Configuring and removing the multicast route rate limit:

```
switch(config)# router pim
switch(config-pim)# multicast-route-limit 1024
switch(config-pim)# no multicast-route-limit
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

no ip pim-sparse

```
no ip pim-sparse
```

Description

Removes all the PIM-SM related configurations for the interface.

Example

Removing PIM-SM configuration:

```
switch(config)# interface vlan 40
switch(config-if-vlan)# no ip pim-sparse
```

Removing PIM-SM configuration on the sub-interface:

Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/10.10
switch(config-subif)# no ip pim-sparse
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

register-rate-limit

```
register-rate-limit <limit>
no register-rate-limit <limit>
```

Description

Configures the limit on the maximum number of register messages sent per second for every unique (S,G) entry. By default, there is no maximum rate set. When the limit is configured, register messages generation is limited to the configured value.

The **no** form of this command removes the currently configured limit value.

Parameter	Description
<limit>	Specifies the value to be configured as the register rate limit. Range: 1 to 4294967295.

Examples

Configuring and removing the register rate limit:

```
switch(config)# router pim
switch(config-pim)# register-rate-limit 10
switch(config-pim)# no register-rate-limit
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim`	Administrators or local user group members with execution rights for this command.

register-source

```
register-source <INTERFACE-NAME>
no register-source <INTERFACE-NAME>
```

Description

Specifies the source interface to be used for PIM registration in the case of VXLAN anycast interfaces. When the PIM enabled anycast VLAN is directly connected to a multicast source, **register-source** is used to send registration messages to the RP and this interface receives the register-stop messages from the RP.

The **no** form of this command removes the register source configuration.

Parameter	Description
<INTERFACE-NAME>	Specifies the name of the interface to use.

Usage

- This is a global configuration under router-pim configuration and is required in Symmetric IRB with anycast IP address configuration.
- This configuration is required in the source connected switch only when the PIM-DR and RP are in two different switches.
- Without this configuration, there will be traffic loss as the registration sequence will not be successful. It is mandatory to have this source interface configured with a non-anycast IP address which is unique to the VTEP, and with PIM enabled.

Examples

Configuring the source interface for PIM registrations:

```
switch# config
```

```
switch(config)# router pim vrf vrf1
switch(config-pim)# register-source loopback1
```

Removing the **register-source** configuration:

```
switch(config-pim)# no register-source loopback1
```

Command History

Release	Modification
10.09.1000	Command introduced

Command Information

Platforms	Command context	Authority
6300 6400 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

router pim

```
router pim [vrf <VRF-NAME>]
   accept-register access-list <ACL-RULE>
   accept-rp <IP-ADDR> access-list <ACL-RULE>
   active-active
   bfd all-interfaces
   bsr-candidate {bsm-interval <INTERVAL-VALUE> | {hash-mask-length <LENGTH-VALUE> |
   priority <PRIORITY-VALUE> | source-ip-interface <INTERFACE-NAME>}
   enable|disable
   join-prune-interval <INTERVAL-VALUE>
   multicast-route-limit <limit>
   no ...
   register-rate-limit <limit>
   rp-address <IP-ADDR> [<GRP-ADDR/GRP-MASK>] [override]
   rp-candidate {group-prefix <GRP-ADDR/GRP-MASK>  |hold-time <TIME-VALUE> | priority
   <PRIORITY-VALUE> | source-ip-interface <INTERFACE-NAME> [group-prefix <GRP-ADDR/GRP-
   MASK>]}
   rpf-override <SRC-ADDR/SRC-MASK><RPF-ADDR|INTERFACE-NAME>
```

Description

Changes the current context to the PIM configuration context and enables PIM globally on the router. If no VRF is specified, the default VRF is assumed.

The **no** form of this command removes the PIM configuration from the specified context or the default VRF.

Parameter	Description
`vrf <VRF-NAME>`	Specifies the name of a VRF.
`accept-register access-list <ACL-RULE>`	Specify an ACL rule name to configures ACL on RP to filter PIM Register packets from unauthorized sources. The ACL specified will contain the (S,G) traffic in register packets to permitted or denied.
`accept-rp <IP-ADDR> access-list <ACL-RULE>`	Specify the IPv4 address of the static RP and ACL rule name to enable the PIM router to filter PIM join/prune messages destined for a specific RP and specific groups. The ACL specifies the group addresses which are allowed or denied. Up to 8 RP addresses and group ACL can be associated with the PIM router. PIM will store the accepted RP address and the associated group ACL. When a join or prune message is received, a RP look up is made for the packet. If the RP is in the configured list and if the group in the join/prune packet is allowed in the ACL, the packet is allowed. Otherwise the packet is dropped. To allow join/prune message from any groups, group address in the ACL can be wild-carded. In this case, only RP address check is performed. This parameter impacts only (*,G) join/prune messages. If there are any existing flows, the user will need to disable and enable PIM on the interface to apply the ACL. Loopback interfaces are special interfaces where only unicast PIM messages are updated. This includes Register, Register Stop, and Candidate RP Advertisements. When a loopback interface is configured as the RP, the ACL drop counters will be updated on the interface on which the packets are received. **NOTE:** If there is an active flow which is in the SPT, the traffic flow through the SPT will continue. Only (*,G) join/prune messages are dropped. (S,G) join/prune messages will not be impacted.
`active-active`	Enables the PIM active-active mechanism per VRF on VSX. The default is disabled. PIM active-active keeps the multicast forwarding state synchronized on both VSX peer devices. Synchronization is achieved by electing the VSX peer that has the highest IP address as a designated router (DR) and the other as Proxy-DR. If you want the multicast traffic to flow through VSX primary, assign higher IP addresses to the interfaces in VSX primary. When the VSX peer that is acting as the DR goes down, traffic is recovered faster since the multicast routes are synchronized.
`bfd all-interfaces`	Enables BFD on all PIM interfaces. BFD can be disabled at individual PIM interface using the **ip pim-sparse bfd disable** command.

Parameter	Description
	NOTE: Not supported on the Aruba 6200 Switch Series.
`bsr-candidate`	Configure settings for a router that operates as the BSR in a domain.
`bsm-interval <INTERVAL-VALUE>`	Configures the interval in seconds to send periodic RP-Set messages to all PIM-SM interfaces on a router that operates as the BSR in a domain. This setting must be smaller than the **rp-candidate hold-time** settings (range of 30 to 255; default 150) configured in the RPs operating in the domain. Default: 60 seconds. Range: 5-300.
`hash-mask-length <LENGTH-VALUE>`	Controls the distribution of multicast groups among the C-RP, in a domain where there is overlapping coverage of the groups among the RPs. This value specifies the length (number of significant bits) when allocating this distribution. A longer hash-mask-length results in fewer multicast groups, for each block of group addresses assigned to the RPs. Multiple blocks of addresses assigned to each C-RP results in wider dispersal of addresses. Includes enhanced load-sharing for the multicast traffic for the different groups that are used in the domain at the same time. Default: 30 bits. Range: 1-32.
`priority <PRIORITY-VALUE>`	Configures the priority to apply to the router when a BSR election process occurs in the PIM-SM domain. The candidate with the highest priority becomes the BSR for the domain. If the highest priority is shared by multiple routers, the candidate having the highest IP address becomes the BSR of the domain. Zero (0) is the lowest priority. To make BSR selection easily predictable, use this command to assign a different priority to each candidate BSR in the PIM-SM domain. Default: 0. Range: 0-255
`source-ip-interface <INTERFACE-NAME>`	Configures the router to advertise itself as a candidate PIM-SM BSR on the interface specified, and enables BSR candidate operation. The result makes the router eligible to be elected as the BSR for the PIM-SM domain in which it operates. One BSR candidate interface is allowed per-router. The Interface can be a VLAN interface (such as vlan15) or routed interfaces (such as lag 1 or 1 / 1 / 19). PIM-SM must be enabled on this interface (use the **ip pim-sparse enable** command).
`enable|disable`	Enables or disables PIM globally on the router.
`join-prune-interval <INTERVAL-VALUE>`	Configures the frequency at which the router will send periodic join or prune-interval messages. Range 5 to 65535 Default: 60.

Parameter	Description
`multicast-route-limit <limit>`	Configures the limit on the maximum number of multicast route entries that can be programmed. When the limit is configured, multicast route entries created because of IGMP or MLD membership reports, and multicast route entries created because of multicast streams are restricted to the configured limit. Flows exceeding the configured multicast route limit will be programmed as a bridge entry and will not have the outgoing interfaces list populated. This configuration prevents creation of new multicast routes when limits are reached. At the time of configuration, if the device has more multicast routes than the configured limit, existing multicast routes continue to exist until they are removed. The flows are programmed in the HW on a FCFS basis. There could be scenarios where the flow is forwarded in neighbor router, but it may not be forwarded on the current router because of exceeding the limits configured on the current router. In such cases, it is recommended to configure higher limits to avoid traffic outage. Range: 1 to 4294967295.
`no...`	Negates any configured parameter.
`register-rate-limit <limit>`	Configures the limit on the maximum number of register messages sent per second for every unique (S,G) entry. By default, there is no maximum rate set. When the limit is configured, register messages generation is limited to the configured value. Range: 1 to 4294967295.
`rp-address`	Statically configures the router as the RP for a specified multicast group or range of multicast groups. When a static RP and a C-RP are configured to support the same multicast groups and the multicast group mask for the static RP is equal to or greater than the same mask for the applicable C-RPs, this command assigns the higher precedence to the static RP, resulting in the C-RP operating only as a backup RP for the configured group. Without override, the C-RP has precedence over a static RP configured for the same multicast group or groups. This must be configured on all PIM-SM routers in the domain. If group address is not specified, it applies to all IPv4 multicast addresses (224.0.0.0 - 239.255.255.255). PIM-SM supports a maximum of 8 static RPs per VRF.
<IP-ADDR>	Specifies the address of the static RP in IPv4 format (**x.x.x.x**).
<GRP-ADDR/GRP-MASK>	Specifies the multicast group address in IPv4 format (**x.x.x.x**) and the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.
`override`	Specifies higher precedence to static RP over Candidate RP.

Parameter	Description
rp-candidate	Configure Candidate Rendezvous Point (C-RP) settings.
group-prefix *<GRP-ADDR/GRP-MASK>*	Adds multicast group address to the current Candidate Rendezvous Point (C-RP) configuration by specifying the the multicast group address in IPv4 format (**x.x.x.x**) and the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.
hold-time *<TIME-VALUE>*	Changes the hold-time a C-RP includes in its advertisements to the BSR. Hold-time is included in the advertisements the C-RP periodically sends to the elected BSR for the domain. Also updates the BSR on how long to wait after the last advertisement from the reporting RP before assuming it has become unavailable. Range: 30 to 250. Default: 150.
priority *<PRIORITY-VALUE>*	Changes the current priority setting for a C-RP. Where multiple C-RP configurations are used to support the same multicast groups, the candidate having the highest priority is elected. Zero (0) is the highest priority, and 255 is the lowest priority. Range: 0 to 255. Default: 192.
source-ip-interface	Enables the Candidate Rendezvous Point (C-RP) operation, and configures the router to advertise itself as a C-RP to the Bootstrap Router (BSR) for the current domain. This step includes the option to allow the C-RP to be a candidate for all possible multicast groups, or for up to four multicast groups, or ranges of groups. If group-prefix is not given, it considers for all multicast group addresses.
<INTERFACE-NAME>	Specifies the interface to use as a source for the C-RP router IP address.
group-prefix *<GRP-ADDR/GRP-MASK>*	Specifies the multicast group address in IPv4 format (**x.x.x.x**) and the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.
rpf-override	The Reverse Path Forward (RPF) override allows overriding the normal RPF lookup mechanism, and indicates to the router that it may accept multicast traffic on an interface other than the one that the RPF lookup mechanism would normally select. This includes accepting traffic from an invalid source IP address for the subnet or VLAN that is directly connected to the router. Traffic may also be accepted from a valid PIM neighbor that is not on the reverse path towards the source of the received multicast traffic.
<SRC-ADDR/SRC-MASK>	Specifies the multicast source IPv4 address in IPv4 format (**x.x.x.x**) and the number of bits in the address mask in CIDR format (**x**), where **x** is a

Parameter	Description
	decimal number from 0 to 128.
<RPF-ADDR|INTERFACE-NAME>	Specifies the RPF override IP address or interface.

Usage

When a register ACL is associated with a PIM Router, the PIM protocol will store the source and destination address details along with the action (permit or deny). If there are any existing flows, the user will need to disable and enable PIM on the interface to apply the ACL.

Upon receiving the register messages, a look up is made to check if the S and G in the packet is in the permitted list. If there is no match or if there is a deny rule match, a register stop message is immediately sent and the packet is dropped and no further action is taken. Permitted packets will go through the normal flow.

Loopback interfaces are special interfaces where only unicast PIM messages are updated. This includes Register, Register Stop, and Candidate RP Advertisements.

When a loopback interface is configured as the RP, the ACL drop counters will be updated on the interface on which the packets are received.

Recommendations for the active-active mechanism:

- Do not configure the DR priority of interfaces when **active-active** is enabled. The DR priority will be set to high on DR and default on Proxy-DR and any user-configured DR priority will be ignored.
- Always configure **keepalive** between VSX peers. If the ISL goes down when **keepalive** is not configured, both VSX peers start acting independently as DRs, resulting in duplicate traffic.
- Do not configure IGMP joins on transit VLANS.
- RP redundancy is not supported on the **active-active** mechanism. If one of the VSX peers is configured as RP and it goes down, the new traffic flows will not be converged until the RP is elected. For a static RP, new flows will never be converged until the VSX peer is back up.

Reverse Path Forward (RPF) override usage details:

- Reverse Path Forward (RPF) checking is a core multicast routing mechanism. The RPF ensures that the multicast traffic received arrives on the expected router interface before further processing. If the RPF check fails for a multicast packet, the packet is discarded. For multicast traffic flow that arrives on the SPT, the expected incoming interface for a given source or group is the interface towards the source address of the traffic (determined by the unicast routing system). For traffic arriving on the RP tree, the expected incoming interface is the interface towards the RP.
- RPF checking is applied to all multicast traffic and is significant in preventing network loops. Up to eight manual RPF overrides can be specified. The RPF-address indicates one of two distinct RPF candidates:
    1. A valid PIM neighbor address from which forwarded multicast traffic is accepted with a source address of ***<source-addr/src-mask>***.
    2. A local router address on a PIM-enabled interface to which ***<source-addr/src-mask>*** is directly connected. If configured, the local router will assume the role of DR for this flow and registers the flow with an RP.

Examples

Configuring and enabling default router PIM:

```
switch(config)# router pim
switch(config-pim)#enable
```

Configuring specified router PIM:

```
switch(config)# router pim vrf green
switch(config-pim)#
```

Configuring ACL on RP with an ACL rule named **pim_reg_acl**:

```
switch(config)# access-list ip pim_reg_acl
switch(config-acl-ip)# 10 permit any 20.1.1.1 225.1.1.2
switch(config-acl-ip)# 20 deny any 30.1.1.1 225.1.1.3
switch(config)# router pim
switch(config-pim)# accept-register acces
```

Configuring ACL on a RP with an ACL rule named **pim_rp_grp_acl** to filter join/prune messages:

```
switch(config)# access-list ip pim_rp_grp_acl
switch(config-acl-ip)# 10 permit any any 225.1.1.2/255.255.255.0
switch(config-acl-ip)# 20 permit any any 239.1.1.2/255.255.255.0
switch(config)-acl-ip# router pim
switch(config-pim)# accept-rp 30.1
```

On the 6400 Switch Series, interface identification differs.

Configuring and removing the BSR-candidate interface:

```
switch(config)# router pim
switch(config-pim)# bsr-candidate source-ip-interface 1/1/4
switch(config-pim)# bsr-candidate source-ip-interface vlan5
switch(config-pim)# no rp-candidate source-ip-interface 1/1/4
```

Configuring and removing sub-interface 1/1/4.10 as the BSR-candidate:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# router pim
switch(config-pim)# bsr-candidate source-ip-interface 1/1/4.10
switch(config-pim)#
switch(config-pim)# no rp-candidate source-ip-interface 1/1/4.10
```

Configuring and removing the multicast route rate limit:

```
switch(config)# router pim
switch(config-pim)# multicast-route-limit 1024
switch(config-pim)# no multicast-route-limit
```

Configuring and removing the register rate limit:

```
switch(config)# router pim
switch(config-pim)# register-rate-limit 10
switch(config-pim)# no register-rate-limit
```

Configuring and removing candidate-RP router priority and hold times

```
switch(config)# router pim
switch(config-pim)# rp-candidate priority 250
switch(config-pim)# rp-candidate hold-time 200
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config	Administrators or local user group members with execution rights for this command.

rp-address access list

```
rp-address <IP-ADDR> [access-list <ACL-NAME>][override]
no rp-address <IP-ADDR> [access-list <ACL-NAME>][override]
```

Description

Statically configures the router as the RP and associates the static RP to the specified ACL.

The **no** form of this command removes static RP ACL configuration.

Parameter	Description
<IP-ADDR>	Specifies the address of the static RP in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255.
access-list <ACL-NAME>	Specifies the name of the access control list.
override	Specifies whether or not static RP configuration precedes the information learned by a BSR.

Usage

The ACL includes a list of permitted/ denied group addresses for the specified RP.

- When configured on a source DR, only permitted group addresses are registered to the RP. When applied on other routers, (*,G) PIM join/prune messages are filtered according to the applied ACL.
- Only destination group addresses in the ACEs are filtered and any other fields configured in the ACE are ignored. If only PIM (*,G) messages need to be filtered, configure **accept-rp** ACLs.
- When static RP ACL is configured, only one static RP can be configured per VRF and that configured RP handles all the multicast groups in range 224.0.0.0/4.



A change in the RP ACL does not impact the flows that have already switched to SPT. Only when the source information is expired and the RP is needed to establish the multicast tree, is the change in the ACL reflected. If the source is always active, PIM can be disabled and re-enabled to clear the learned sources information and re-establish multicast trees based on the latest RP ACL configurations.

Examples

Configuring the static RP ACL:

```
...
access-list ip static_rp_acl
    10 permit any any 225.1.1.1
    20 permit any any 239.1.1.0/255.255.255.0
    30 deny any any 226.1.1.0/255.255.255.0

switch(config)# router pim
switch(config-pim)# rp-address 40.0.0.4 access-list static_rp_acl
```

Removing the static RP ACL configuration:

```
switch(config-pim)# no rp-address 40.0.0.4 access-list static_rp_acl
```

Command History

Release	Modification
10.10	Added optional access list parameter **[access-list <ACL-NAME>]**
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360	config-pim	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
8400 9300 10000		

rp-address

```
rp-address <IP-ADDR> [<GRP-ADDR/GRP-MASK>] [override]
no rp-address <IP-ADDR> [<GRP-ADDR/GRP-MASK>] [override]
```

Description

Statically configures the router as the RP for a specified multicast group or range of multicast groups. This must be configured on all PIM-SM routers in the domain. If group address is not specified, it applies to all IPv4 multicast addresses (224.0.0.0 - 239.255.255.255). PIM-SM supports a maximum of 8 static RPs per VRF. Optionally associates the specified access control list to the given static RP address.

The **no** form of this command removes static RP configuration and its precedence.

Parameter	Description
<IP-ADDR>	Specifies the address of the static RP in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255.
<GRP-ADDR>	Specifies the multicast group address in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255.
<GRP-MASK>	Specifies the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.
`override`	Specifies higher precedence to static RP over candidate RP.

Usage

Where a static RP and a C-RP are configured to support the same multicast groups and the multicast group mask for the static RP is equal to or greater than the same mask for the applicable C-RPs, this command assigns the higher precedence to the static RP, resulting in the C-RP operating only as a backup RP for the configured group. Without override, the C-RP has precedence over a static RP configured for the same multicast group or groups.

Examples

Configuring the static RP precedence over the candidate RP:

```
switch(config)# router pim
switch(config-pim)# rp-address 40.0.0.4 230.0.0.4/24 ovverride
switch(config-pim)# rp-address 40.0.0.8 222.0.0.4/24
switch(config-pim)# no rp-address 40.0.0.4 230.0.0.4/24
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

rp-candidate group-prefix

```
rp-candidate group-prefix <GRP-ADDR/GRP-MASK>
no rp-candidate group-prefix <GRP-ADDR/GRP-MASK>
```

Description

Adds multicast group address to the current Candidate Rendezvous Point (C-RP) configuration.

The **no** form of this command removes C-RP multicast group address.

Parameter	Description
<GRP-ADDR>	Specifies the multicast group address in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255.
<GRP-MASK>	Specifies the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.

Examples

Configuring and removing candidate group prefix:

```
switch(config)# router pim
switch(config-pim)# rp-candidate group-prefix 230.0.0.4/24
switch(config-pim)# no rp-candidate group-prefix 230.0.0.4/24
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100	config-pim	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
8320 8325 8360 8400 9300 10000		

rp-candidate hold-time

```
rp-candidate hold-time <TIME-VALUE>
no rp-candidate hold-time
```

Description

Changes the hold-time a C-RP includes in its advertisements to the BSR.

Hold-time is included in the advertisements the C-RP periodically sends to the elected BSR for the domain. Also updates the BSR on how long to wait after the last advertisement from the reporting RP before assuming it has become unavailable.

The **no** form of this command removes the currently configured value and sets it to the default value 150 seconds.

Parameter	Description
<TIME-VALUE>	Specifies the hold-time value in seconds to be sent in C-RP-Adv messages. Range: 30 to 250. Default: 150.

Example

Setting and removing the candidate holdtime:

```
switch(config)# router pim
switch(config-pim)# rp-candidate hold-time 250
switch(config-pim)# no rp-candidate hold-time
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360	config-pim	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
8400 9300 10000		

rp-candidate priority

```
rp-candidate priority <PRIORITY-VALUE>
no rp-candidate priority
```

Description

Changes the current priority setting for a C-RP. Where multiple C-RP configurations are used to support the same multicast groups, the candidate having the highest priority is elected. Zero (0) is the highest priority, and 255 is the lowest priority.

The **no** form of this command removes the currently configured value and sets it to the default of 192.

Parameter	Description
<PRIORITY-VALUE>	Specifies the priority value for the Candidate-RP router. Range: 0 to 255. Default: 192.

Example

Configuring and removing candidate priority:

```
switch(config)# router pim
switch(config-pim)# rp-candidate priority 250
switch(config-pim)# no rp-candidate priority
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

rp-candidate source-ip-interface

```
rp-candidate source-ip-interface <INTERFACE-NAME> [group-prefix <GRP-ADDR/GRP-MASK>]
no rp-candidate source-ip-interface <INTERFACE-NAME> [group-prefix <GRP-ADDR/GRP-MASK>]
```

Description

Enables the Candidate Rendezvous Point (C-RP) operation, and configures the router to advertise itself as a C-RP to the Bootstrap Router (BSR) for the current domain.

This step includes the option to allow the C-RP to be a candidate for all possible multicast groups, or for up to four multicast groups, or ranges of groups. If group-prefix is not given, it considers for all multicast group addresses.

The **no** form of this command removes the C-RP configuration.

Parameter	Description
<INTERFACE-NAME>	Specifies the interface to use as a source for the C-RP router IP address.
<GRP-ADDR>	Specifies the multicast group address in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255.
<GRP-MASK>	Specifies the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.

Examples

Configuring and removing candidate source IP interface:

```
switch(config)# router pim
switch(config-pim)# rp-candidate source-ip-interface vlan40 group-prefix
230.0.0.4/24
switch(config-pim)# no rp-candidate source-ip-interface vlan20
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

rpf-override

```
rpf-override <SRC-ADDR/SRC-MASK> <RPF-ADDR|INTERFACE-NAME>
no rpf-override <SRC-ADDR/SRC-MASK> <RPF-ADDR|INTERFACE-NAME>
```

Description

The Reverse Path Forward (RPF) override, allows overriding the normal RPF lookup mechanism, and indicates to the router that it may accept multicast traffic on an interface other than the one that the RPF lookup mechanism would normally select. This includes accepting traffic from an invalid source IP address for the subnet or VLAN that is directly connected to the router. Traffic may also be accepted from a valid PIM neighbor that is not on the reverse path towards the source of the received multicast traffic.

The **no** form of this command removes currently configured RPF entry.

Parameter	Description
<SRC-ADDR/SRC-MASK>	Specifies the multicast source IPv4 address in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255. And the number of bits in the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.
<RPF-ADDR>	Specifies the RPF address in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255.
<INTERFACE-NAME>	Specifies the RPF interface name.

Usage

Reverse Path Forward (RPF) checking is a core multicast routing mechanism. The RPF ensures that the multicast traffic received arrives on the expected router interface before further processing. If the RPF check fails for a multicast packet, the packet is discarded. For multicast traffic flow that arrives on the SPT, the expected incoming interface for a given source or group is the interface towards the source address of the traffic (determined by the unicast routing system). For traffic arriving on the RP tree, the expected incoming interface is the interface towards the RP.

Example

Configuring and removing RPF override:

```
switch(config)# router pim
switch(config-pim)# rpf-override 40.0.0.4/24 30.0.0.4
switch(config-pim)# no rpf-override 40.0.0.4/24 30.0.0.4
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200	config-pim	Administrators or local user group members with execution rights

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000		for this command.

show ip mroute

```
show ip mroute [all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows multicast routing information. Optionally, you can show specific information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows mroute information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing IP mroute for the default VRF:

```
Switch(config-vlan-20)# show ip mroute
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address           : 232.10.10.10
Source Address          : 192.168.20.2
SSM Mroute              : True
Neighbor                : 192.168.3.0
Uptime                  : 02:08:31
State                   : route
Incoming interface      : 1/1/5
Outgoing Interface List :
Interface       State
-----------     ----------
vlan20          forwarding
```

Showing IP mroute for all VRFs:

```
switch# do show ip mroute all-vrfs
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address           : 232.10.10.10
Source Address          : 192.168.2.100
SSM Mroute              : True
Neighbor                : 192.168.3.0
Uptime                  : 00:38:24
State                   : route
Incoming interface      : 1/1/4
Outgoing Interface List :
Interface       State
-----------     ----------
vlan20          forwarding

VRF : red
Total number of entries : 1

Group Address           : 232.11.11.11
Source Address          : 30.0.0.3
SSM Mroute              : True
Neighbor                : 31.0.0.1
Uptime                  : 00:32:55
State                   : route
Incoming interface      : vlan31
Outgoing Interface List :
Interface       State
-----------     ----------
vlan32          forwarding

switch#
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip mroute brief

`show ip mroute brief [al-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows brief version of the multicast routing information. Optionally, you can specify the display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows mroute information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing the IP mroute brief:

```
switch# show ip mroute  brief
VRF : default
Total number of entries : 1

Group Address      Source Address     Neighbor          Interface
-------------      --------------     --------          ---------
239.1.1.1          40.0.0.6           10.1.1.2          vlan5
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip mroute group-addr

`show ip mroute <GROUP-ADDR> [<SOURCE-ADDR>] [all-vrfs | vrf <vrf-name>] [vsx-peer]`

Description

Shows the multicast routing information for the given group address. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
<GROUP-ADDR>	Specifies a group address in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255.
<SOURCE-ADDR>	Specifies show information for the group from this source in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255.
`all-vrfs`	Shows mroute information for the group for all VRFs.
`vrf` *<VRF-NAME>*	Specifies the name of a VRF.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing information for group 239.1.1.1 and VRF green:

```
switch# show ip mroute 239.1.1.1 vrf green

VRF : green

Group Address                 : 239.1.1.1
Source Address                : 40.0.0.5
Neighbor                      : 10.1.1.2
Incoming interface            : vlan1
Unicast Routing Protocol      : connected
Metric                        : 1234
Metric  Pref                  : 1234
Downstream Interface
Interface   State
---------   -----
vlan6       forwarding
```

Showing information for group 239.1.1.1 from source 40.0.0.5 and all VRFs:

```
switch# show ip mroute 239.1.1.1 40.0.0.5 all-vrfs

VRF : blue

Group Address                 : 239.1.1.1
Source Address                : 40.0.0.5
Incoming interface            : vlan3
Unicast Routing Protocol      : connected
Metric                        : 1234
Metric  Pref                  : 1234
Downstream Interface
Interface   State
---------   -----
vlan2       forwarding
```

```
VRF : green

Group Address                  : 239.1.1.1
Source Address                 : 40.0.0.5
Neighbor                       : 10.1.1.2
Incoming interface             : vlan1
Unicast Routing Protocol       : connected
Metric                         : 1234
Metric  Pref                   : 1234
Downstream Interface
Interface    State
---------    -----
vlan6        forwarding
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip multicast anomalies

```
show ip multicast anomalies (pim | igmp | msdp | data-path | all) {source <source_ip>}
{group <group_ip>} {interface <IFNAME>} {vrf <vrf_name>} {all-vrfs}
```

Description

This command is used to display IPv4 multicast anomalies occurring across all the multicast modules in the system. Use this issue to troubleshoot current issues, or to detect multicast issues that occurred in the past by capturing the list of anomalies occurring across the multicast stack.

Parameter	Description
`pim`	Display multicast anomalies specific to PIM.
`igmp`	Display multicast anomalies specific to IGMP.
`msdp`	Display multicast anomalies specific to MSDP.

Parameter	Description
data-path	Display multicast anomalies specific to the datapath.
all	Display anomalies of all muticast modules.
group <group_ip>	Display multicast anomalies specific to the group.
interface <IFNAME>	Display multicast anomalies specific to an interface
source <source_ip>	Display multicast anomalies specific to a source.
vrf <vrf-name>	Display multicast anomalies specific to a VRF.
all-vrfs	Display multicast anomalies for all VRFs.

Examples

Showing datapath multicast anomalies for a specified group, interface and VRF.

```
switch# show ip multicast anomalies all all-vrfs

2022-02-18T09:28:40.272639+00:00 8320 pimd[2206]: MCAST_ANOMALY|IPV4|PIM|-
|100.1.1.1|224.0.0.2|VLAN20|VRF_BLUE| Dropping packet as max number of mroute or
nexthop is reached

2022-02-18T09:28:40.275256+00:00 8320 hpe-repld[2678]: MCAST_ANOMALY|-|DATA-PATH|-
|-|-|-|-|Could not allocate resources | linecard = e1937928-ceee-4027-a240-
aa54ba2de076 | err = Ingress resources exhausted

2022-02-18T09:28:40.283113+00:00 8320 ops-switchd[1214]: MCAST_ANOMALY|IPV4|DATA-
PATH|-|100.1.1.1|224.0.0.2|VLAN20|VRF_BLUE|Unable to add IPMC entry
```

Command History

Release	Modification
10.10	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip multicast boundary interface

```
show ip multicast boundary interface <interface-name>
```

Description

Displays IP Multicast boundary ACL configurations and packet drop counters for the specified interface.

Examples

The following example displays IP multicast boundary information for interface **1/1/1**.

```
switch# show ip multicast boundary interface vlan50
IP Multicast Boundary Configurations
------------------------------------
access-list ip permitssm
    20 permit any any 225.0.0.0/255.0.0.0
    30 permit any any 230.0.0.0/255.0.0.0
    40 permit any any 232.0.0.0/255.0.0.0

IP Multicast Boundary Rx packet drop counters
---------------------------------------------
PIM Joins/Prunes           0
PIM BSM                    0
PIM C-RP Advertisements    0
PIM Asserts                0
Multicast Data Packets     0
IGMP Joins                 0
```

Related Commands

Command	Description
ip multicast boundary	This command configures administratively-scoped multicast boundaries on PIM-enabled Interfaces.

Command History

Release	Modification
10.10	Command Introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Users having admin privileges.

show ip pim

```
show ip pim [all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows the PIM router information. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows PIM router information on all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Usage

- In the 6400 Switch Series, In-Service Software Upgrade (ISSU) and multicast NSF are not supported in mixed mode.
- Multicast NSF is not supported for PIM RP enabled switches, therefore some transient traffic loss is expected during ISSU on RP routers where both PIM and MSDP are enabled.
- When PIM NSF status is inactive, the PIM NSF Time Remaining information is not shown.

Example

Showing IP PIM router information:

```
switch# show ip pim

PIM Global Parameters

VRF                               :  default
PIM Status                        :  Enabled
PIM SSM Status                    :  Enabled
PIM SSM Range ACL                 :  pim_ssm_grp_range_acl
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Active
PIM NSF Time Remaining (HH:MM:SS) :  00:01:21
```

Command History

Release	Modification
10.10	Added NSF information: PIM NSF status, PIM NSF Time Remaining
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim bsr

```
show ip pim bsr [all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows the information about BSR candidates in the domain and multicast groups it supports. Optionally, you can specify the display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows PIM candidate BSR information for all VRFs.
`vrf <VRF-NAME>`	Optional. Shows PIM candidate BSR information for a particular VRF. If the **<VRF-NAME>** is not specified, it shows information for the default VRF.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing information about BSR candidates:

```
switch# show ip pim bsr all-vrfs

Status and Counters- PIM-SM Bootstrap Router Information

VRF                         : default
E-BSR Address               : 10.0.0.1
E-BSR Priority              : 0
E-BSR Hash Mask Length      : 30
E-BSR Up Time               : 3000 secs
Next Bootstrap Message      : 80 secs

C-BSR Admin Status          : This system is a Candidate-BSR
C-BSR Address               : 2.2.2.2/24
C-BSR Priority              : 34
C-BSR Hash Mask Length      : 30
C-BSR Message Interval      : 76
C-BSR Source IP Interface   : vlan10
```

```
C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : 2.2.2.2
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 192
C-RP Source IP Interface  : vlan10

Group Address    Group Mask
---------------  ---------------
226.2.2.2        255.255.255.255
228.2.2.2        255.255.255.255
232.2.2.2        255.255.255.255

VRF                       : green
E-BSR Address             : 2.2.2.2
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 3000 secs
Next Bootstrap Message    : 80 secs

C-BSR Admin Status        : This system is a Candidate-BSR
C-BSR Address             : 2.2.2.2/24
C-BSR Priority            : 34
C-BSR Hash Mask Length    : 32
C-BSR Message Interval    : 60
C-BSR Source IP Interface : vlan10

C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : 2.2.2.2
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 192
C-RP Source IP Interface  : vlan10

Group Address    Group Mask
---------------  ---------------
231.2.2.2        255.255.255.255
232.2.2.2        255.255.255.255
235.2.2.2        255.255.255.255
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

Platforms	Command context	Authority
9300 10000		

show ip pim bsr elected

```
show ip  pim bsr elected [all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows information about the elected BSR in the domain and multicast groups it supports. Optionally you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Selects all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM elected bootstrap router information:

```
switch# show ip pim bsr elected all-vrfs

Status and Counters- PIM-SM Elected Bootstrap Router Information

VRF                         : default
E-BSR Address               : 10.0.0.1
E-BSR Priority              : 0
E-BSR Hash Mask Length      : 30
E-BSR Up Time               : 3000 secs
Next Bootstrap Message      : 80 secs

VRF                         : green
E-BSR Address               : 20.0.0.1
E-BSR Priority              : 0
E-BSR Hash Mask Length      : 30
E-BSR Up Time               : 3000 secs
Next Bootstrap Message      : 80 secs
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim bsr local

`show ip pim bsr local [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the information about BSR candidates on the local router and multicast groups it supports. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Selects all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing local Candidate BSR:

```
switch# show ip pim bsr local all-vrfs

Status and Counters - PIM-SM Local Candidate-BSR Information

VRF                         : default
C-BSR Admin Status          : This system is a Candidate-BSR
C-BSR Address               : 2.2.2.2/24
C-BSR Priority              : 34
C-BSR Hash Mask Length      : 30
C-BSR Message Interval      : 76
C-BSR Source IP Interface   : vlan10

VRF                         : green
C-BSR Admin Status          : This system is a Candidate-BSR
C-BSR Address               : 2.2.2.2/24
C-BSR Priority              : 34
C-BSR Hash Mask Length      : 32
C-BSR Message Interval      : 60
C-BSR Source IP Interface   : vlan10
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim interface

```
show ip pim interface [brief | all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows the information about PIM interfaces currently configured in the router. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.



BIDIR PIM is not supported on the 8320 and 8400 switch series.

Parameter	Description
`brief`	Specifies brief interface information
`all-vrfs`	Selects all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing the information about PIM interfaces currently configured in the router for the 6200, 6300, 6400, 8100, 8325, 8360, 9300, and 10000 switch series.

```
switch# show ip pim interface 1/1/2

PIM Interfaces

VRF: default
```

```
Interface: 1/1/2
Neighbor count: 2
IP Address:50.1.1.4/24
Mode: bidir
Designated Router: NA
Proxy DF: false
Hello Interval (sec): 30
Hello Delay (sec):5
Override Interval (msec): 2500        Lan Prune Delay: Yes
Propagation Delay (msec): 500         Configured DR Priority: NA
Operational DR Priority : NA
Neighbor Timeout: 105
```

Showing PIM interface for the 8320 and8400 switch series:

```
switch# show ip pim interface


PIM Interfaces

VRF: default

Interface          IP Address         mode
------------------ -----------------  ----------
1/1/1              40.0.0.4/24        sparse
1/1/2              50.0.0.4/24        sparse
```

Showing PIM interface information in brief for the default VRF:

```
switch(config)# show ip pim interface brief

-------------------------------------------------------------------------------
--
           VRF : default                          Total number of interfaces : 4
-------------------------------------------------------------------------------
--
Interface      IP Address            DR Address         Neighbor     Mode      VSX

                                                        count
Role
-----------    ------------------    ---------------    ---------    ------    ---
--
1/1/1          40.0.0.4/24           Nil                1            bidir     NA

vlan10         50.1.1.1/24           Nil                0            bidir     NA
vlan20         60.0.0.4/24           Nil                1            bidir     NA
vlan30         30.10.10.2/24         Nil                2            bidir     NA
loopback1      70.0.0.4/24           NA                 NA           bidir     NA
-------------------------------------------------------------------------------
--
```

Showing PIM interface brief information for all VRFs:

```
switch(config)# show ip pim interface brief all-vrfs

-------------------------------------------------------------------------------
```

```
--
           VRF : default                            Total number of interfaces : 1
------------------------------------------------------------------------------
--
Interface      IP Address            DR Address         Neighbor     Mode      VSX

                                                        count
Role
-----------    ------------------    ---------------    ---------    ------    ---
--
1/3/1          31.1.1.1/30           Nil                0            sparse    N/A

------------------------------------------------------------------------------
--

------------------------------------------------------------------------------
--
           VRF : vrf1                               Total number of interfaces : 1
------------------------------------------------------------------------------
--
1/3/2          32.1.1.1/30           Nil                0            sparse    N/A

------------------------------------------------------------------------------
--
```

Command History

Release	Modification
10.13	Added support for BIDIR PIM on the 6200,6300, 6400,8100, 8325,8360, 9300,10000 switch series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim interface interface-name

```
show ip pim interface {<INTERFACE-NAME> [vsx-peer] | lag | loopback | tunnel |  vlan
<VLAN-ID> | vxlan} [vrf <VRF-NAME>]
```

Description

Shows detailed information about the PIM interface currently configured.

Parameter	Description
<INTERFACE-NAME>	Specifies an interface for showing PIM interface information.
vsx-peer	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.
LAG	Shows LAG interface information.
loopback	Shows loopback interface information.
tunnel	Shows tunnel interface information.
vlan *<VLAN-ID>*	Specifies an interface for showing PIM interface information.
vrf *<VRF-NAME>*	Specifies the name of a VRF. Default: default.
vxlan	Shows the VXLAN interface information.

Example

Showing PIM interface information for interface 1/1/2:

```
switch# show ip pim interface 1/1/2

PIM Interfaces

VRF: default

Interface  : 1/1/2
IP Address : 50.0.0.4/24
Mode       : sparse

Designated Router :
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5

Override Interval (msec)  : 2500              Lan Prune Delay     : Yes
Propagation Delay (msec)  : 500               DR Priority         : 1
Neighbor Timeout          : 105
```

Showing the PIM interface information for VLAN 10:

```
switch# show ip pim interface vlan 10

PIM Interfaces

VRF: red

Interface      : vlan10
Neighbor count : 1
IP Address     : 100.100.1.1/24
Mode           : sparse

Designated Router      : 100.100.1.1
Proxy DR               : false
Hello Interval (sec)   : 30
```

```
Hello Delay (sec)      : 5

Override Interval (msec) : 2500        Lan Prune Delay : Yes
Propagation Delay (msec) : 500         DR Priority     : 1
Neighbor Timeout         : 83
```

Showing the PIM interface information for VLAN 10 when anycast neighbors are present:

```
switch# show ip pim interface vlan 10

PIM Interfaces

VRF: red

Interface      : vlan10
Neighbor count : 1
IP Address     : 100.100.1.1/24
Mode           : sparse

Designated Router      : 100.100.1.1
Proxy DR               : false
Hello Interval (sec)   : 30
Hello Delay (sec)      : 5

Override Interval (msec) : 2500        Lan Prune Delay : Yes
Propagation Delay (msec) : 500         DR Priority     : 1
Neighbor Timeout         : 83

Anycast Neighbors Present : True
DR State                  : Non-DR
Operational DR Priority   : 30529026
Elected DR priority       : 50529027
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim interface interface-name counters

`show ip pim interface <INTERFACE-NAME> counters [vsx-peer]`

Description

Shows the PIM packet counters information for the specified interface.

Parameter	Description
<INTERFACE-NAME>	Specifies the interface to show packet counter information.
vsx-peer	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Usage

Loopback interfaces are special interfaces where only unicast PIM messages are updated. This includes Register, Register Stop, and Candidate RP Advertisements.

When a loopback interface is configured as the RP, the ACL drop counters will be updated on the interface on which the packets are received.

Example

Showing PIM packet counters for interface 1/1/5:

```
Switch(config)# show ip pim interface 1/1/5 counters

Interface  : 1/1/5
VRF        : default

Tx Counters :

Hello                                  310
State Refresh                          0
Join/Prune                             141
SSM Join/Prune                         141
RP Advertisement                       0
Graft                                  0
Graft Ack                              0
Assert                                 0
Bsm                                    0
Register                               0
Register Stop                          0
SSM Register Stop                      0

Rx Counters :

Hello                                  308
State Refresh                          0
Join/Prune                             0
SSM Join/Prune                         0
RP Advertisement                       0
Graft                                  0
Graft Ack                              0
Assert                                 0
Bsm                                    0
Register                               0
SSM Register                           0
Register Stop                          0
Register Drops(Register ACL hitcount)  0
Join/Prune Drops(RP ACL hitcount)      0
```

```
Rx Drop Counters :

Hello                                   0
State Refresh                           0
Join/Prune                              0
RP Advertisement                        0
Graft                                   0
Graft Ack                               0
Assert                                  0
Bsm                                     0
Switch(config)#
```

Showing PIM packet counters for interface VLAN 1:

```
switch# show ip pim interface vlan1 counters

Interface           : vlan1
VRF                 : default

Rx Counters :

Hello                                 4
State Refresh                         0
Join/Prune                            1
RPadv                                 0
Graft                                 0
GraftAck                              0
Assert                                0
Bsm                                   0
Register                              0
Register Stop                         0
Register Drops(Register ACL hitcount)  10
Join/Prune Drops(RP ACL hitcount)      5


Tx Counters :

Hello               9
State Refresh       0
Join/Prune          0
RPadv               0
Graft               0
GraftAck            0
Assert              0
Bsm                 0
Register            0
Register Stop       0

Invalid Rx Counters :

Hello               0
State Refresh       0
Join/Prune          0
RPadv               0
Graft               0
GraftAck            0
Assert              0
Bsm                 0
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim neighbor

```
show ip pim neighbor [<IP-ADDRESS>] [brief | all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows PIM neighbor information. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
<IP-ADDRESS>	Specifies an IP address.
`brief`	Specifies PIM neighbor information display in brief format.
`all-vrfs`	Selects all VRFs.
`vrf` *<VRF-NAME>*	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM neighbor information for the 6200, 6300, 6400,8100, 8325, 8360, 9300, 10000 switch series.:

```
switch# show ip pim neighbor

PIM Neighbor

VRF                         : default
Total number of neighbors : 1

IP Address                  : 30.1.1.3
```

```
Interface                  : vlan30
Up Time (HH:MM:SS)         : 03:55:40
Expire Time (HH:MM:SS)     : 00:01:23
DR Priority                : NA
Hold Time (HH:MM:SS)       : 00:01:45
Bidir Capable              : True
```

Showing PIM neighbor information for the 8320. 8400 switch series:

```
switch# show ip pim neighbor

PIM Neighbor

VRF                 : default
IP Address          : 40.0.0.44
Interface           : 1/1/1
Up Time (sec)       : 544
Expire Time (sec)   : 80
DR Priority         : 40
```

Showing PIM neighbor information in brief for the default VRF:

```
switch# show ip pim neighbor brief
--------------------------------------------------------------------------------
-
 VRF: default                  Total number of neighbor : 2
--------------------------------------------------------------------------------
-
Interface   Neighbor   Uptime      Expires    DR       Hold Time  Secondary
Address
            (IPV4)     (HH:MM:SS)  (HH:MM:SS)  Priority (HH:MM:SS)  (IPV4)
----------  --------  ---------   ---------   ------   ---------  ----------------
-
29091/1/1   40.0.0.5  11:54:21    00:01:31    NA       00:01:45   Nil
29101/1/2   50.0.0.5  00:03:23    00:01:23    NA       00:01:45
60.0.0.4,70.0.0.4
--------------------------------------------------------------------------------
-
```

Command History

Release	Modification
10.13	Added support for BIDIR PIM on the 6200, 6300, 6400,8100, 8325, 8360, 9300, 10000 switch series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this

Platforms	Command context	Authority
6400 8100 8320 8325 8360 8400 9300 10000		command from the operator context (>) only.

show ip pim pending

```
show ip pim pending [<GROUP-ADDR>] [all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows the pending joins on a PIM router. Optionally you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Use this command to determine what flows are being requested on the PIM network. If data availability for a flow is expected, and a join for the flow is pending, the troubleshooting search moves to the source of that flow, since the routers are verified to be seeing the request for data.

Parameter	Description
<GROUP-ADDR>	Specifies a group address in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255.
`all-vrfs`	Selects all VRFs.
`vrf` *<VRF-NAME>*	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

On the 6400 Switch Series, interface identification differs.

Showing pending PIM joins:

```
switch# show ip pim pending
Join Pending
VRF : default
   Group 234.0.20.4
       (*,G) Pending
            Incoming Interface:  1/1/32
   Group 234.0.20.5
       (*,G) Pending
            Incoming Interface:  1/2/32
   Group 234.0.20.6
       (*,G) Pending
            Incoming Interface:  1/1/32
   Group 234.0.20.7
```

```
      (*,G) Pending
           Incoming Interface:  1/1/2
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim rp

```
show ip pim rp [<group-ip>] [{vrf <vrf-name>}|all-vrfs]
```

Description

Displays the rendezvous point (RP) address for a particular group in the given VRF. The output of this command also includes the type of RP (static or dynamic) and the uptime for the mapping. This information can help verify that Group-to-RP mapping is consistent across all routers in the network. If the **group-ip** parameter is not included, the output of this command displays the group-to-RP mappings of those groups with active multicast traffic in the given VRF. If a VRF name is not specified, the output of this command displays information for the default VRF.

Parameter	Description
`<group-ip>`	Display group-to-RP mappings for the specified group.
`vrf <VRF-NAME>`	Specifies the name of a VRF. The default VRF is named **default**.
`all-vrfs`	Selects all VRFs.

Example

Showing RP mapping information for a single group:

```
switch# show ip pim rp 239.1.1.1

VRF: default
```

```
PIM-SM Group-to-Resultant_RP Mapping Information
Group Address    RP Address    RP Type   Up Time(HH:MM:SS)
-------------    ----------    -------   -----------------
239.1.1.1        20.1.1.1      bsr       12:01:20
```

Showing RP mapping for all VRFs:

```
switch# show ip pim rp all-vrfs
VRF: default

PIM-SM Group-to-Resultant_RP Mapping Information
Group Address    RP Address    RP Type   Up Time(HH:MM:SS)
-------------    ----------    -------   -----------------
239.1.1.1        20.1.1.1      bsr       15:10:45
239.1.1.2        40.1.1.1      static    05:07:30
239.1.1.3        Not Found     -         -

VRF: red

PIM-SM Group-to-Resultant_RP Mapping Information
Group Address    RP Address    RP Type   Up Time(HH:MM:SS)
-------------    ----------    -------   -----------------
225.1.1.1        100.1.1.5     bsr       15:11:50
```

Command History

Release	Modification
10.12	Command introduced on 6200 series
10.10	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim rp-registered-source

```
show ip pim rp-registered-sources <group-address> [source-address] [all-vrfs | vrf <vrf-name>]
```

Description

Displays the registered sources information on the RP router. This command shows information about the active multicast flows that are registered by the source designated router (DR) to this Rendezvous

Point (RP). When the multicast source becomes inactive, the entry will be removed from this table. Note that this command displays only the set of flows that have been registered successfully for which the current router is the RP.

show ipv pim rp registered sources

```
show ip pim rp-registered-sources <group-address> [source-address] [all-vrfs | vrf <vrf-name>]
```

Description

Shows information about active multicast flows that are registered by source DR to a specific RP.

Parameter	Description
`<group-address>`	Shows registered sources information for the group address. Format: **x.x.x.x**
`<source-address>`	(Optional) Shows registered sources information for the group from this source. Format: **x.x.x.x** Display registered sources information for group address.
`vrf <VRF-NAME>`	Displays registered sources information for a specific VRF.
`all-vrfs`	Displays registered sources information for all VRFs.

Example

The following example the registered sources information for all VRFs.

```
switch# show ip pim rp-registered-sources all-vrfs
Multicast flows registered with this RP
VRF : default
Total number of entries : 2
Source Address           Group Address           RP Address
--------------------     --------------------    --------------------
20.1.1.1                 225.1.1.4               2.2.2.2
20.1.1.1                 225.1.1.5               2.2.2.2

Multicast flows registered with this RP
VRF : red
Total number of entries : 2
Source Address           Group Address           RP Address
--------------------     --------------------    --------------------
30.1.1.1                 229.1.1.1               4.4.4.4
30.1.1.1                 229.1.1.2               4.4.4.4
```

The following example the registered sources information for a specific group and source address.

```
switch# show ip pim rp-registered-sources 229.1.1.10 30.1.1.1

Multicast flows registered with this RP
VRF : default
Total number of entries : 1
Source Address           Group Address           RP Address
--------------------     --------------------    --------------------
30.1.1.1                 229.1.1.10              4.4.4.4
```

```
PIM-SM Group-to-Resultant_RP Mapping Information
Group Address   RP Address   RP Type  Up Time(HH:MM:SS)
-------------   ----------   -------  ----------------
225.1.1.1       100.1.1.5    bsr      15:11:50
Showing RP mapping information for a single group:
```

```
Multicast flows registered with this RP
VRF : default
Total number of entries : 2
Source Address           Group Address           RP Address
--------------------     --------------------    --------------------
20.1.1.1                 225.1.1.4               2.2.2.2
20.1.1.1                 225.1.1.5               2.2.2.2

Multicast flows registered with this RP
VRF : red
Total number of entries : 2
Source Address           Group Address           RP Address
--------------------     --------------------    --------------------
30.1.1.1                 229.1.1.1               4.4.4.4
30.1.1.1                 229.1.1.2               4.4.4.4
```

Command History

Release	Modification
10.12	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim rp-candidate

`show ip pim rp-candidate [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the candidate RP operational and configuration information. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Selects all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM RP candidate:

```
switch# show ip pim rp-candidate all-vrfs

 Status and Counters- PIM-SM Candidate-RP Information

 VRF                      : Green
 C-RP Admin Status        : This system is a Candidate-RP
 C-RP Address             : 10.1.1.27
 C-RP Hold Time           : 150
 C-RP Advertise Period    : 60
 C-RP Priority            : 192
 C-RP Source IP Interface : Vlan10

 Group Address    Group Mask
 ---------------- ---------------
 239.10.10.240    255.255.255.252
 236.0.0.0        255.255.255.0

 VRF                      : Red
 C-RP Admin Status        : This system is a Candidate-RP
 C-RP Address             : 20.1.1.27
 C-RP Hold Time           : 150
 C-RP Advertise Period    : 60
 C-RP Priority            : 192
 C-RP Source IP Interface : Vlan20

 Group Address    Group Mask
 ---------------- ---------------
 239.10.10.240    255.255.255.252
 236.0.0.0        255.255.255.0
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this

Platforms	Command context	Authority
6400 8100 8320 8325 8360 8400 9300 10000		command from the operator context (>) only.

show ip pim rp-set

```
show ip pim rp-set [all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows the multicast group support for both the learned C-RP assignments and any statically configured RP assignments. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Selects all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM RP set information:

```
switch# show ip pim rp-set all-vrfs

VRF: default

Status and Counters - PIM-SM Static RP-Set Information
Group Address    Group Mask       RP Address       Override
---------------  ---------------  ---------------  --------
233.100.128.255  255.255.255.255  100.10.10.1      Yes
238.100.128.255  255.255.255.255  100.10.10.3      Yes

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
---------------  ---------------  ---------------  ---------  -----------
223.2.2.34       255.0.0.0        9.0.0.25         12         0

VRF: green

Status and Counters - PIM-SM Static RP-Set Information
Group Address    Group Mask       RP Address       Override
---------------  ---------------  ---------------  --------
226.102.128.255  255.255.255.255  105.10.10.3      Yes
234.102.128.255  255.255.255.255  110.10.10.3      Yes
```

```
Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
---------------  ---------------  ---------------  ---------  -----------
223.2.2.34       255.0.0.0        9.0.0.25         12         0
229.2.2.34       255.0.0.0        9.0.0.25         10         0
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim rp-set learned

`show ip pim rp-set learned [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the multicast group support for dynamically learned RP assignments. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Selects all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM RP set learned information:

```
switch# show ip pim rp-set learned all-vrfs
```

```
VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
---------------  ---------------  ---------------  ---------  -----------
223.2.2.34       255.0.0.0        9.0.0.25         12         0

VRF: green

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
---------------  ---------------  ---------------  ---------  -----------
223.2.2.34       255.0.0.0        9.0.0.25         12         0
229.2.2.34       255.0.0.0        9.0.0.25         10         0
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim rp-set static

`show ip pim rp-set static [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the multicast group support for statically configured RP assignments. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Selects all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM Static RP set information:

```
switch# show ip pim rp-set static all-vrfs

VRF: default

Status and Counters - PIM-SM Static RP-Set Information
Group Address    Group Mask       RP Address       Override
---------------  ---------------  ---------------  --------
233.100.128.255  255.255.255.255  100.10.10.1      Yes
238.100.128.255  255.255.255.255  100.10.10.3      Yes

VRF: green

Status and Counters - PIM-SM Static RP-Set Information
Group Address    Group Mask       RP Address       Override
---------------  ---------------  ---------------  --------
226.102.128.255  255.255.255.255  105.10.10.3      Yes
234.102.128.255  255.255.255.255  110.10.10.3      Yes
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim rpf

show ip pim rpf [<source-ip-address> [<group-ip-address>]] [vrf <vrf-name> | all-vrfs]

Description

Shows PIM RPF details for the specified source or RP address in the given VRF. It shows the nexthop and interface through which shortest path to the source is available. Additionally, it prints if PIM neighborship is present on the nexthop. If VRF is not given, it displays for default VRF.

Parameter	Description
<IP-ADDR>	Show PIM RPF details for the given IPv4/IPv6 (X:X::X:X) address
`vrfs`	Shows PIM RPF information for specific VRF.
`vrf` *<VRF-NAME>*	Specifies the name of a VRF. Default: default.
`all-vrfs`	Shows PIM RPF details in all VRFs.

Examples

Showing PIM RPF for an IP address:

```
switch# [show ip pim rpf 1.1.1.1]

VRF: default
IP Address    RPF Interface  RPF Nexthop   PIM Neighbor  RPF Route/Mask   Origin
In Use
----------    -------------  -----------   ------------  --------------   ------
------
1.1.1.1       vlan10         10.1.1.1      yes           1.1.1.1/32       O
yes
```

Showing PIM RPF for all VRFs:

```
switch# [show ip pim rpf all-vrfs]

VRF: default
IP Address    RPF Interface  RPF Nexthop    PIM Neighbor  RPF Route/Mask   Origin
In Use
------------  -------------  -----------    ------------  --------------   ------
------
1.1.1.1       vlan10         10.1.1.1       yes           1.1.1.1/32       O
yes
10.1.1.1      vlan10         -              no            10.1.1.0/24      C
yes
10.1.1.2      vlan10         -              no            10.1.1.2/32      C
yes

VRF: red
IP Address    RPF Interface  RPF Nexthop    PIM Neighbor  RPF Route/Mask   Origin
In Use
----------    -------------  -----------    ------------  --------------   ------
------
2.2.2.2       vlan20         20.0.0.1       yes           2.2.2.2/32       SU
yes
20.0.0.1      vlan20         -              no            20.0.0.0/24      C
yes
20.0.0.2      vlan20         -              no            20.0.0.2/32      C
yes
```

Command History

Release	Modification
10.12	Command introduced
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim rpf-override

```
show ip pim rpf-override [all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows the RPF override configuration, which can be useful information when troubleshooting potential RPF misconfigurations. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF

Parameter	Description
`all-vrfs`	Optional. Shows PIM RPF override information for all VRFs.
`vrf <VRF-NAME>`	Optional. Shows PIM RPF override information for a particular VRF. If the **<VRF-NAME>** is not specified, it shows information for the default VRF.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

On the 6400 Switch Series, interface identification differs.

Showing PIM RPF override:

```
switch# show ip pim rpf-override all-vrfs

VRF                 : default
Static RPF Override
Multicast Source RPF IP Address
------------------- -----------------
```

```
10.0.0.2/32          1.1.1.1

VRF                 : green
Static RPF Override
Multicast Source RPF IP Address
------------------- ------------------
10.0.0.2/32          1.1.1.1
10.1.1.1/32          1.1.1.2
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim rpf-override source

`show ip pim rpf-override source <IP-ADDR> [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the RPF override configuration for the specified source. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
source <IP-ADDR>	Specifies the RPF source address in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255.
all-vrfs	Selects all VRFs.
vrf *<VRF-NAME>*	Specifies the name of a VRF. Default: default.
vsx-peer	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

On the 6400 Switch Series, interface identification differs.

Showing PIM RPF override source:

```
switch# show ip pim rpf-override source 10.0.0.2

VRF                 : default
Static RPF Override
Multicast Source RPF IP Address
------------------- ------------------
10.0.0.2             1.1.1.1
```

Showing PIM RPF override source for all VRFs:

```
switch# show ip pim rpf-override source 10.0.0.2 all-vrfs

VRF                 : default
Static RPF Override
Multicast Source RPF IP Address
------------------- ------------------
10.0.0.2             1.1.1.1

VRF                 : green
Static RPF Override
Multicast Source RPF IP Address
------------------- ------------------
10.0.0.2             1.1.1.1
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim tree-state

```
show ip pim tree-state {<group-ip> [<source-ip>]}|brief [{vrf <vrf-name>}| all-vrfs]
```

Description

Displays upstream join states for a specified group and source address in a VRF.

The command displays upstream state, upstream interface and RPF neighbor used to send join messages and a list of downstream interfaces from which join messages are received.

The set of downstream interfaces in this command may not show the final list of outgoing interfaces for a flow, which is computed from various internal states and is shown in the output of the command show ip mroute.

Parameter	Description
`<group-ip>`	Shows PIM Join details for the specified group IP address
`<source-ip>`	Shows PIM Join details for the specified source IP address. If a source address is **not** specified, only *,G states are displayed for the specified group. If a source **address** is specified, (S,G) states are displayed along with (*,G) states and (S,G,RPT) states wherever applicable.
`brief`	Display brief details for the multicast group and source in a table format.
`vrf <VRF-NAME>`	Show join state details for the specified VRF.
`all-vrfs`	Show join state details for all VRFs.

Usage

The output of this command can indicate one of the following two multicast group (*,G) and multicast source and group (S,G) upstream states:

- **Joined** : Join sent to upstream RPF neighbor.
- **Not Joined** : Joins not sent upstream.

The following states are applicable to the multicast group (*G), and root path tree (S,G,RPT) only:

- **Pruned** : Traffic from the source is arriving on the shortest path tree, (*,G) Joined, but (S,G,RPT) pruned.
- **Not Pruned** : Traffic from the multicast group (*,G) Joined, and (S,G,rpt) not pruned.
- **RPT Not Joined**' : The multicast group (*,G) has not joined.

Examples

Display multicast group (*,G) join information for the VRF **red**.

```
show ip pim tree-state 239.1.1.1 vrf red
(*,G) Information for Group 239.1.1.1
VRF: red
Upstream Information:
State                          : Joined
Joined Interface               : vlan50
RPF Neighbor                   : 20.1.1.2
Uptime                         : 01:58:30
Downstream Information:
Interfaces                     : vlan50, vlan201
```

Display group (*,G), source and group (S,G), and root-path tree (S,G, RPT) Information for group **239.1.1.1** and source IP **30.1.1.1**.

```
show ip pim tree-state 239.1.1.1 30.1.1.1 vrf red
(*,G) Information for Group 239.1.1.1
VRF: red
Upstream Information:
State                          : Joined
Joined Interface               : vlan50
RPF Neighbor                   : 20.1.1.2
Uptime                         : 01:58:30
Downstream Information:
Interfaces                     : vlan200
(S,G) Information for Group 239.1.1.1 Source 30.1.1.1
Upstream Information:
State                          : Joined
Joined Interface               : vlan30
RPF Neighbor                   : 40.1.1.2
Uptime                         : 01:57:30
SPT bit set                    : True
Downstream Information:
Interfaces                     : vlan200
(S,G,RPT) Information for Group 239.1.1.1 Source 30.1.1.1
Upstream Information:
State                          : Pruned
Joined Interface               : vlan50
RPF Neighbor                   : 20.1.1.2
Uptime                         : 01:58:30
Downstream Information:
Interfaces                     : vlan200
```

Display brief information for the IP PIM tree state.

```
switch# show ip pim tree-state brief
State abbreviations :
J - Joined  NJ - Not Joined  RPTNJ - RPT Not Joined
P - Pruned  NP - Not Pruned
-------------------------------------------------------------------------------
VRF : default
-------------------------------------------------------------------------------
Group Address      Source Address     RPF          Uptime        State  Type
Neighbor     (HH:MM:SS)
-------------      --------------     -----------  ----------    ------ -------
239.1.1.1          *                  10.1.1.2     01:58:30      J      *,G
239.1.1.1          40.0.0.6           10.1.1.2     01:58:30      J      S,G
239.1.1.2          *                  10.1.1.2     01:58:30      J      *,G
239.1.1.2          40.0.0.6           20.1.1.2     01:58:30      J      S,G
239.1.1.2          40.0.0.6           10.1.1.2     01:58:30      P      S,G,RPT
-------------------------------------------------------------------------------
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

sources-per-group

```
sources-per-group <limit>
no sources-per-group <limit>
```

Description

Configures the total number of sources allowed for a group on the router. By default, there is no limit on the number of sources for a group. When the number of sources for a group exceeds the configured limit, multicast traffic from additional sources will be dropped.

The **no** form of this command removes the currently configured limit value.

Parameter	Description
<limit>	Specifies the value to be configured as the sources allowed per group. Range: 1 to 4294967295.

Usage

Flows exceeding the limit will be programmed as a bridge entry and will not have the outgoing interfaces list populated. This configuration does not allow new sources for the group. At the time of configuration, if the device has more sources for the given group than the configured value, already allowed sources continue to exist until they are removed.

The flows are programmed in the HW on a FCFS basis. There could be scenarios where the flow is forwarded in neighbor router, but it may not be forwarded on the current router because of exceeding the limits configured on the current router. In such cases, it is recommended to configure higher limits to avoid traffic outage.

Examples

Configuring and removing the sources allowed per group:

```
switch(config)# router pim
switch(config-pim)# sources-per-group 4
switch(config-pim)# no sources-per-group
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim`	Administrators or local user group members with execution rights for this command.

spt-threshold

```
spt-threshold
no spt-threshold
```

Description

Enables the router to switch the multicast traffic flows to the shortest path tree. Default is enabled.

The **no** form of this command disables the routers ability to switch the multicast traffic flows to the shortest path tree.

To apply this configuration a user needs to apply disable/enable PIM globally.

Example

Enabling and disabling the SPT threshold:

```
switch(config)# router pim
switch(config-pim)# spt-threshold
switch(config-pim)# no spt-threshold
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim`	Administrators or local user group members with execution rights for this command.

PIM-SM commands for IPv6

Only the default VRF is supported on the Aruba 6200 Switch Series.

accept-register access-list

```
accept-register access-list <ACL-RULE>
no accept-register access-list <ACL-RULE>
```

Description

Configures ACL on RP to filter PIM Register packets from unauthorized sources. The ACL specified will contain the (S,G) traffic in register packets to permitted or denied.

The **no** form of this command removes the currently configured ACL rule.

Parameter	Description
<ACL-RULE>	Specifies the ACL rule name.

Usage

When register ACL is associated with a PIM Router, PIM protocol will store the source and destination address details along with the action (permit or deny).

Upon receiving the register messages, a look up is made to check if the S and G in the packet is in the permitted list. If there is no match or if there is a deny rule match, a register stop message is immediately sent and the packet is dropped and no further action is taken. Permitted packets will go through the normal flow.

Loopback interfaces are special interfaces where only unicast PIM messages are updated. This includes Register, Register Stop, and Candidate RP Advertisements.

When a loopback interface is configured as the RP, the ACL drop counters will be updated on the interface on which the packets are received.

Examples

Configuring ACL on RP with an ACL rule named **pim_regv6_acl**:

```
switch(config)# access-list ipv6 pim_regv6_acl
switch(config-acl-ipv6)# 10 permit any 20.::1 ff1e::1
switch(config-acl-ipv6)# 20 deny any 30::1 ff1e::3
switch(config)# router pim6
switch(config-pim6)# accept-register access-list pim_regv6_acl
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim6`	Administrators or local user group members with execution rights for this command.

accept-rp

```
accept-rp <IPv6-ADDR> access-list <ACL-RULE>
no accept-rp <IPv6-ADDR> access-list <ACL-RULE>
```

Description

Enables PIM router to filter PIM join/prune messages destined for a specific RP and specific groups. The ACL specifies the group addresses which are allowed or denied. Up to 8 RP addresses and group ACL can be associated with the PIM router.

The **no** form of this command removes the currently configured ACL rule.

Parameter	Description
<IPv6-ADDR>	Specifies an address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
<ACL-RULE>	Specifies the ACL rule name.

Usage

PIM will store the accepted RP address and the associated group ACL. When a join or prune message is received, a RP look up is made for the packet. If the RP is in the configured list and if the group in the join/prune packet is allowed in the ACL, the packet is allowed. Otherwise the packet is dropped.

To allow join/prune message from any groups, group address in the ACL can be wild-carded. In this case, only RP address check is performed.

This command impacts only (*,G) join/prune messages. If there are any existing flows, the user will need to disable and enable PIM on the interface to apply the ACL.

Loopback interfaces are special interfaces where only unicast PIM messages are updated. This includes Register, Register Stop, and Candidate RP Advertisements.

When a loopback interface is configured as the RP, the ACL drop counters will be updated on the interface on which the packets are received.

If there is an active flow which is in the SPT, the traffic flow through the SPT will continue. Only (*,G) join/prune messages are dropped. (S,G) join/prune messages will not be impacted.

Examples

Configuring ACL on RP with an ACL rule named **pim_rpv6_grp_acl** to filter join/prune messages:

```
switch(config-pim)# access-list ip pim_rpv6_grp_acl
switch(config-acl-ipv6)# 10 permit any any ff2e::2/64
switch(config-acl-ipv6)# 20 permit any any ff1e::1/64
switch(config-acl-ipv6)# router pim6
switch(config-pim6)# accept-rp 30::1 access-list pim_rpv6_grp_acl
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim6	Administrators or local user group members with execution rights for this command.

bsr-candidate bsm-interval

```
bsr-candidate bsm-interval <INTERVAL-VALUE>
no bsr-candidate bsm-interval
```

Description

Configures the interval in seconds to send periodic RP-Set messages to all PIM-SM interfaces on a router that operates as the BSR in a domain. This setting must be smaller than the **rp-candidate hold-time** settings (range of 30 to 255; default 150) configured in the RPs operating in the domain.

The **no** form of this command removes the currently configured value and sets it to the default of 60 seconds.

Parameter	Description
<INTERVAL-VALUE>	Specifies the BSR-candidate BSM interval in seconds. Range: 5 to 300. Default: 60.

Example

Configuring and removing BSR-candidate BSM-interval:

```
switch(config)# router pim6
switch(config-pim6)# bsr-candidate bsm-interval 150
switch(config-pim6)# no bsr-candidate bsm-interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim6	Administrators or local user group members with execution rights for this command.

bsr-candidate hash-mask-length

```
bsr-candidate hash-mask-length <LENGTH-VALUE>
no bsr-candidate hash-mask-length
```

Description

Controls the distribution of multicast groups among the C-RP, in a domain where there is overlapping coverage of the groups among the RPs. This value specifies the length (number of significant bits) when allocating this distribution. A longer hash-mask-length results in fewer multicast groups, for each block of group addresses assigned to the RPs. Multiple blocks of addresses assigned to each C-RP results in wider dispersal of addresses. Includes enhanced load-sharing for the multicast traffic for the different groups that are used in the domain at the same time.

The **no** form of this command removes currently configured value and sets to the default of 126.

Parameter	Description
<LENGTH-VALUE>	Specifies the length (in bits) of the hash mask. Range: 1 to 128. Default: 126.

Example

Configuring and removing the BSR-candidate hash-mask-length:

```
switch(config)# router pim6
switch(config-pim6)# bsr-candidate hash-mask-length 4
switch(config-pim6)# no bsr-candidate hash-mask-length
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim6	Administrators or local user group members with execution rights for this command.

bsr-candidate priority

```
bsr-candidate priority <PRIORITY-VALUE>
no bsr-candidate priority
```

Description

Configures the priority to apply to the router when a BSR election process occurs in the PIM-SM domain. The candidate with the highest priority becomes the BSR for the domain. If the highest priority is shared by multiple routers, the candidate having the highest IP address becomes the BSR of the domain. Zero (0) is the lowest priority. To make BSR selection easily predictable, use this command to assign a different priority to each candidate BSR in the PIM-SM domain.

The **no** form of this command removes currently configured value and sets to the default of 0.

Parameter	Description
<PRIORITY-VALUE>	Specifies the priority for the Candidate Bootstrap router. Range: 0 to 255. Default: 0.

Example

Configuring and removing the BSR-candidate priority:

```
switch(config)# router pim6
switch(config-pim6)# bsr-candidate priority 250
switch(config-pim6)# no bsr-candidate priority
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim6`	Administrators or local user group members with execution rights for this command.

bsr-candidate source-ip-interface

```
bsr-candidate source-ip-interface <INTERFACE-NAME>
no bsr-candidate source-ip-interface <INTERFACE-NAME>
```

Description

Configures the router to advertise itself as a candidate PIM-SM BSR on the interface specified, and enables BSR candidate operation. The result makes the router eligible to be elected as the BSR for the PIM-SM domain in which it operates. One BSR candidate interface is allowed per-router.

The **no** form of this command removes the Candidate BSR configuration.

Parameter	Description
<INTERFACE-NAME>	Specifies the interface to use as a source for Candidate-BSR router IP address. Interface can be a VLAN interface, routed interface, or LAG. PIM-SM must be enabled on this interface with the command **ipv6 pimv6-sparse enable**.

Example

On the 6400 Switch Series, interface identification differs.

Configuring and removing the BSR-candidate interface:

```
switch(config)# router pim6
switch(config-pim6)# bsr-candidate source-ip-interface 1/1/4
switch(config-pim6)# no rp-candidate source-ip-interface 1/1/4
```

Configuring and removing the BSR-candidate sub-interface:

```
switch(config)# router pim6
switch(config-pim6)# bsr-candidate source-ip-interface 1/1/4
switch(config-pim6)# no rp-candidate source-ip-interface 1/1/4
```

Configuring sub-interface 1/1/19/10 as Candidate BSR:

```
switch(config)# router pim6
switch(config-pim6)# bsr-candidate source-ip-interface 1/1/19.10
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim6	Administrators or local user group members with execution rights for this command.

disable

```
disable
```

Description

Disables PIMv6 globally on the router.



Using the **disable** command will cause all the multicast routes to be erased from hardware.

Example

Disabling PIM router:

```
switch(config)# router pim6
switch(config-pim6)# disable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim6`	Administrators or local user group members with execution rights for this command.

enable

`enable`

Description

Enables PIMv6 globally on the router.

Example

Enabling PIM router:

```
switch(config)# router pim6
switch(config-pim6)# enable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim6`	Administrators or local user group members with execution rights for this command.

ipv6 mroute

`ipv6 mroute` *<SRC-ADDR/SRC-MASK> <RPF-ADDRESS> | <INTERFACE-NAME>*

Description

Configures multicast reverse path (RPF) forwarding static routes. This command is an alias of the **rpf-override** command.

The **no** form of this command removes the mroute configuration.

Parameter	Description
<SRC-ADDR>	Specifies the multicast source address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
<SRC-MASK>	Specifies the number of bits in the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.
<RPF-ADDR>	Specifies the RPF address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
<INTERFACE-NAME>	Specifies the RPF interface name.

Usage

Reverse Path Forward (RPF) checking is a core multicast routing mechanism. The RPF ensures that the multicast traffic received arrives on the expected router interface before further processing. If the RPF check fails for a multicast packet, the packet is discarded. For multicast traffic flow that arrives on the SPT, the expected incoming interface for a given source or group is the interface towards the source address of the traffic (determined by the unicast routing system). For traffic arriving on the RP tree, the expected incoming interface is the interface towards the RP.

RPF checking is applied to all multicast traffic and is significant in preventing network loops. Up to eight manual RPF overrides can be specified. The RPF-address indicates one of two distinct RPF candidates:

1. A valid PIM neighbor address from which forwarded multicast traffic is accepted with a source address of **<source-addr/src-mask>**.
2. A local router address on a PIM-enabled interface to which **<source-addr/src-mask>** is directly connected. If configured, the local router will assume the role of DR for this flow and registers the flow with an RP.

Example

Configuring and removing IP mroute:

```
switch(config-pim)# router pim6
switch(config-pim6)# ipv6 mroute 50::4/24 tunnel1
switch(config-pim6)# no ipv6 mroute 50::4/24 tunnel1
```

Command History

Release	Modification
10.10	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this

Platforms	Command context	Authority
6400 8100 8320 8325 8360 8400 9300 10000		command from the operator context (>) only.

ipv6 pim6-sparse

```
ipv6 pim6-sparse {enable | disable}
no ipv6 pim6-sparse [enable]
```

Description

Enables or disables PIM-SM on the current interface. PIM-SM is disabled by default on an interface. An IPv6 address must be configured on the interface to enable PIM-SM.

Parameter	Description
`enable`	Enables PIM-SM on the interface. IPv6 address must be configured on the interface to enable PIM-SM (use the **ipv6 address <X:X::X:X/M>** command).
`disable`	Disables PIM SM on the interface.

Examples

Enabling and disabling PIM-SM on an interface:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 address 2001::01/64
switch(config-if-vlan)# ipv6 pim6-sparse enable
switch(config-if-vlan)# ipv6 pim6-sparse disable
```

Enabling and disabling PIM-SM on a sub-interface:

```
switch(config)# interface 1/1/19.10
switch(config-subif)# ipv6 address 90::1/64
switch(config-subif)# ipv6 pim6-sparse enable
switch(config-subif)# ipv6 pim6-sparse disable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6200
6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

ipv6 pim6-sparse bfd

Not supported on the Aruba 6200 Switch Series.

```
ipv6 pim6-sparse bfd [disable]
no ipv6 pim6-sparse bfd
```

Description

Configures BFD on a per-interface basis for an interface associated with the PIM process.

The **no** form of this command removes the BFD configuration on the interface and sets it to the default configuration.

If BFD is enabled globally, it will be enabled by default on all interfaces. The only exception is when it is disabled specifically on an interface using the **ipv6 pim6-sparse bfd disable** command.
If BFD is disabled globally, it will be disabled by default on all interfaces. The only exception is when it is enabled specifically on an interface using the **ipv6 pim6-sparse bfd** command.

Parameter	Description
`disable`	Disables the BFD configuration on the interface.

Examples

Enabling the BFD configuration on the interface:

```
switch(config)# interface vlan 40
switch(config-if-vlan)# ipv6 pim6-sparse bfd
```

Disabling the BFD configuration on the interface:

```
switch(config-if-vlan)# ipv6 pim6-sparse bfd disable
```

Removing the BFD configuration on the interface:

```
switch(config-if-vlan)# no ipv6 pim6-sparse bfd
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
		Administrators or local user group members with execution rights for this command.

ipv6 pim6-sparse dr-priority

```
ipv6 pim6-sparse dr-priority <PRIORITY-VALUE>
no ipv6 pim6-sparse dr-priority
```

Description

Changes the router priority for the designated router (DR) election process in the current interface.

A numerically higher value means a higher priority. If multiple routes share the highest priority, the router with the highest IP address is selected as the DR.

The **no** form of this command removes currently configured value and sets to the default of 1.

Parameter	Description
<PRIORITY-VALUE>	Specifies the priority value to use on the interface in the DR election process. Range: 0 to 4294967295. Default: 1.

Examples

Configuring and removing the interface priority value:

```
switch(config)# interface vlan 40
switch(config-if-vlan)# ipv6 pim6-sparse dr-priority 4444
switch(config-if-vlan)# no ipv6 pim6-sparse dr-priority
```

Configuring and removing the interface priority value:

```
switch(config)# interface 1/1/19.10
switch(config-if-vlan)# ipv6 pim6-sparse dr-priority 2000
switch(config-if-vlan)# no ipv6 pim6-sparse dr-priority
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6200
6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

ipv6 pim6-sparse hello-delay

```
ipv6 pim6-sparse hello-delay <DELAY-VALUE>
no ipv6 pim6-sparse hello-delay
```

Description

Configures the maximum time in seconds before the router actually transmits the initial PIM hello message on the current interface.

The **no** form of this command removes currently configured value and sets to the default of 5 seconds.

Parameter	Description
<DELAY-VALUE>	Specifies the hello-delay in seconds, which is the maximum time before a triggered PIM Hello message is transmitted on this interface. Range: 0 to 5. Default: 5.

Usage

- In cases where a new interface activates connections with multiple routers. If all the connected routers sent hello packets at the same time, the receiving router could become momentarily overloaded.
- This command randomizes the transmission delay to a time between zero and the hello delay setting. Using zero means no delay. After the router sends the initial hello packet to a newly detected interface, it sends subsequent hello packets according to the current hello interval setting.

Example

Configuring and removing hello-delay interface:

```
switch(config)# interface vlan 40
switch(config-if-vlan)# ipv6 pim6-sparse hello-delay 4
switch(config-if-vlan)# no ipv6 pim6-sparse hello-delay
```

Configuring and removing hello-delay on a sub-interface:

```
switch(config)# interface 1/1/19.10
switch(config-subif)# ipv6 pim6-sparse hello-delay 4
switch(config-subif)# no ipv6 pim6-sparse hello-delay
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ipv6 pim6-sparse hello-interval

```
ipv6 pim6-sparse hello-interval <INTERVAL-VALUE>
no ipv6 pim6-sparse hello-interval
```

Description

Configures the frequency at which the router transmits PIM hello messages on the current interface.

The **no** form of this command removes the currently configured value and sets to the default of 30 seconds.

Parameter	Description
<INTERVAL-VALUE>	Specifies the frequency at which PIM Hello messages are transmitted on this interface in seconds. Range: 5 to 300. Default: 30.

Usage

- The router uses hello packets to inform neighbor routers of its presence.
- The router also uses this setting to compute the hello holdtime, which is included in hello packets sent to neighbor routers.
- Hello holdtime tells neighbor routers how long to wait for the next hello packet from the router. If another packet does not arrive within that time, the router removes the neighbor adjacency on that interface from the PIM adjacency table, which removes any flows running on that interface.
- Shortening the hello interval reduces the hello holdtime. If they do not receive a new hello packet when expected, it changes how quickly other routers stop sending traffic to the router.

Example

Configuring and removing sparse hello-interval:

```
switch(config-if)# ipv6 pim6-sparse hello-interval 60
switch(config-if)# no ipv6 pim6-sparse hello-interval
```

Configuring and removing sparse hello-interval on a sub-interface:

```
switch)config)# interface 1/1/19.10
switch(config-subif)# ipv6 pim6-sparse hello-interval 100
switch(config-subif)# no ipv6 pim6-sparse hello-interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ipv6 pim6-sparse ipv6-addr

```
ipv6 pim6-sparse ipv6-addr {<IPv6-ADDR-VALUE> | any}
no ipv6 pim6-sparse ipv6-addr
```

Description

Enables the router to dynamically determine the source IP address to use for PIM-SM packets sent from the interface or to use the specific IPv6 address.

The **no** form of this command removes the currently configured value and sets to the default of **any**.

Parameter	Description
<IP-ADDR-VALUE>	Specifies the source IP address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
any	Specifies dynamically determining the source IP from the current IP address of the interface.

Examples

Configuring and removing source IP address:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 pim6-sparse ipv6-addr 2001::02
switch(config-if-vlan)# no ipv6 pim6-sparse ipv6-addr
```

Configuring and removing source IP address on a sub-interface:

```
switch(config)# interface 1/1/19.10
switch(config-subif)# ipv6 pim6-sparse ipv6-addr 2001:1::1
switch(config-if-vlan)# no ipv6 pim6-sparse ipv6-addr 2001:1::1
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ipv6 pim6-sparse lan-prune-delay

```
ipv6 pim6-sparse lan-prune-delay
no ipv6 pim6-sparse lan-prune-delay
```

Description

Enables the LAN prune delay option on the current interface. The default is enabled.

With LAN-prune-delay enabled, the router informs downstream neighbors how long it will wait before pruning a flow after receiving a prune request. Other downstream routers on the same interface must send a join to override the prune before the LAN-prune-delay time to continue the flow. Prompts any downstream neighbors with multicast receivers continuing to belong to the flow to reply with a join. If no joins are received after the LAN-prune-delay period, the router prunes the flow. The propagation-delay and override-interval settings determine the LAN-prune-delay setting.

The **no** form of this command disables the LAN prune delay option.

Example

Enabling and disabling the LAN prune delay:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 pim6-sparse lan-prune-delay
switch(config-if-vlan)# no ipv6 pim6-sparse lan-prune-delay
```

Enabling and disabling the LAN prune delay on a sub-interface:

```
switch(config)# interface 1/1/19.10
switch(config-subif)# ipv6 pim6-sparse lan-prune-delay
switch(config-subif)# no ipv6 pim6-sparse lan-prune-delay
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ipv6 pim6-sparse override-interval

```
ipv6 pim6-sparse override-interval <INTERVAL-VALUE>
no ipv6 pim6-sparse override-interval
```

Description

Configures the override interval that gets inserted into the Override Interval field of a LAN Prune Delay option.

The **no** form of this command removes the currently configured value and sets the value to the default of 2500 ms.

Parameter	Description
<INTERVAL-VALUE>	Specifies the override interval of a LAN Prune Delay option in ms. Range: 500 to 6000. Default: 2500.

Usage

A router sharing a VLAN with other multicast routers uses the override-interval value along with the propagation-delay value to compute the **lan-prune-delay** setting. The setting specifies how long to wait for a PIM-SM join after receiving a prune packet from downstream for a particular multicast group.

Example scenario:

A network may have multiple routers sharing VLAN X. When an upstream router is forwarding traffic from multicast group X to VLAN Y, if one of the routers on VLAN Y does not want this traffic, it issues a prune response to the upstream neighbor. The upstream neighbor then goes into a prune pending state for group X on VLAN Y. During this period, the upstream neighbor continues to forward the traffic. During the pending period, another router on VLAN Y can send a group X join to the upstream neighbor. If this happens, the upstream neighbor drops the prune pending status and continues forwarding the traffic. But if no routers on the VLAN send a join, the upstream router prunes.

Example

Configuring and removing the override interval:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 pim6-sparse override-interval 4000
switch(config-if-vlan)# no ipv6 pim6-sparse override-interval
```

Configuring and removing the override interval on a sub-interface:

```
switch(config)# interface 1/1/19.10
switch(config-subif)# ipv6 pim6-sparse override-interval 5000
switch(config-subif)# no ipv6 pim6-sparse override-interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ipv6 pim6-sparse propagation-delay

```
ipv6 pim6-sparse propagation-delay <DELAY-VALUE>
no ipv6 pim6-sparse propagation-delay
```

Description

Configures the propagation delay that gets inserted into the LAN prune delay field of a LAN Prune Delay option.

The **no** form of this command removes currently configured value and sets to the default of 500 ms.

Parameter	Description
<DELAY-VALUE>	Specifies the propagation delay value in ms. Range: 250 to 2000. Default: 500.

Examples

Configuring and removing the propagation delay:

```
switch(config)# interface vlan 40
switch(config-if-vlan)# ipv6 pim6-sparse propagation-delay 400
switch(config-if-vlan)# no ipv6 pim6-sparse propagation-delay
```

Configuring and removing the propagation delay on a sub-interface:

```
switch(config)# interface 1/1/19.10
switch(config-subif)# ipv6 pim6-sparse propagation-delay 1000
switch(config-subif)# no ipv6 pim6-sparse propagation-delay
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

join-prune-interval

```
join-prune-interval <INTERVAL-VALUE>
no join-prune-interval
```

Description

Configures the frequency at which the router will send periodic join or prune-interval messages.

The **no** form of this command sets the interval to the default value of 60 seconds.

Parameter	Description
<INTERVAL-VALUE>	Specifies the join-prune-interval in seconds. Range 5 to 65535. Default: 60.

Examples

Configuring join prune interval:

```
switch(config)# router pim6
switch(config-pim6)# join-prune-interval 400
switch(config-pim6)# no join-prune-interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim6	Administrators or local user group members with execution rights for this command.

no ipv6 pim6-sparse

```
no ipv6 pim6-sparse
```

Description

Removes all the PIM-SM related IPv6 configurations for the interface.

Example

Removing PIM-SM configuration:

```
switch(config)# interface vlan40
switch(config-if-vlan)# no ipv6 pim6-sparse
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
		Administrators or local user group members with execution rights for this command.

register-source

```
register-source <INTERFACE-NAME>
no register-source <INTERFACE-NAME>
```

Description

Specifies the source interface to be used for PIM registration in the case of VXLAN anycast interfaces. When the PIM enabled anycast VLAN is directly connected to a multicast source, **register-source** is used to send registration messages to the RP and this interface receives the register-stop messages from the RP.

The **no** form of this command removes the register source configuration.



For PIMv6, both IPv6 link-local and active-gateway address of the anycast VLAN interface is configured with the anycast link-local address. Refer to **EVPN VXLAN distributed anycast gateway** in the Multicast Guide for more information.

Parameter	Description
<INTERFACE-NAME>	Specifies the name of the interface to use.

Usage

- This is a global configuration under router-pim configuration and is required in Symmetric IRB with anycast IP address configuration.
- This configuration is required in the source connected switch only when the PIM-DR and RP are in two different switches.
- Without this configuration, there will be traffic loss as the registration sequence will not be successful. It is mandatory to have this source interface configured with a non-anycast IP address which is unique to the VTEP, and with PIM enabled.

Examples

Configuring the source interface for PIM registrations:

```
switch# config
switch(config)# router pim6 vrf vrf1
switch(config-pim)# register-source loopback1
```

Removing the **register-source** configuration:

```
switch(config-pim)# no register-source loopback1
```

Command History

Release	Modification
10.12	Command introduced for PIMv6.
10.09.1000	Command introduced

Command Information

Platforms	Command context	Authority
6300 6400 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

router pim6

```
router pim6 [vrf <VRF-NAME>]
no router pim6 [vrf <VRF-NAME>]
```

Description

Changes the current context to the PIMv6 configuration context. If no VRF is specified, the default VRF is assumed.

The **no** form of this command removes the PIM configuration from the specified context or the default VRF.

Parameter	Description
vrf <*VRF-NAME*>	Specifies the name of a VRF. Default: default.

Examples

Configuring default router PIM:

```
switch(config)# router pim6
switch(config-pim6)#
```

Configuring specified router PIM:

```
switch(config)# router pim6 vrf Green
switch(config-pim6)#
```

Removing router PIM:

```
switch(config)# no router pim6
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config`	Administrators or local user group members with execution rights for this command.

rp-address access list

```
rp-address <IPv6-ADDR> [access-list <ACL-NAME>][override]
no rp-address <IPv6-ADDR> [access-list <ACL-NAME>][override]
```

Description

Statically configures the router as the RP and associates the static RP to the specified ACL.

The **no** form of this command removes static RP ACL configuration.

Parameter	Description
<IPv6-ADDR>	Specifies an address in IPv6 format (xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx), where x is a hexadecimal number from 0 to F.
access-list <ACL-NAME>	Specifies the name of the access control list.
`override`	Specifies whether or not static RP configuration precedes the information learned by a BSR.

Usage

The ACL includes a list of permitted/ denied group addresses for the specified RP.

- When configured on a source DR, only permitted group addresses are registered to the RP. When applied on other routers, (*,G) PIM join/prune messages are filtered according to the applied ACL.
- Only destination group addresses in the ACEs are filtered and any other fields configured in the ACE are ignored. If only PIM (*,G) messages need to be filtered, configure **accept-rp** ACLs.

- When static RP ACL is configured, only one static RP can be configured per VRF and that configured RP handles all the multicast groups in range ff00::/8.



A change in the RP ACL does not impact the flows that have already switched to SPT. Only when the source information is expired and the RP is needed to establish the multicast tree, is the change in the ACL reflected. If the source is always active, PIM can be disabled and re-enabled to clear the learned sources information and re-establish multicast trees based on the latest RP ACL configurations.

Examples

Configuring the static RP ACL:

```
...
access-list ip static_rp6_acl
10 permit any any ff2e::2/64
20 permit any any ff1e::1/64

switch(config)# router pim6
switch(config-pim6)# rp-address 30::1 access-list static_rp6_acl
```

Removing the static RP ACL configuration:

```
switch(config-pim)# no rp-address 30::1 access-list static_rp6_acl
```

Command History

Release	Modification
10.10	Added optional access list parameter **[access-list <ACL-NAME>]**
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

rp-address

```
rp-address <IPv6-ADDR> [<GRP-ADDR/GRP-MASK>] [override]
no rp-address <IPv6-ADDR> [<GRP-ADDR/GRP-MASK>] [override]
```

Description

Statically configures the router as the RP for a specified multicast group or range of multicast groups. This must be configured on all PIM-SM routers in the domain. If group address is not specified, it applies to all IPv6 multicast addresses.

The **no** form of this command removes static RP configuration and its precedence.

Parameter	Description
<IPv6-ADDR>	Specifies an address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
<GRP-ADDR>	Specifies the range of multicast group addresses in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
<GRP-MASK>	Specifies the number of bits in the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.
`override`	Specifies higher precedence to static RP over Candidate RP.

Usage

Where a static RP and a C-RP are configured to support the same multicast groups and the multicast group mask for the static RP is equal to or greater than the same mask for the applicable C-RPs, this command assigns the higher precedence to the static RP, resulting in the C-RP operating only as a backup RP for the configured group. Without override, the C-RP has precedence over a static RP configured for the same multicast group or groups.

Examples

```
switch(config)# router pim6
switch(config-pim6)# rp-address 2001::01 ff08::1:3/64 ovverride
switch(config-pim6)# rp-address 2002::02 ff08::1:4/64
switch(config-pim6)# no rp-address 2002::02 ff08::1:4/64
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim`	Administrators or local user group members with execution rights for this command.

rp-candidate group-prefix

```
rp-candidate group-prefix <GRP-ADDR/GRP-MASK>
no rp-candidate group-prefix <GRP-ADDR/GRP-MASK>
```

Description

Adds multicast group address to the current Candidate Rendezvous Point (C-RP) configuration.

The **no** form of this command removes C-RP multicast group address.

Parameter	Description
<GRP-ADDR>	Specifies the multicast group address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
<GRP-MASK>	Specifies the number of bits in the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.

Examples

Configuring and removing candidate group prefix:

```
switch(config)# router pim6
switch(config-pim6)# rp-candidate group-prefix ff08::1:3/64
switch(config-pim6)# no rp-candidate group-prefix ff08::1:3/64
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim6	Administrators or local user group members with execution rights for this command.

rp-candidate hold-time

```
rp-candidate hold-time <TIME-VALUE>
no rp-candidate hold-time
```

Description

Changes the hold-time a C-RP includes in its advertisements to the BSR.

Hold-time is included in the advertisements the C-RP periodically sends to the elected BSR for the domain. Also updates the BSR on how long to wait after the last advertisement from the reporting RP before assuming it has become unavailable.

The **no** form of this command removes the currently configured value and sets it to the default value 150 seconds.

Parameter	Description
<TIME-VALUE>	Specifies the hold-time value in seconds to be sent in C-RP-Adv messages. Range: 30 - 255. Default: 150.

Example

Setting and removing the candidate holdtime:

```
switch(config)# router pim6
switch(config-pim6)# rp-candidate hold-time 250
switch(config-pim6)# no rp-candidate hold-time
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim6	Administrators or local user group members with execution rights for this command.

rp-candidate priority

```
rp-candidate priority <PRIORITY-VALUE>
no rp-candidate priority
```

Description

Changes the current priority setting for a C-RP. Where multiple C-RP configurations are used to support the same multicast groups, the candidate having the highest priority is elected. Zero (0) is the highest priority, and 255 is the lowest priority.

The **no** form of this command removes the currently configured value and sets it to the default of 192.

Parameter	Description
<PRIORITY-VALUE>	Specifies the priority value for the Candidate-RP router. Range: 0 to 255. Default: 192.

Example

Configuring and removing candidate priority:

```
switch(config)# router pim6
switch(config-pim6)# rp-candidate priority 250
switch(config-pim6)# no rp-candidate priority
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

rp-candidate source-ip-interface

```
rp-candidate source-ip-interface <INTERFACE-NAME> [group-prefix <GRP-ADDR/GRP-MASK>]
no rp-candidate source-ip-interface <INTERFACE-NAME> [group-prefix <GRP-ADDR/GRP-MASK>]
```

Description

Enables the Candidate Rendezvous Point (C-RP) operation, and configures the router to advertise itself as a C-RP to the Bootstrap Router (BSR) for the current domain.

This step includes the option to allow the C-RP to be a candidate for all possible multicast groups, or for up to four multicast groups, or ranges of groups. If group-prefix is not given, it considers for all multicast group addresses.

The **no** form of this command removes the C-RP configuration.

Parameter	Description
<INTERFACE-NAME>	Specifies the interface to use as a source for the C-RP router IP address.

Parameter	Description
`group-prefix <GRP-ADDR/GRP-MASK>`	Specifies the multicast group address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F. And the number of bits in the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.

Examples

Configuring a C-RP using VLAN 40 as the source for the C-RP router IP address and associating the ff08::1:3/64 multicast group with the C-RP router:

```
switch(config)# router pim6
switch(config-pim6)# rp-candidate source-ip-interface vlan40 group-prefix
ff08::1:3/64
```

Configuring a C-RP using loopback1 as the source for the C-RP router IP address and associating the ff08::1:3/64 multicast group with the C-RP router:

```
switch(config)# router pim6
switch(config-pim6)# rp-candidate source-ip-interface loopback1 group-prefix
ff08::1:3/64
```

Configuring sub-interface 1/1/19.10 as candidate RP:

```
switch(config)# router pim6
switch(config-pim6)# rp-candidate source-ip-interface 1/1/19.10
```

Removing the candidate source IP interface:

```
switch(config-pim6)# no rp-candidate source-ip-interface vlan20
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim6`	Administrators or local user group members with execution rights for this command.

rpf-override

```
rpf-override <SRC-ADDR/SRC-MASK> <RPF-ADDR|INTERFACE-NAME>
no rpf-override <SRC-ADDR/SRC-MASK> <RPF-ADDR|INTERFACE-NAME>
```

Description

The Reverse Path Forward (RPF) override, allows overriding the normal RPF lookup mechanism, and indicates to the router that it may accept multicast traffic on an interface other than the one that the RPF lookup mechanism would normally select. This includes accepting traffic from an invalid source IP address for the subnet or VLAN that is directly connected to the router. Traffic may also be accepted from a valid PIM neighbor that is not on the reverse path towards the source of the received multicast traffic.

The **no** form of this command removes currently configured RPF entry.

Parameter	Description
<SRC-ADDR>	Specifies the multicast source address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
<SRC-MASK>	Specifies the number of bits in the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.
<RPF-ADDR>	Specifies the RPF address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
<INTERFACE-NAME>	Specifies the RPF interface name.

Usage

Reverse Path Forward (RPF) checking is a core multicast routing mechanism. The RPF ensures that the multicast traffic received arrives on the expected router interface before further processing. If the RPF check fails for a multicast packet, the packet is discarded. For multicast traffic flow that arrives on the SPT, the expected incoming interface for a given source or group is the interface towards the source address of the traffic (determined by the unicast routing system). For traffic arriving on the RP tree, the expected incoming interface is the interface towards the RP.

RPF checking is applied to all multicast traffic and is significant in preventing network loops. Up to eight manual RPF overrides can be specified. The RPF-address indicates one of two distinct RPF candidates:

1. A valid PIM neighbor address from which forwarded multicast traffic is accepted with a source address of **<source-addr/src-mask>**.
2. A local router address on a PIM-enabled interface to which **<source-addr/src-mask>** is directly connected. If configured, the local router will assume the role of DR for this flow and registers the flow with an RP.

Example

Configuring and removing RPF override:

```
switch(config)# router pim6
switch(config-pim6)# rpf-override 50::4/24 40::1
switch(config-pim)# no rpf-override 50::4/24 40::1
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim6`	Administrators or local user group members with execution rights for this command.

show ipv6 mroute *<GROUP-ADDR>*

`show ipv6 mroute <GROUP-ADDR> [<SOURCE-ADDR>] [all-vrfs | vrf <vrf-name>] [vsx-peer]`

Description

Shows the multicast routing information for the given group address. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
<GROUP-ADDR>	Specifies a group address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
<SOURCE-ADDR>	Specifies a source IP address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing information for group ff08::1:3 and VRF green:

```
switch# show ipv6 mroute  ff08::1:3 vrf green

VRF : green
```

```
Group Address           : ff08::1:3
Source Address          : 2001::03
Neighbor                : 2003::04
Incoming interface      : 1/1/1
Outgoing Interface List :
Interface      State
---------      -----
1/1/4          pruned
```

Showing information for group ff08::1:3 from source 2001::03 and all VRFs:

```
switch# show ipv6 mroute  ff08::1:3 2001::03 all-vrfs

VRF : blue

Group Address           : ff08::1:3
Source Address          : 2001::03
Neighbor                : 2003::04
Incoming interface      : 1/1/1
Outgoing Interface List :
Interface      State
---------      -----
1/1/4          pruned


VRF : green

Group Address           : ff08::1:3
Source Address          : 2001::03
Neighbor                : 2003::04
Incoming interface      : 1/1/2
Outgoing Interface List :
Interface      State
---------      -----
1/1/4          pruned
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 mroute

```
show ipv6 mroute [all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows multicast routing information. Optionally, you can show specific information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing IPv6 mroute information for the default VRF:

```
Switch# show ipv6 mroute
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address           : ff32::10
Source Address          : fd00:192:168:20::2
SSM Mroute              : True
Neighbor                : fe80::f403:4301:1422:2600
Uptime                  : 00:14:05
State                   : route
Incoming interface      : 1/1/5
Outgoing Interface List :
Interface       State
-----------     ----------
vlan20          forwarding
```

Showing IPv6 mroute information for all VRFs:

```
switch# do show ipv6 mroute all-vrfs
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address           : ff32::10
Source Address          : fd00:192:168:2::100
SSM Mroute              : True
Neighbor                : fe80::eceb:b801:14e4:2900
Uptime                  : 00:19:20
State                   : route
Incoming interface      : 1/1/4
Outgoing Interface List :
Interface       State
-----------     ----------
vlan20          forwarding
```

```
VRF : red
Total number of entries : 1

Group Address           : ff32::11
Source Address          : 30::3
SSM Mroute              : True
Neighbor                : fe80::eceb:b880:1fe4:2900
Uptime                  : 00:01:13
State                   : route
Incoming interface      : vlan31
Outgoing Interface List :
Interface       State
-----------     ----------
vlan32          forwarding
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 mroute brief

`show ipv6 mroute brief [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows brief version of the multicast routing information. Optionally, you can specify the display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows mroute information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing the IPv6 mroute brief:

```
switch# show ipv6 mroute brief all-vrfs
IP Multicast Route Entries

VRF : blu
Total number of entries : 2

Group Address  : ff08::1:3
Source Address : 2002::04
Neighbor       : 2003::04
Interface       : 1/1/2

Group Address  : ff08::1:4
Source Address : 2002::03
Neighbor       : 2003::05
Interface       : 1/1/3

VRF : default
Total number of entries : 1

Group Address  : ff08::1:5
Source Address : 2001::03
Neighbor       : 2002::01
Interface       : 1/1/1
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6

`show ipv6 pim6 [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the PIM router information. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing the IPv6 PIM router:

```
switch# show ipv6 pim6

PIM Global Parameters

VRF                          :  default
PIM Status                   :  Enabled
Join/Prune Interval (sec)    :  46
SPT Threshold                :  Disabled
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 bsr

`show ipv6 pim6 bsr [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the information about BSR candidates in the domain and multicast groups it supports. Optionally, you can specify the display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing information about BSR candidates:

```
switch# show ipv6 pim6 bsr all-vrfs

Status and Counters- PIM-SM(IPv6) Bootstrap Router Information

VRF                         : blu
E-BSR Address               : 2006::06
E-BSR Priority              : 0
E-BSR Hash Mask Length      : 0
E-BSR Up Time               : 0 secs
Next Bootstrap Message      : 0 secs

C-BSR Admin Status          : This system is a Candidate-BSR
C-BSR Address               : 2007::01
C-BSR Priority              : 40
C-BSR Hash Mask Length      : 36
C-BSR Message Interval      : 50
C-BSR Source IP Interface   : lag1

C-RP Admin Status           : This system is a Candidate-RP
C-RP Address                : 2007::01
C-RP Hold Time              : 60
C-RP Advertise Period       : 60
C-RP Priority               : 46
C-RP Source IP Interface    : lag1

Group Prefix    : ff00::/8
Group Prefix    : ff08::1:3/64
Group Prefix    : ff08::1:4/64

VRF                         : default
E-BSR Address               : 2001::01
E-BSR Priority              : 40
E-BSR Hash Mask Length      : 36
E-BSR Up Time               : 53 mins
Next Bootstrap Message      : 88 secs

C-BSR Admin Status          : This system is a Candidate-BSR
C-BSR Address               : 2001::01
C-BSR Priority              : 40
C-BSR Hash Mask Length      : 36
C-BSR Message Interval      : 50
C-BSR Source IP Interface   : 1/1/1

C-RP Admin Status           : This system is a Candidate-RP
C-RP Address                : 2001::01
C-RP Hold Time              : 60
```

```
C-RP Advertise Period     : 60
C-RP Priority             : 46
C-RP Source IP Interface  : 1/1/1

Group Prefix   : ff00::/8
Group Prefix   : ff08::1:5/64
Group Prefix   : ff08::1:6/64
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 bsr elected

`show ipv6 pim6 bsr elected [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows information about the elected BSR in the domain and multicast groups it supports. Optionally you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM elected bootstrap router information:

```
switch# show ipv6 pim6 bsr elected all-vrfs

Status and Counters - PIM-SM(IPv6) Elected Bootstrap Router Information

VRF                         : blu
E-BSR Address               : 2005::05
E-BSR Priority              : 0
E-BSR Hash Mask Length      : 0
E-BSR Up Time               : 0 secs
Next Bootstrap Message      : 0 secs

VRF                         : default
E-BSR Address               : 2002::02
E-BSR Priority              : 0
E-BSR Hash Mask Length      : 30
E-BSR Up Time               : 50 mins
Next Bootstrap Message      : 88 secs
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 bsr local

`show ipv6 pim6 bsr local [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the information about BSR candidates on the local router and multicast groups it supports. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not

Parameter	Description
	have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing local Candidate BSR:

```
switch# show ipv6 pim6 bsr local all-vrfs

Status and Counters - PIM-SM(IPv6) Local Candidate-BSR Information

VRF                         : blu
C-BSR Admin Status          : This system is a Candidate-BSR
C-BSR Address               : 2007::01
C-BSR Priority              : 40
C-BSR Hash Mask Length      : 36
C-BSR Message Interval      : 50
C-BSR Source IP Interface   : lag1

VRF                         : default
C-BSR Admin Status          : This system is a Candidate-BSR
C-BSR Address               : 2001::01
C-BSR Priority              : 40
C-BSR Hash Mask Length      : 36
C-BSR Message Interval      : 50
C-BSR Source IP Interface   : 1/1/1
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 interface *<INTERFACE-NAME>*

`show ipv6 pim6 interface <INTERFACE-NAME> [vsx-peer]`

Description

Shows detailed information about the PIM interface currently configured.

Parameter	Description
<INTERFACE-NAME>	Specifies an interface for showing PIM interface information. Interface can also be a LAG or VLAN.
vsx-peer	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

On the 6400 Switch Series, interface identification differs.

Showing PIM interface information for interface 1/1/1:

```
switch# show ipv6 pim6 interface 1/1/1

PIM Interfaces

VRF: default

Interface  : 1/1/1
IPv6 Address : fe80::a00:9ff:feec:dc0e/64
Mode       : sparse

Designated Router :
Hello Interval (sec)   : 30
Hello Delay (sec)      : 4

Override Interval (msec)   : 500              Lan Prune Delay      : Yes
Propagation Delay (msec)   : 350              DR Priority          : 3
Neighbor Timeout           : 0
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 interface

```
show ipv6 pim6 interface [all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows the information about PIM interfaces currently configured in the router. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM interface:

```
switch# show ipv6 pim6 interface
PIM Interfaces

VRF: default

Interface          IP Address
mode
------------------ ------------------------------------------------------------
----------
1/1/1              fe80::a00:9ff:feec:dc0e/64
sparse
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 neighbor

`show ipv6 pim6 neighbor [<IPv6-ADDR>] [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows PIM neighbor information. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
<IPv6-ADDR>	Specifies a neighbor address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
`all-vrfs`	Shows information for all VRFs.
`vrf` *<VRF-NAME>*	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

On the 6400 Switch Series, interface identification differs.

Showing PIM neighbor information:

```
switch# show ipv6 pim6 neighbor

PIM Neighbor

VRF                 : default
IP Address          : 2001::02
Interface           : 1/1/1
Up Time (sec)       : 0
Expire Time (sec)   : 0
DR Priority         : 44
```

Showing PIM neighbor information (including the presence of anycast neighbors) for all VRFs:

```
switch# show ipv6 pim6 neighbor all-vrfs

PIM Neighbor


VRF                       : red
Total number of neighbors : 2

IPv6 Address              : fe80::5:5:5:5
Interface                 : vni10000
Up Time (HH:MM:SS)        : 06:57:07
Expire Time (HH:MM:SS)    : 00:03:26
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:03:30

IPv6 Address              : fe80::3821:c780:a5c:18c0
Interface                 : vlan10
Up Time (HH:MM:SS)        : 00:01:46
Expire Time (HH:MM:SS)    : 00:01:29
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses    :100:100::3
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 pending

```
show ipv6 pim6 pending [<GROUP-ADDR>] [all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows the pending joins on a PIM router. Optionally you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Use this command to determine what flows are being requested on the PIM network. If data availability for a flow is expected, and a join for the flow is pending, the troubleshooting search moves to the source of that flow, since the routers are verified to be seeing the request for data.

Parameter	Description
<GROUP-ADDR>	Specifies a group address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
`all-vrfs`	Shows information for all VRFs.
`vrf` *<VRF-NAME>*	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

On the 6400 Switch Series, interface identification differs.

Showing pending PIM joins:

```
switch# show ipv6 pim6 pending
Join Pending
```

```
VRF : default
   Group ff08::1:3
       (*,G) Pending
            Incoming Interface:  1/1/1
   Group ff08::1:4
       (*,G) Pending
            Incoming Interface:  1/1/1
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 rp

`show ipv6 pim6 rp [<group-ip>] [{vrf <vrf-name>}|all-vrfs]`

Description

Displays the rendezvous point (RP) address for a particular group in the given VRF. The output of this command also includes the type of RP (static or dynamic) and the uptime for the mapping. This information can help verify that Group-to-RP mapping is consistent across all routers in the network. If the **group-ip** parameter is not included, the output of this command displays the group-to-RP mappings of those groups with active multicast traffic in the given VRF. If a VRF name is not specified, the output of this command displays information for the default VRF.

Parameter	Description
`<group-ip>`	Display group-to-RP mappings for the specified group.
`vrf <VRF-NAME>`	Specifies the name of a VRF. The default VRF is named **default**.
`all-vrfs`	Selects all VRFs.

Example

Showing RP mapping information for a single group:

```
switch# show ipv6 pim6 rp ff57::3

VRF: default

PIM-SM(IPv6) Group-to-Resultant_RP Mapping Information

Group Address      : ff57::3
RP Address         : Not Found
RP Type            : -
Up Time (HH:MM:SS) : -
```

Showing RP mapping for all VRFs:

```
switch# show ipv6 pim6 rp all-vrfs

VRF: default

PIM-SM(IPv6) Group-to-Resultant_RP Mapping Information

Group Address      : ff56::7
RP Address         : 2002::2
RP Type            : bsr
Up Time (HH:MM:SS) : 00:45:20

VRF: red

PIM-SM(IPv6) Group-to-Resultant_RP Mapping Information

Group Address      : ff55::5
RP Address         : 4001::1
RP Type            : static
Up Time (HH:MM:SS) : 02:33:50

Group Address      : ff55::6
RP Address         : 3003::3
RP Type            : bsr
Up Time (HH:MM:SS) : 01:30:05
```

Command History

Release	Modification
10.12	Command introduced on 6200 series
10.10	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

Platforms	Command context	Authority
8360 8400 9300 10000		

show ipv6 pim6 rp-registered-source

```
show ipv6 pim6 rp-registered-sources all-vrfs
```

Description

Displays the registered sources information on the RP router. This command shows information about the active multicast flows that are registered by the source designated router (DR) to this Rendezvous Point (RP). When the multicast source becomes inactive, the entry will be removed from this table. Note that this command displays only the set of flows that have been registered successfully for which the current router is the RP.

show ipv6 pim6 rp registered sources

```
show ipv6 pim6 rp-registered-sources <group-address> [source-address] [all-vrfs | vrf
<vrf-name>]
```

Description

Shows information about active multicast flows that are registered by source DR to a specific RP.

Parameter	Description	
`<group-address>`	Shows registered sources information for the group address. Format: **X:X::X:X** group-address	Shows registered sources information for the group address
`<source-address>`	(Optional) Shows registered sources information for the group from this source. Format **:X:X::X:X** source-address	Shows registered sources information for the group from selected source.
`vrf <VRF-NAME>`	Displays registered sources information for a specific VRF.	
`all-vrfs`	Displays registered sources information for all VRFs. all-vrfs	Shows registered sources information on all VRFs
vrf	Shows registered sources information for specific VRF	
vrf-name	Shows registered sources information for	

Parameter	Description	
	the given VRF	

Example

Showing information about rp-registered-sources in all-vrfs:

```
switch# show ipv6 pim6 rp-registered-sources all-vrfs

Multicast flows registered with this RP
VRF : default
Total number of entries : 1
Source Address           Group Address           RP Address
-------------------     --------------------    --------------------
2001::1                  ff55::5                 2002::2

Multicast flows registered with this RP
VRF : red
Total number of entries : 1
Source Address           Group Address           RP Address
--------------------     --------------------    --------------------
3001::1                  ff99::5                 3002::2
```

The following example the registered sources information for a specific group and source address.

```
switch# show ipv6 pim6 rp-registered-sources ff55::5 2001::1

Multicast flows registered with this RP
VRF : default
Total number of entries : 1
Source Address           Group Address           RP Address
--------------------     --------------------    --------------------
2001::1                  ff55::5                 3333::3
```

Command History

Release	Modification
10.12	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

Platforms	Command context	Authority
8100 8320 8325 8360 8400 9300 10000		

show ipv6 pim6 rp-candidate

```
show ipv6 pim6 rp-candidate [all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows the candidate RP operational and configuration information. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM RP candidate:

```
switch# show ipv6 pim6 rp-candidate all-vrfs

 Status and Counters- PIM-SM(IPv6) Candidate-RP Information

VRF                         : blu
C-RP Admin Status           : This system is a Candidate-RP
C-RP Address                : 2007::01
C-RP Hold Time              : 60
C-RP Advertise Period       : 60
C-RP Priority               : 46
C-RP Source IP Interface    : lag1

Group Prefix    : ff00::/8
Group Prefix    : ff08::1:3/64
Group Prefix    : ff08::1:4/64


VRF                         : default
C-RP Admin Status           : This system is a Candidate-RP
C-RP Address                : 2001::01
C-RP Hold Time              : 60
C-RP Advertise Period       : 60
C-RP Priority               : 46
C-RP Source IP Interface    : 1/1/1
```

```
Group Prefix   : ff00::/8
Group Prefix   : ff08::1:5/64
Group Prefix   : ff08::1:6/64
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 rpf

show ipv6 pim6 rpf [<source-ip-address> [<group-ip-address>]] [vrf <vrf-name> | all-vrfs]

Description

Shows PIM RPF details for the specified source or RP address in the given VRF. It shows the nexthop and interface through which shortest path to the source is available. Additionally, it prints if PIM neighborship is present on the nexthop. If VRF is not given, it displays for default VRF.

Parameter	Description
<IP-ADDR>	Show PIM RPF details for the given IPv4/IPv6 (X:X::X:X) address
`vrfs`	Shows PIM RPF information for specific VRF.
`vrf` *<VRF-NAME>*	Specifies the name of a VRF. Default: default.
`all-vrfs`	Shows PIM RPF details in all VRFs.

Examples

Showing PIM RPF for VRF red:

```
switch# show ipv6 pim6 rpf vrf red

Multicast RPF Details
Origin Codes: C - connected, SM - static-multicast, SU - static-unicast
```

```
              O - OSPF, B - BGP, R - RIP
VRF: red
IP Address       : 2000::2
RPF Interface    : vlan20
RPF Nexthop      : -
PIM Neighbor     : no
RPF Route/Mask   : 2000::2/128
Origin           : C
In Use           : yes

IP Address       : 2222::2
RPF Interface    : vlan20
RPF Nexthop      : fe80::94f1:2880:141d:a800
PIM Neighbor     : yes
RPF Route/Mask   : 2222::2/128
Origin           : O
In Use           : yes
```

Command History

Release	Modification
10.12	Command introduced
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 rpf-override

`show ipv6 pim6 rpf-override [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the RPF override configuration, which can be useful information when troubleshooting potential RPF misconfigurations. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF

Parameter	Description
`all-vrfs`	Shows information for all VRFs.

Parameter	Description
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM RPF override:

```
switch# show ipv6 pim6 rpf-override all-vrfs

VRF : Green
Static RPF Override
Multicast Source : 2003::1/128
RPF IPv6 Address : 2001::01
Multicast Source : 2005::1/128
RPF IPv6 Address : 2007::01
VRF : Red
Static RPF Override
Multicast Source : 2004::02/128
RPF IPv6 Address : 2002::02
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 rpf-override source

`show ipv6 pim6 rpf-override source <IPv6-ADDR> [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the RPF override configuration for the specified source. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`source <IPv6-ADDR>`	Specifies the RPF source address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing PIM RPF override source:

```
switch# show ipv6 pim6 rpf-override source 2004::02

VRF : default
Static RPF Override
Multicast Source : 2004::02/128
RPF IPv6 Address : 2002::02
```

Showing PIM RPF override source for all VRFs:

```
switch# show ipv6 pim6 rpf-override source 2004::02 all-vrfs

VRF : Red
Static RPF Override
Multicast Source : 2004::02/128
RPF IPv6 Address : 2002::02
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 rp-set

```
show ipv6 pim6 rp-set [all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows the multicast group support for both the learned C-RP assignments and any statically configured RP assignments. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM RP set information:

```
switch# show ipv6 pim6 rp-set all-vrfs

VRF: blu

Status and Counters - PIM-SM(IPv6) Static RP-Set Information

Group Prefix  : ff00::/8
RP Address    : 2004::04
Override [No] : No

Status and Counters - PIM-SM(IPv6) Learned RP-Set Information

Group Prefix       : ff08::1:3/64
RP Address         : 2007::01
Hold Time (sec)    : 60
Expire Time (sec)  : 0
Group Prefix       : ff08::1:4/64
RP Address         : 2007::01
Hold Time (sec)    : 60
Expire Time (sec)  : 92

VRF: default

Status and Counters - PIM-SM(IPv6) Static RP-Set Information

Group Prefix  : ff00::/8
RP Address    : 2003::03
Override [No] : No

Status and Counters - PIM-SM(IPv6) Learned RP-Set Information

Group Prefix       : ff08::1:5/64
RP Address         : 2001::01
Hold Time (sec)    : 60
Expire Time (sec)  : 0
```

```
Group Prefix       : ff08::1:6/64
RP Address         : 2002::01
Hold Time (sec)    : 60
Expire Time (sec)  : 92
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 rp-set learned

`show ipv6 pim6 rp-set learned [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the multicast group support for dynamically learned RP assignments. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM RP set learned information:

```
switch# show ipv6 pim6 rp-set learned all-vrfs

VRF: blu

Status and Counters - PIM-SM(IPv6) Learned RP-Set Information
```

```
Group Prefix       : ff08::1:3/64
RP Address         : 2007::01
Hold Time (sec)    : 60
Expire Time (sec)  : 0
Group Prefix       : ff08::1:4/64
RP Address         : 2007::01
Hold Time (sec)    : 60
Expire Time (sec)  : 92

VRF: default

Status and Counters - PIM-SM(IPv6) Learned RP-Set Information
Group Prefix       : ff08::1:5/64
RP Address         : 2001::01
Hold Time (sec)    : 60
Expire Time (sec)  : 0
Group Prefix       : ff08::1:6/64
RP Address         : 2002::01
Hold Time (sec)    : 60
Expire Time (sec)  : 92
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 rp-set static

`show ipv6 pim6 rp-set static [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the multicast group support for statically configured RP assignments. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.

Parameter	Description
vsx-peer	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM Static RP set information:

```
switch# show ipv6 pim6 rp-set static all-vrfs

VRF: blu

Status and Counters - PIM-SM(IPv6) Static RP-Set Information

Group Prefix  : ff00::/8
RP Address    : 2004::04
Override [No] : No

VRF: default

Status and Counters - PIM-SM(IPv6) Static RP-Set Information

Group Prefix  : ff00::/8
RP Address    : 2003::03
Override [No] : No
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 tree-state

```
show ipv6 pim6 tree-state {<group-ip> [<source-ip>]}|brief [{vrf <vrf-name>}| all-vrfs]
```

Description

Displays upstream join states for a specified group and source address in a VRF in an IPv6 network.

The command displays upstream state, upstream interface and RPF neighbor used to send join messages and a list of downstream interfaces from which join messages are received.

The set of downstream interfaces in this command may not show the final list of outgoing interfaces for a flow, which is computed from various internal states and is shown in the output of the command show ip mroute (PIM-SM.

Parameter	Description
`<group-ip>`	Shows PIM Join details for the specified group IPv6 address
`<source-ip>`	Shows PIM Join details for the specified source IPv6 address. If a source address is **not** specified, only *,G states are displayed for the specified group. If a source **address** is specified, (S,G) states are displayed along with (*,G) states and (S,G,RPT) states wherever applicable.
`brief`	Display brief details for the multicast group and source in a table format.
`vrf <VRF-NAME>`	Show join state details for the specified VRF.
`all-vrfs`	Show join state details for all VRFs.

Usage

The output of this command can indicate one of the following two multicast group (*,G) and multicast source and group (S,G) upstream states:

- **Joined** : Join sent to upstream RPF neighbor.
- **Not Joined** : Joins not sent upstream.

The following states are applicable to the multicast group (*G), and root path tree (S,G,RPT) only:

- **Pruned** : Traffic from the source is arriving on the shortest path tree, (*,G) Joined, but (S,G,RPT) pruned.
- **Not Pruned** : Traffic from the multicast group (*,G) Joined, and (S,G,rpt) not pruned.
- **RPT Not Joined**' : The multicast group (*,G) has not joined.

Examples

Display multicast group (*,G) join information for the VRF **red**.

```
show ipv6 pim6 tree-state ff55::1 vrf red
(*,G) Information for Group ff55::1
VRF: red
Upstream Information:
State                          : Joined
Joined Interface               : vlan50
RPF Neighbor                   : 20::2
Uptime                         : 01:58:30
Downstream Information:
Interfaces                     : vlan50, vlan201
```

Display group (*,G), source and group (S,G), and root-path tree (S,G, RPT) Information for group **ff55::1** and source IP **30::1**.

```
show ipv6 pim6 tree-state ff55::1 30::1 vrf red
(*,G) Information for Group ff55::1
VRF: red
Upstream Information:
State                          : Joined
Joined Interface               : vlan50
RPF Neighbor                   : 20::2
Uptime                         : 01:58:30
Downstream Information:
Interfaces                     : vlan200
(S,G) Information for Group ff55::1 Source 30::1
Upstream Information:
State                          : Joined
Joined Interface               : vlan30
RPF Neighbor                   : 40::2
Uptime                         : 01:57:30
SPT bit set                    : True
Downstream Information:
Interfaces                     : vlan200
(S,G,RPT) Information for Group ff55::1 Source 30::1
Upstream Information:
State                          : Pruned
Joined Interface               : vlan50
RPF Neighbor                   : 20::2
Uptime                         : 01:58:30
Downstream Information:
Interfaces                     : vlan200
```

Display brief information for the IPv6 PIM6 tree state.

```
show ipv6 pim6 tree-state brief
State abbreviations :
J - Joined  NJ - Not Joined  RPTNJ - RPT Not Joined
P - Pruned  NP - Not Pruned
--------------------------------------------------------------------------------
VRF : default
--------------------------------------------------------------------------------
Group Address      Source Address     RPF          Uptime        State  Type
Neighbor     (HH:MM:SS)
-------------      --------------     -----------  ----------    ------ -------
ff5e::1            *                  10::2        01:58:30      J      *,G
ff5e::1            2035:135:1::100    10::2        01:58:30      J      S,G
ff5e::2            *                  10::2        01:58:30      J      *,G
ff5e::2            2035:135:1::100    20::2        01:58:30      J      S,G
ff5e::2            2035:135:1::100    10::2        01:58:30      P      S,G,RPT
--------------------------------------------------------------------------------
```

Command History

Release	Modification
10.14	-Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

sources-per-group

```
sources-per-group <limit>
no sources-per-group <limit>
```

Description

Configures the total number of sources allowed for a group on the router. By default, there is no limit on the number of sources for a group. When the number of sources for a group exceeds the configured limit, multicast traffic from additional sources will be dropped.

The **no** form of this command removes the currently configured limit value.

Parameter	Description
<limit>	Specifies the value to be configured as the sources allowed per group. Range: 1 to 4294967295.

Usage

Flows exceeding the limit will be programmed as a bridge entry and will not have the outgoing interfaces list populated. This configuration does not allow new sources for the group. At the time of configuration, if the device has more sources for the given group than the configured value, already allowed sources continue to exist until they are removed.

The flows are programmed in the HW on a FCFS basis. There could be scenarios where the flow is forwarded in neighbor router, but it may not be forwarded on the current router because of exceeding the limits configured on the current router. In such cases, it is recommended to configure higher limits to avoid traffic outage.

Examples

Configuring and removing the sources allowed per group:

```
switch(config)# router pim6
switch(config-pim6)# sources-per-group 4
switch(config-pim6)# no sources-per-group
```

Command History

Release	Modification
10.12	Command introduced for IPv6

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim6`	Administrators or local user group members with execution rights for this command.

spt-threshold

```
spt-threshold
no spt-threshold
```

Description

Enables the router to switch the multicast traffic flows to the shortest path tree. Default is enabled.

The **no** form of this command disables the routers ability to switch the multicast traffic flows to the shortest path tree.

To apply this configuration a user needs to apply disable/enable PIM globally.

Example

Enabling and disabling the SPT threshold:

```
switch(config)# router pim6
switch(config-pim6)# spt-threshold
switch(config-pim6)# no spt-threshold
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

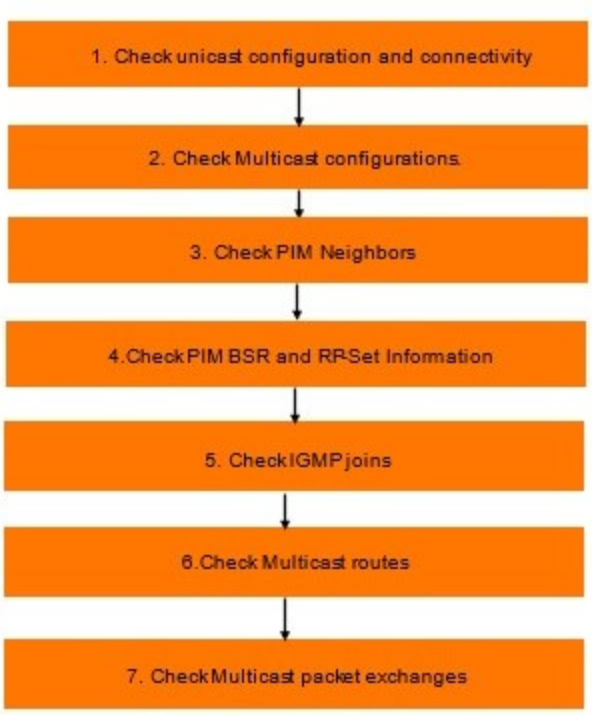
Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim6`	Administrators or local user group members with execution rights for this command.

Debugging and Troubleshooting

The recommended multicast troubleshooting flow is provided in Figure 1, Multicast troubleshooting flow.

Additional tips and guidance for each step are provided below.

Figure 1 *Multicast troubleshooting flow*



Refer to the steps listed in this section for IPv4 multicast VXLAN troubleshooting.

Step 1: Check Unicast configuration and connectivity

a. PIM relies on unicast routing information to form multicast routes. Validate unicast routing protocols are configured across the network.
b. Use the **show ip route** command to validate the unicast routing table.

```
src# show ip route 172.1.1.1 vrf default
VRF: default
Prefix            : 172.1.1.1/32                VRF(egress)         : -
Nexthop           : 20.1.1.2                    Interface           :
 vlan20
Origin            :
ospf                          Type              : ospf_intra_area
Distance          :
110                           Metric            : 100
Age               :
00h:05m:21s                   Tag               : 0
Encap Type        : -                           Encap
Details      : -
```

c. Make sure that the multicast sources are reachable. Use **ping** to ensure the reachability to the multicast sources/RP/BSR addresses from all routers.

d. Use the **show ip pim rpf** command to confirm RPF information learned by PIM.

```
switch# show ip pim rpf
Multicast RPF Details
Origin Codes: C - connected, SM - static-multicast, SU - static-unicast
O - OSPF, B - BGP, R - RIP
VRF: default
IP Address       RPF Interface  RPF Nexthop      PIM Neighbor  RPF
Route/Mask      Origin  In Use
---------------  -------------  ---------------  ------------  ------------------
------  ------
1.1.1.1          vlan10         10.1.1.1         yes
1.1.1.1/32          O       yes
10.1.1.1         vlan10         -                no
10.1.1.0/24         C       yes
10.1.1.2         vlan10         -                no
10.1.1.2/32         C       yes
```

Step 2: Validate Multicast specific configurations

a. Validate pim is enabled (**ip pim-sparse enable**) on all the interfaces where multicast routing is required.

b. Use the **show ip pim** interface command to check PIM interface specific information.

```
primary# show ip pim interface vlan2206
PIM Interfaces
VRF: default

Interface : vlan2206
Neighbor count : 3
IP Address : 193.168.102.45/29
Mode : sparse

Designated Router : 193.168.102.45
Proxy DR : false
Hello Interval (sec) : 30
Hello Delay (sec) : 5

Override Interval (msec) : 2500 Lan Prune Delay : Yes
Propagation Delay (msec) : 500 DR Priority : 1
Neighbor Timeout : 95
```

c. Make sure that PIM is enabled globally. This needs to be enabled per VRF.

```
switch# show ip pim
PIM Global Parameters
VRF                              :  default
PIM Status                       :  Enabled
PIM SSM Status                   :  Disabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
```

d. Make sure that one or more routers is configured as RP. RP can be configured as a static RP or can be learnt via BSR:
   - If the RP is static, configure it on all the routers. Ensure unicast reachability to RP .
   - If its dynamic RP, ensure BSR is elected across all routers and RP-set is propagated across all routers.

e. On the last hop router, make sure igmp is enabled along with PIM.

Step 3: Check PIM neighbors

a. Ensure that PIM neighbors are formed between PIM-enabled interfaces.
b. Use the **show ip pim neighbor** command to validate the neighbors.

```
switch# show ip pim neighbor all-vrfs
PIM Neighbor
VRF                         : VRF_1
Total number of neighbors : 1
IP Address                  : 14.1.0.10

Interface                  : vlan101
Up Time (HH:MM:SS)         : 01:03:42
Expire Time (HH:MM:SS)     : 00:01:31
DR Priority                : 1
Hold Time (HH:MM:SS)       : 00:01:45
Anycast neighbor           : True
```

c. If PIM neighbors are not formed, validate the configurations and ensure ip pim-sparse is enabled on the interface and router pim is enabled on the corresponding VRF.
d. If the configurations are correct, validate PIM Hello packets are exchanged between the routers. See Step 7: Check Multicast packet exchanges for details.

Step 4: Check PIM BSR and RP-Set Information

Use the show commands listed below to validate rp-set is learned correctly on all routers.

```
switch# show ip pim rp-set
VRF: default
Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
---------------  ---------------  ---------------  ---------  -----------
224.0.0.0        240.0.0.0        1.1.1.1        150        94
```

a. Use **show ip pim bsr** command to check if bsr is learned if the RP is not configured statically.

```
rp# show ip pim bsr
Status and Counters- PIM-SM Bootstrap Router Information

VRF                         : default
E-BSR Address               : 172.1.1.1
E-BSR Priority              : 0
E-BSR Hash Mask Length      : 30
E-BSR Up Time               : 49 secs
Next Bootstrap Message      : 21 secs

C-BSR Admin Status          : This system is a Candidate-BSR
```

```
C-BSR Address             : 172.1.1.1
C-BSR Priority            : 0
C-BSR Hash Mask Length    : 30
C-BSR Message Interval    : 60
C-BSR Source IP Interface : loopback1

C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : 172.1.1.1
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 192
C-RP Source IP Interface  : loopback1

Group Address    Group Mask
---------------  ---------------
224.0.0.0        240.0.0.0
```

b. If RP/BSR is not learnt, validate the configurations. Use show ip pim rpf to make sure PIM has RPF path to reach RP and BSR.

```
switch# show ip pim rpf 1.1.1.1
Multicast RPF Details
Origin Codes: C - connected, SM - static-multicast, SU - static-unicast
O - OSPF, B - BGP, R - RIP
VRF: default
IP Address       RPF Interface  RPF Nexthop      PIM Neighbor  RPF Route/Mask
Origin  In Use
---------------  -------------  ---------------  ------------  ------------------
------  ------
1.1.1.1          vlan10         10.1.1.1         yes           1.1.1.1/32
O       yes
```

c. If the configurations are correct, validate PIM BSR/C-RP Advertisement packets are exchanged between the routers. See Step 7: Check Multicast packet exchanges for details.

Step 5: Check IGMP joins

a. On the last hop router, validate the igmp membership reports.

```
switch# show ip igmp interface 1/1/1 groups

IGMP group information for group 239.1.1.1

Interface Name   : 1/1/1
VRF Name         : default

Group Address    : 239.1.1.1
Last Reporter    : 100.1.1.10

                         V1        V2        Sources   Sources
Vers Mode Uptime    Expires   Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
2         10m 59s   3m 44s              3m 44s
```

If igmp snooping is enabled, make sure the joined ports are learnt correctly.

```
switch# show ip igmp snooping detail

IGMP Snooping Protocol Info

Total VLANs with IGMP enabled             : 1
Current count of multicast groups joined  : 1

IGMP Drop Unknown Multicast               : Global
VLAN ID : 100
VLAN Name : VLAN100
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 15.1.1.1
Querier Port : 1/1/1
Querier UpTime :9m 32s
Querier Expiration Time :0m 10s
Router Detected Port(s) :

Active Group Address   Tracking  Vers Mode Uptime    Expires    Ports/Vteps
---------------------- ---------- ---- ---- --------- ---------- ------------------
------------
225.1.1.1              Filter    3    EXC  1m 2s     3m 19s     1/1/2,1/1/5
```

b. If joins are not shown, make sure that the querier is elected successfully in the interface and the periodic AHQ packet reaches the clients.
c. Ensure joins are refreshed periodically and are not removed. Check uptime in show ip igmp and show ip igmp snooping outpus to ensure joins are stable.
d. On VSX, IGMP joins are synchronized amongst the VSX switches. If IGMP snooping is enabled, make sure that the joined ports is the same in both VSX peers. Similarly querier port should be the same across both VSX peers. If they are different, ensure that the MAC addresses are in sync between both the VSX peers.
e. Make sure there are no COPP drops for IGMP class.

Step 6: Check Multicast routes

a. Check the multicast routes using the **show ip mroute** command. Validate the incoming and outgoing interface lists.

```
switch# show ip mroute  225.1.1.1 vrf red
VRF : red
Group Address                 : 225.1.1.1
Source Address                : 40.40.40.2
SSM Mroute                    : False
Neighbor                      : 20.20.20.2
Incoming interface            : 1/1/2
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 110
Uptime                        : 01:58:30
Downstream Interface
Interface      State        VSX Role
---------      ----------   --------
vlan10         forwarding     DR
```

b. If the multicast routes are not formed as expected, there will be traffic loss. If the interface is missing in multicast routes or the mroute is in bridge state (no outgoing interfaces):

- On the client VLAN, ensure IGMP joins are present on the DR.
- Use **show ip pim rp** command to find the RP for a given group:

```
switch# show ip pim rp 239.1.1.1
VRF: default
PIM-SM Group-to-Resultant_RP Mapping Information
Group Address   RP Address   RP Type  Up Time(HH:MM:SS)
-------------   ----------   -------  ----------------
239.1.1.1       20.1.1.1     bsr      12:01:20
```

- Validate unicast reachability to RP and multicast source on the last hop router (LHR).
- Validate IGMP joins are processed by PIM using the show ip pim pending command. If the multicast data is seen by the router, there will not be any pending entries.
- If the joins are seen, check the packet captures between LHR to ensure PIM *,G joins are sent towards RP.
- If RP has received the *,G join, check the packet captures between RP and Source DR to ensure (S,G) joins are sent towards the source.
- Once LHR receives the data via RPT, ensure that the LHR is sending (S,G) joins towards source via packet captures.

c. If the multicast routes is not present in show ip mroute in the source DR:
   - Ensure that the flow is active.
   - If the flow is active, but mroutes are not shown, it indicates an issue in the PIM registration path.
   - Make sure Source DR can reach RP and RP can reach back to the source DR.

d. If the multicast routes are present, but the traffic is not flowing, then run `show ip multicast` {routing | bridging} `datapath` to validate the forwarding path.

```
switch# show ip multicast bridging datapath group 230.0.0.1 source 10.0.0.2
vlan 10
Multicast Bridging Datapath Details
VRF                         : default
Source                      : 10.0.0.2/32
Group                       : 230.0.0.1/32
Replication Group Index     : 70
Hardware Status             : active
Error Code                  : None
Retries for programming     : 0
Vlan                        : VLAN10
State                    : forwarding
Replication Details     :
L2 Ports        State
-----------     ----------
1/1/6           forwarding

switch# show ip multicast routing datapath group 239.1.1.1 source 10.0.0.10
port vlan10

Multicast Routing Datapath Details
VRF                         : default
Source                      : 10.0.0.10/32
Group                       : 239.1.1.1/32
Primary Upstream Interface : vlan10
```

```
From                        : pim_sm
Type                        : route
Replication Group Index     : 34235
Hardware Status             : active
Error Code                  : None
Retries for programming     : 3
Upstream Interface          : vlan10
State                    : forwarding
Replication Details     :
L2 Ports         State
-----------      ----------
1/1/10           forwarding
Downstream Interface        : vlan20
State                    : forwarding
Replication Details     :
L2 Ports         State
-----------      ----------
1/1/1            forwarding
1/1/2            forwarding
```

Step 7: Check Multicast packet exchanges

a. Packet exchanges between PIM enabled routers can be inspected to analyse any issues like PIM neighbors/RP/BSR not learnt.

b. Find out the VRF associated with the interface

```
switch:/home/admin# ovsdb-client dump VRF name table_id
VRF table
name    table_id
------- -------
default 0
mgmt    1
red     2
```

a. Go to the corresponding namespace and capture the PIM packets and look for Hello packets.

```
switch:/home/admin# ip netns exec VRF_2 bash
8320:/home/admin# tcpdump -i vlan10 pim
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on vlan10, link-type EN10MB (Ethernet), capture size 262144 bytes
09:15:03.527266 IP 20.1.1.2 > 224.0.0.13: PIMv2, Hello, length 34

09:15:07.447342 IP 8320 > 224.0.0.13: PIMv2, Hello, length 34
```

active-active

1. Determine which router is the DR and ProxyDR in the client VLAN.
   a. To identify the functions of DR and Proxy DR for the VLAN execute command "**show ip pim interface vlanX**". Look for the "Proxy DR " field. A true value indicates that that router is the Proxy DR for that VLAN. False indicates otherwise.

```
switch# show ip pim interface vlan10
```

```
PIM Interfaces

VRF: default

Interface  : 1/1/2
IP Address : 50.0.0.4/24
Mode       : sparse

Designated Router :
Proxy DR                : false <- Indicates this as DR router.
Hello Interval (sec)    : 30
Hello Delay (sec)       : 5

Override Interval (msec) : 2500                Lan Prune Delay      : Yes
Propagation Delay (msec) : 500                 DR Priority          : 1
Neighbor Timeout         : 105
```

AOS-CX shows extensive details regarding VSX roles for all applicable VLANs.



If IGMP is not enabled in the VLANs, roles will be displayed as **N/A**.

```
switch# show ip pim interface detail

PIM Interfaces
VRF: default
Total number of interfaces: 4

Interface    IP Address     DR Address     Neighbor     Mode          VSX
                                           Count                      Role
---------    -----------    ----------     --------     -----         --------
Vlan10       40.0.0.4/24    40.0.0.1       1            sparse        DR
Vlan20       50.0.0.4/24    50.0.0.4       0            sparse        Proxy DR
loopback1    1.1.1.1/24     N/A            N/A          sparse        N/A
Vlan30       10.0.0.4/24    10.0.0.1       1            sparse        N/A
```

2. Determine which upstream router is sourcing the data to DR and ProxyDR, and which is forwarding the streams to clients.
   a. To identify the VSX router that is forwarding the stream to client, use **show ip mroute <G> <S>**. In the outgoing interface list, look for Proxy-DR field.
      i. A **Proxy-DR = false** result indicates that this router is the DR and forwarding the stream to the clients on Vlan10.
      ii. A **Proxy-DR = true** result indicates that this router is Proxy DR.
   b. From OS-CX version 10.5 onwards the VSX Role will be displayed as DR or Proxy DR, respectively. The neighbor IP and incoming interface will communicate to the upstream neighbor and interface through which DR and ProxyDR routers to receive the traffic.
   c. At DR router:

```
switch# show ip mroute
VRF : default
Total number of entries : 1

Group Address                   : 239.1.1.1
```

```
Source Address                  : 40.40.40.2
Neighbor                        : 20.20.20.2
Incoming interface : vlan20
Outgoing Interface List
Interface       State                   Proxy-DR
---------       -----                   --------
vlan10          forwarding              false
```

d. AR Proxy DR router:

```
switch# show ip mroute
VRF : default
Total number of entries : 2

Group Address                   : 239.1.1.1
Source Address                  : 40.40.40.2
Neighbor                        : 20.20.20.2
Incoming interface              : vlan20
Outgoing Interface List
Interface       State                   Proxy-DR
---------       -----                   --------
vlan10          forwarding              true

Group Address                   : 239.1.1.1
Source Address                  : 40.40.40.2
Neighbor                        : 20.20.20.1
Incoming interface              : vlan10
Outgoing Interface List
```

FAQ and best practices

1. Why does the ProxyDR router see additional mroutes that are bridge entries?

Though both DR and Proxy DR router receive the data from the source, only the DR router forwards the streams to the outgoing interface list. Since the outgoing interface list is a shared SVI between VSX pairs, the ProxyDR router also receives a copy of the stream via ISL link on the same outgoing VLANs. Thus the ProxyDR router creates a bridge entry for all these flows with the incoming interface as that of the same downstream host VLANs. If there are many client VLANs that subscribe to the same streams, the ProxyDR router will create a bridge entry on all those client VLANs. This is one of the reasons for the overall scale to go down in an Active-Active setup.

2. Can the DR priority of the interface be modified by configuration?

When Active-Active is configured, DR priority is internally used for its pre-empting functionality and a user-configured DR priority will not take effect. Therefore, it is not recommended to modify DR priority on the host VLANs when PIM Active-Active is configured.

3. Does PIM Active-Active run on all PIM-enabled SVIs that are members of MCLAG?

PIM Active-Active is designed to improve the failover time where the multicast clients are located and hence it is only limited to those SVI where IGMP (ip igmp) is enabled and member of MCLAG. PIM Active-Active functionality, like the DR and ProxyDR roles, are only applicable on these VLANs.

4. Is PIM Active-Active supported when the downstream aggregation switch is also configured as a PIM router?

In a PIM Active-Active solution more than one ProxyDR is not supported as that would cause additional bandwidth to fetch the source traffic to all Proxy DR routers. If the protocol detects more than one neighbor on the client SVIs (IGMP enabled) an error will be logged. Therefore, it is not a supported configuration.

RMON LOG: **More than one PIM Neighbor detected on Active-Active interface %s. Configuration not supported.**

5. Is PIM Active-Active supported when the SVIs on the downstream MCLAG is extended to multiple VSX tiers or other Independent PIM routers?

As explained above PIM Active-Active solution assumes that there are two PIM routers in the host connected SVI segment, where one takes the DR and other the Proxy DR role. If it detects more than one neighbor on those SVIs an error will be logged and traffic outages can be seen. Therefore, it is not a recommended configuration.

RMON LOG: **More than one PIM Neighbor detected on Active-Active interface %s. Configuration not supported.**

6. Is PIM Active-Active supported on multi-tier VSX deployments?

PIM active-active is supported on multi-tier VSX deployments, however it must be noted that the feature is required to be only enabled on the VSX tier where IGMP clients are connected. Also it is not advisable to enable IGMP (ip igmp) on the infrastructure links which connect the VSX tiers together. If IGMP is enabled on those inter VSX links, PIM detects multiple neighbors and throws a warning.

7. Can the PIM Active-Active configured VSX router also be configured as an RP or BSR router?

It is recommended to configure a non-PIM Active-Active router as RP or BSR. The guidelines for RP are explained in the RP section above.

8. Does PIM Active-Active improve recovery time during MM failover?

The Proxy DR router can detect MM failover and will take up the DR role when MM failover happens. The failed router then becomes the ProxyDR router.

9. Does PIM Active-Active run on all PIM enabled SVIs on the VSX router?

Though PIM Active-Active is enabled from the VRF's context, the SVIs that it picks to run are based on the following criteria. If any of the conditions is not met, active-active will not run on them.

- PIM-SM must be enabled on the SVI.
- SVI should be a member VLAN of one of the MCLAG links.
- IGMP (ip igmp enable) must be enabled on the SVI.

10. Does PIM Active-Active imply redundancy for RPs?

PIM Active-Active does not guarantee RP redundancies. This is primarily used for downstream host redundancy when VSX is used as an L3-L2 split. This should not be confused with Active Forwarding for Unicast.

11. Does PIM Active-Active indicate zero traffic loss?

As mentioned in previous sections PIM Active-Active minimizes the traffic loss when the DR is down or there is a role change. It does not guarantee a zero traffic loss for multicast but reduces the downtime from 105 seconds to 2-3 seconds.

12. Is PIM Active-Active supported for PIM-DM?

PIM-DM does not have a concept of DR and works in flood-prune manner. PIM-DM is not expected to be enabled on a VSX topology. PIM Active-Active is not supported for PIM-DM.

13. What is the impact of disabling PIM Active-Active on a working setup?

The PIM A.ctive-Active feature is applicable only to last hop routers where IGMP joins are present; therefore, ideally it should not be enabled on any other intermediate routers.

General recommendations

- PIM Active/Active configuration is recommended for multicast clients connected to downstream VSX LAGs. PIM Active/Active does not provide DR redundancy for downstream receivers connected over ROP or sub-interfaces (i.e. multicast traffic impact when DR fails).
- When RP is configured on a VSX, anycast RP with MSDP is recommended. For BSR/C-RP, a PIM peering over a point-to-point transit VLAN between VSX devices is needed. In case of BSR/C-RP, convergence time is higher than anycast RP configuration when active RP fails.

Chapter 8
Protocol Independent Multicast - Dense Mode (V4 and V6)

In a network, IP multicast traffic transmitted for multimedia applications is blocked at routed interface boundaries unless a multicast routing protocol is running. Protocol Independent Multicast (PIM) is a family of routing protocols. It forms multicast trees to forward traffic from multicast sources to subnets which use protocols such as IGMP and MLD to request the traffic.

Protocol Independent Multicast - Dense Mode (PIM-DM) overview

PIM relies on the unicast routing tables to identify the path back to a multicast source. This routing method is known as reverse path forwarding (RPF). The unicast routing protocols create the unicast routing tables. With this information, PIM sets up the distribution tree for the multicast traffic.

PIM-DM operates at the router level to direct traffic for a particular multicast group along the most efficient path to the network which has hosts that have joined that group. A unicast source address and a multicast group address comprise a given source/group (S/G) pair. Multicast traffic moving from a source to a multicast group address creates a flow to one or more areas of the network requiring the traffic. The flow destination is the multicast group address and not a specific host or VLAN. A single multicast flow has one source and one multicast group address (destination), but may reach many hosts in different subnets, depending on which hosts have issued joins for the same multicast group.

PIM routes the multicast traffic for a particular S/G pair on paths between the source unicast address and to the interfaces where it is requested (by joins from hosts connected to those subnets.) Physical destinations for a particular multicast group can be hosts in different networks. Individual hosts use IGMP/MLD configured per-subnet to send joins requesting membership in a particular multicast group. All hosts that have joined a given multicast group (defined by a multicast address) remain in that group as long as they continue to issue periodic joins.

PIM-DM interoperates with IGMP/MLD and the switch's routing protocols. PIM operates independently of the routing protocol that is chosen to run on the switches. So PIM-DM can be used with RIP, OSPF, BGP, or static routes configured. PIM-DM uses a unicast routing table to find the path to the originator of the multicast traffic and sets up multicast trees for distributing multicast traffic.

PIM-DM defaults, protocols, and supported configurations

Default configuration

PIM-DM is disabled by default. Either PIM-SM or PIM-DM can be configured within a VRF at a time. All the interfaces within the VRF must run with same mode.

Routing protocol support

PIM uses unicast routing information from any of the routing protocols that are running on the system, such as OSPFv2, OSPFv3, BGP. Static routes are also supported with Nexthop IP addresses.

PIM enabled interfaces (L3 and SVI)

PIM can be enabled across all VRFs on a maximum of 1,000 interfaces with an upper limit of 128 per VRF.



Although up to 128 PIM DM enabled interfaces can be configured, when configuring trunk interfaces with multiple Dense enabled SVIs, the trunk interfaces must have sufficient bandwidth or have only the required number of trunks it can support. This ensures that the link utilization is not exceeded due to the initial flooding nature of the protocol.

IGMP and MLD compatibility

PIM-DM is compatible with IGMP version 2 and version 3, MLD version 1 and version 2, and is fully interoperable with IGMP/MLD for determining multicast flows.

VRRP

PIM-DM is fully interoperable with VRRP to quickly transition multicast routes in a failover.

VRF support

PIM-DM can run on multiple VRF instances in parallel. It is supported on all VRFs supported in the system.

Limitations

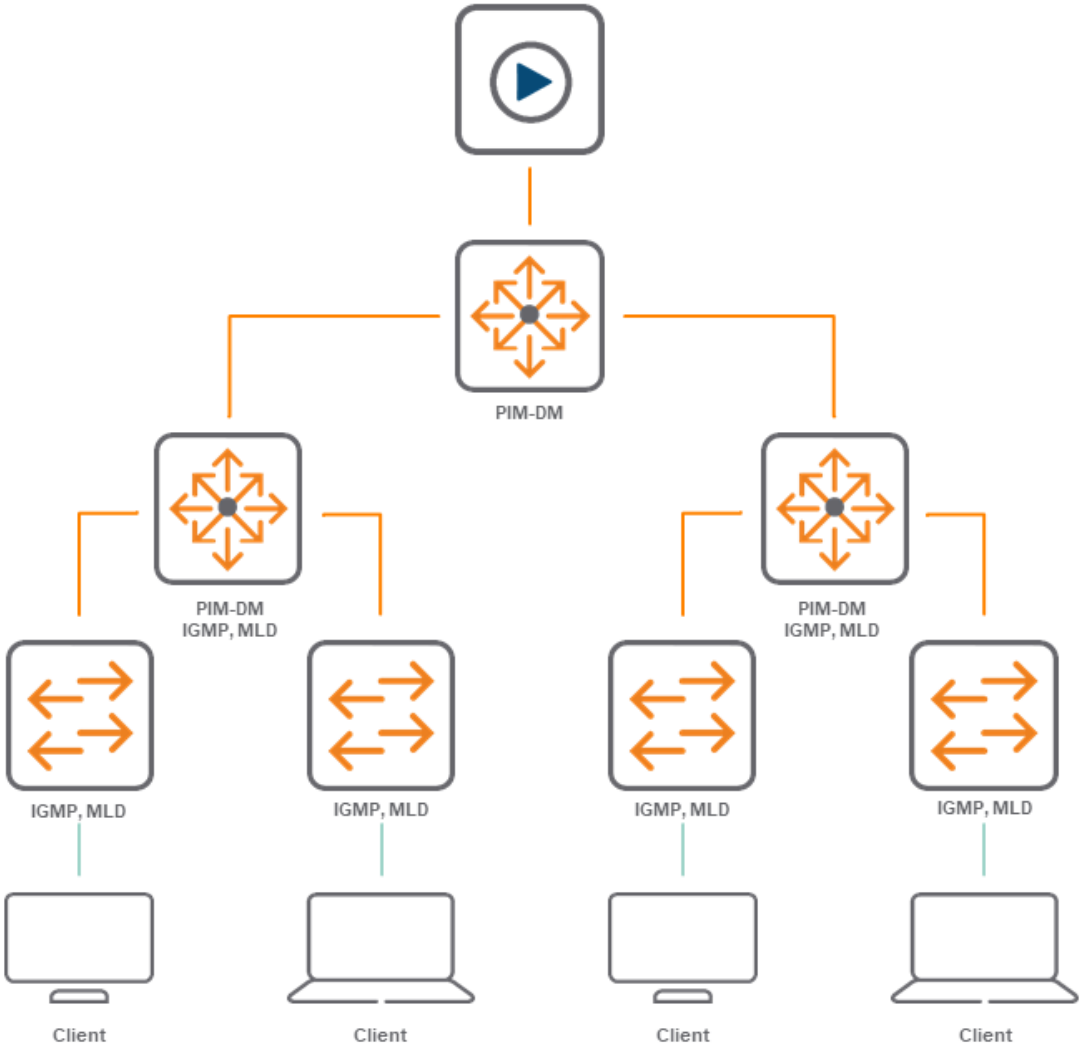
PIM-DM currently does not support the following:

- VxLAN, 6in4, 6in6, and GRE interfaces
- PIM-DM cannot be enabled on VSX deployments.

PIM-DM configuration example

When the routing switch detects a new multicast flow, it initially floods the traffic throughout the PIM-DM domain, then it prunes the traffic on the branches (network paths) where joins have not been received from individual hosts. The following is a sample topology diagram for a PIM-DM configuration.

Figure 1 *PM-DM Configuration Examples*



The routing switch maintains individual branches in the multicast tree as long as there is at least one host maintaining a membership in the multicast group. When all the hosts in a particular subnet drop out of the group, PIM-DM prunes that interface from the multicast tree. Similarly, if the routing switch detects a join from a host in a pruned interface, it adds that branch back into the tree.

Unlike PIM-SM, the number of mroutes created with dense mode is typically high since the source router floods the traffic initially to all the PIM neighbors. If we have two routers connected with many VLAN trunks, the resulting mroutes on the receiver router will be proportional to the number of SVIs configured. Ensure that the given flows are within the limits of the receiver router's mroute scale.

PIM-DM features

Multicast flow management

Multicast flow management refers to how the routing switch manages forwarding and pruned flows. This is useful when planning topologies to include multicast support and when viewing and interpreting the show command output for PIM-DM features.

Initial flood and prune

When a router running PIM-DM receives a new multicast flow, it initially floods the traffic to all downstream multicast routers. Branches that do not have members send Prune messages toward the source to prune off the unwanted/unnecessary traffic.

Maintaining the prune state

For a multicast group "X" on a given interface, when the last host belonging to group "X" leaves the group, PIM places that interface in a prune state. Multicast traffic from group "X" is now blocked to that interface. The prune state remains until a host on the same interface issues a join for group "X", in which case the router cancels the prune state and changes the flow to the forwarding state.

State-refresh packets and bandwidth conservation

A multicast switch, if directly connected to a multicast source (such as a video conference application), periodically transmits state-refresh packets to downstream multicast routers. On routers that have pruned the multicast flow, the state-refresh packets keep the pruned state alive. On routers that have been added to the network after the initial flooding and pruning of a multicast group, the state-refresh packets inform the newly added router of the current state of that branch. So if all multicast routers in a network support the state-refresh packet, the multicast router directly connected to the multicast source performs only one flood-prune cycle to the edge of the network when a new flow (multicast group) is introduced and preserves bandwidth for other uses.

PIM-DM commands for IPv4



Only the default VRF is supported on the Aruba 6200 Switch Series.

disable

`disable`

Description

Disables PIM globally on the router. PIM is disabled by default.



Using the **disable** command will cause all the multicast routes to be erased from hardware.

Example

Disabling PIM router:

```
switch(config)# router pim
switch(config-pim)# disable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

enable

```
enable
```

Description

Enables PIM globally on the router.

Example

Enabling PIM router:

```
switch(config)# router pim
switch(config-pim)# enable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

ip pim-dense

```
ip pim-dense {enable|disable}
no ip pim-dense [enable]
```

Description

Enables or disables PIM-DM in the current interface. PIM-DM is disabled by default on an interface. IP address must be configured on the interface to enable PIM-DM.

Parameter	Description
`enable`	Specifies PIM-DM on the interface. IP address must be configured on the interface to enable PIM-DM (use the **ip address <A.B.C.D/M>** command).
`disable`	Disables PIM-DM on the interface.

Examples

Enabling and disabling PIM-DM in an interface:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip address 40.0.0.4/24
switch(config-if-vlan)# ip pim-dense enable
switch(config-if-vlan)#
switch(config-if-vlan)# ip pim-dense disable
```

Enabling and disabling PIM-DM in a sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ip address 10.0.0.1/24
switch(config-subif)# ip pim-dense enable
switch(config-subif)#
switch(config-subif)# ip pim-dense disable
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

ip pim-dense bfd

Not supported on the Aruba 6200 Switch Series.

```
ip pim-dense bfd [disable]
no ip pim-dense bfd
```

Description

Configures BFD on a per-interface basis for an interface associated with the PIM process.

The **no** form of this command removes the BFD configuration on the interface and sets it to the default configuration.

If BFD is enabled globally, it will be enabled by default on all interfaces. The only exception is when it is disabled specifically on an interface using the **ip pim-dense bfd disable** command.
If BFD is disabled globally, it will be disabled by default on all interfaces. The only exception is when it is enabled specifically on an interface using the **ip pim-dense bfd** command.

Parameter	Description
`disable`	Disables the BFD configuration on the interface.

Examples

Enabling the BFD configuration on the interface:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip pim-dense bfd
```

Removing the BFD configuration on the interface:

```
switch(config-if-vlan)# no ip pim-dense bfd
```

Disabling the BFD configuration on the interface and overriding the global setting:

```
switch(config-if-vlan)# ip pim-dense bfd disable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100	`config-if` `config-if-vlan`	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
8320 8325 8360 8400 9300 10000		

ip pim-dense graft-retry-interval

```
ip pim-dense graft-retry-interval <INTERVAL-VALUE>
no ip pim-dense graft-retry-interval
```

Description

Configures the interval for which the routing switch waits for the graft acknowledgment from another router before resending the graft request.

The **no** form of this command removes the currently configured value and sets to the default of 3 seconds.

Parameter	Description
<INTERVAL-VALUE>	Specifies the interval the routing switch waits for the graft acknowledgment. Default: 3 seconds. Range: 1-10 seconds.

Usage

Graft packets result when a downstream router transmits a request to join a flow. The upstream router responds with a graft acknowledgment packet. If the graft acknowledgment is not received within the time period of the graft-retry-interval, it resends the graft packet.

Example

Configuring and removing dense graft retry interval on the interface:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip pim-dense graft-retry-interval 5
switch(config-if-vlan)# no ip pim-dense graft-retry-interval
```

Configuring and removing dense graft retry interval on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360 and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ip pim-dense graft-retry-interval 5
switch(config-subif)#
switch(config-subif)# no ip pim-dense graft-retry-interval
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

ip pim-dense hello-delay

```
ip pim-dense hello-delay <DELAY-VALUE>
no ip pim-dense hello-delay
```

Description

Configures the maximum time in seconds before the router actually transmits the initial PIM hello message on the current interface.

The **no** form of this command removes currently configured value and sets to the default of 5 seconds.

Parameter	Description
<DELAY-VALUE>	Specifies the hello-delay in seconds, which is the maximum time before a triggered PIM Hello message is transmitted on this interface. Default: 5 seconds. Range: 0-5 seconds.

Usage

In cases where a new interface activates connections with multiple routers, if all the connected routers send hello packets at the same time, the receiving router could become momentarily overloaded. This command randomizes the transmission delay to a time between zero and the hello delay setting. Using zero means no delay. After the router sends the initial hello packet to a newly detected interface, it sends subsequent hello packets according to the current hello interval setting.

Example

Configuring and removing hello-delay on the interface:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip pim-dense hello-delay 4
switch(config-if-vlan)# no ip pim-dense hello-delay
```

Configuring and removing hello-delay on the sub-interface:

Applies only to the Aruba 6300, 6400, 8100, 8325, 8360 and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ip pim-dense hello-delay 4
switch(config-subif)#
switch(config-subif)# no ip pim-dense hello-delay
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ip pim-dense hello-interval

```
ip pim-dense hello-interval <INTERVAL-VALUE>
no ip pim-dense hello-interval
```

Description

Configures the frequency at which the router transmits PIM hello messages on the current interface.

The **no** form of this command removes the currently configured value and sets to the default of 30 seconds.

Parameter	Description
<INTERVAL-VALUE>	Required: Specifies the frequency at which PIM Hello messages are transmitted on this interface. Default: 30 seconds. Range: 5-300 seconds.

Usage

- The router uses hello packets to inform neighbor routers of its presence.
- The router also uses this setting to compute the hello holdtime, which is included in hello packets sent to neighbor routers.

- Hello holdtime tells neighbor routers how long to wait for the next hello packet from the router. If another packet does not arrive within that time, the router removes the neighbor adjacency on that interface from the PIM adjacency table, which removes any flows running on that interface.
- Shortening the hello interval reduces the hello holdtime. If they do not receive a new hello packet when expected, it changes how quickly other routers stop sending traffic to the router.

Example

Configuring and removing dense hello-interval:

```
switch(config)# interface 1/1/4
switch(config-if)# ip pim-dense hello-interval 60
switch(config-if)# no ip pim-dense hello-interval
```

Configuring and removing dense hello-interval on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config-subif)# interface 1/1/10.10
switch(config-subif)# ip pim-dense hello-interval 60
switch(config-subif)#
switch(config-subif)# no ip pim-dense hello-interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ip pim-dense ip-addr

```
ip pim-dense ip-addr {<IP-ADDR-VALUE> | any}
no ip pim-dense ip-addr
```

Description

Enables the router to dynamically determine the source IP address to use for PIM packets sent from the interface or to use the specific IP address.

The **no** form of this command removes the currently configured value and sets to the default of **any**.

Parameter	Description
<IP-ADDR-VALUE>	Specifies an IP address as the source IP for the interface.
any	Specifies dynamically determining the source IP from the current IP address of the interface.

Examples

Configuring and removing source IP address:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip pim-dense ip-addr 40.0.0.4
switch(config-if-vlan)# no ip pim-dense ip-addr
```

Configuring and removing source IP address on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360 and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ip pim-dense ip-addr 10.1.1.1
switch(config-subif)#
switch(config-subif)# no ip pim-dense ip-addr
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ip pim-dense lan-prune-delay

```
ip pim-dense lan-prune-delay
no ip pim-dense lan-prune-delay
```

Description

Enables the LAN prune delay option on the current interface. The default status is enabled.

The **no** form of this command disables the LAN prune delay option.

Usage

With LAN-prune-delay enabled, the router informs downstream neighbors how long it will wait before pruning a flow after receiving a prune request. Other downstream routers on the same interface must send a join to override the prune before the LAN-prune-delay time to continue the flow. Prompts any downstream neighbors with multicast receivers continuing to belong to the flow to reply with a join. If no joins are received after the LAN-prune-delay period, the router prunes the flow. The propagation-delay and override-interval settings determine the LAN-prune-delay setting.

Example

Enabling and disabling the LAN prune delay:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip pim-dense lan-prune-delay
switch(config-if-vlan)# no ip pim-dense lan-prune-delay
```

Enabling and disabling the LAN prune delay on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ip pim-dense lan-prune-delay
switch(config-subif)# no ip pim-dense lan-prune-delay
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ip pim-dense max-graft-retries

```
ip pim-dense max-graft-retries <ATTEMPT-VALUE>
no ip pim-dense max-graft-retries
```

Description

Configures the number of attempts the routing switch will retry sending the same graft packet to join a flow.

The **no** form of this command removes the currently configured value and sets to the default of 3 attempts.

Parameter	Description
<INTERVAL-VALUE>	Specifies the number of retries for the routing switch to resend the graft packet. Default: 3 attempts. Range: 1-10 attempts.

Usage

If a graft acknowledgment response is not received after the specified number of retries, the routing switch ceases trying to join the flow. In this case the flow is removed until either a state-refresh from upstream re-initiates the flow or an upstream router floods the flow. Increasing this value helps to improve multicast reliability.

Example

Configuring and removing dense graft retry interval:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip pim-dense max-graft-retries 6
switch(config-if-vlan)# no ip pim-dense max-graft-retries
```

Configuring and removing dense graft retry interval on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360 and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ip pim-dense max-graft-retries 6
switch(config-subif)#
switch(config-subif)# no ip pim-dense max-graft-retries
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ip pim-dense override-interval

```
ip pim-dense override-interval <INTERVAL-VALUE>
no ip pim-dense override-interval
```

Description

Configures the override interval that gets inserted into the Override Interval field of a LAN Prune Delay option.

The **no** form of this command removes the currently configured value and sets the value to the default of 2500 ms.

Parameter	Description
<INTERVAL-VALUE>	Specifies the override interval of a LAN Prune Delay option in ms. Default: 2500 ms. Range: 500-6000.

Usage

Each router on the LAN expresses its view of the amount of randomization necessary in the Override Interval field of the LAN Prune Delay option. When all routers on a LAN use the LAN Prune Delay Option, all routers on the LAN MUST set their Override_Interval to the largest Override value on the LAN.

Example

Configuring and removing the override interval:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip pim-dense override-interval 4000
switch(config-if-vlan)# no ip pim-dense override-interval
```

Configuring and removing the override interval on the sub-interface:

Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ip pim-dense override-interval 4000
switch(config-subif)# no ip pim-dense override-interval
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300	config-if	Administrators or local user group members with execution rights

Platforms	Command context	Authority
6400 8100 8320 8325 8360 8400 9300 10000	config-if-vlan config-lag-if config-subif	for this command.

ip pim-dense propagation-delay

```
ip pim-dense propagation-delay <DELAY-VALUE>
no ip pim-dense propagation-delay
```

Description

Configures the propagation delay that gets inserted into the LAN prune delay field of a LAN Prune Delay option.

The **no** form of this command removes currently configured value and sets to the default of 500 ms.

Parameter	Description
<DELAY-VALUE>	Specifies the propagation delay value in ms. Default: 500 ms. Range: 250-2000 ms.

Usage

The LAN Delay inserted by a router in the LAN Prune Delay option expresses the expected message propagation delay on the link. When all routers on a link use the LAN Prune Delay Option, all routers on the LAN MUST set Propagation Delay to the largest LAN Delay on the LAN.

Examples

Configuring and removing the propagation delay:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip pim-dense propagation-delay 400
switch(config-if-vlan)# no ip pim-dense propagation-delay
```

Configuring and removing the propagation delay on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ip pim-dense propagation-delay 400
switch(config-subif)# no ip pim-dense propagation-delay
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

ip pim-dense ttl-threshold

```
ip pim-dense ttl-threshold <THRESHOLD-VALUE>
no ip pim-dense ttl-threshold
```

Description

Configures the multicast datagram time-to-live (router hop-count) threshold for the interface. A state-refresh packet with a TTL less than this threshold will not be forwarded out the interface.

The **no** form of this command removes the currently configured value and sets to the default of 3 attempts.

Parameter	Description
<THRESHOLD-VALUE>	Specifies the time to live threshold. Default: 3 attempts. Range: 0-255.

Usage

The interface connected to the multicast source does not receive state refresh packets and thus is not state-refresh capable. Downstream VLANs in the switches are state-refresh capable. This parameter provides a method for containing multicast traffic within a network, or even within specific areas of a network. Initially, the multicast traffic source sets a TTL value in the packets it transmits. Each time one of these packets passes through a multicast routing device, the TTL setting decrements by 1. If the packet arrives with a TTL lower than the ttl-threshold, the routing switch does not forward the packet. The following aspects of the TTL setting of incoming multicast packets must be considered, before changing this parameter on a routing switch:

- A value that is too high will allow multicast traffic to go beyond the internal network.
- A value that is too low may prevent some intended hosts from receiving the desired multicast traffic.
- A value of 0 will forward multicast traffic regardless of the packet TTL setting.

Example

Configuring and removing the time-to-live threshold:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip pim-dense ttl-threshold 8
switch(config-if-vlan)# no ip pim-dense ttl-threshold
```

Configuring and removing the time-to-live threshold on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ip pim-dense ttl-threshold 8
switch(config-subif)#
switch(config-subif)# no ip pim-dense ttl-threshold
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

router pim

```
router pim [vrf <VRF-NAME>]
   accept-register access-list <ACL-RULE>
   accept-rp <IP-ADDR> access-list <ACL-RULE>
   active-active
   bfd all-interfaces
   bsr-candidate {bsm-interval <INTERVAL-VALUE> | {hash-mask-length <LENGTH-VALUE> |
   priority <PRIORITY-VALUE> | source-ip-interface <INTERFACE-NAME>}
   enable|disable
   join-prune-interval <INTERVAL-VALUE>
   multicast-route-limit <limit>
   no ...
   register-rate-limit <limit>
   rp-address <IP-ADDR> [<GRP-ADDR/GRP-MASK>] [override]
   rp-candidate {group-prefix <GRP-ADDR/GRP-MASK>  |hold-time <TIME-VALUE> | priority
   <PRIORITY-VALUE> | source-ip-interface <INTERFACE-NAME> [group-prefix <GRP-ADDR/GRP-
   MASK>]}
   rpf-override <SRC-ADDR/SRC-MASK><RPF-ADDR|INTERFACE-NAME>
```

Description

Changes the current context to the PIM configuration context and enables PIM globally on the router. If no VRF is specified, the default VRF is assumed.

The **no** form of this command removes the PIM configuration from the specified context or the default VRF.

Parameter	Description
`vrf <VRF-NAME>`	Specifies the name of a VRF.
`accept-register access-list <ACL-RULE>`	Specify an ACL rule name to configures ACL on RP to filter PIM Register packets from unauthorized sources. The ACL specified will contain the (S,G) traffic in register packets to permitted or denied.
`accept-rp <IP-ADDR> access-list <ACL-RULE>`	Specify the IPv4 address of the static RP and ACL rule name to enable the PIM router to filter PIM join/prune messages destined for a specific RP and specific groups. The ACL specifies the group addresses which are allowed or denied. Up to 8 RP addresses and group ACL can be associated with the PIM router. PIM will store the accepted RP address and the associated group ACL. When a join or prune message is received, a RP look up is made for the packet. If the RP is in the configured list and if the group in the join/prune packet is allowed in the ACL, the packet is allowed. Otherwise the packet is dropped. To allow join/prune message from any groups, group address in the ACL can be wild-carded. In this case, only RP address check is performed. This parameter impacts only (*,G) join/prune messages. If there are any existing flows, the user will need to disable and enable PIM on the interface to apply the ACL. Loopback interfaces are special interfaces where only unicast PIM messages are updated. This includes Register, Register Stop, and Candidate RP Advertisements. When a loopback interface is configured as the RP, the ACL drop counters will be updated on the interface on which the packets are received. **NOTE:** If there is an active flow which is in the SPT, the traffic flow through the SPT will continue. Only (*,G) join/prune messages are dropped. (S,G) join/prune messages will not be impacted.
`active-active`	Enables the PIM active-active mechanism per VRF on VSX. The default is disabled. PIM active-active keeps the multicast forwarding state synchronized on both VSX peer devices. Synchronization is achieved by electing the VSX peer that has the highest IP address as a designated router (DR) and the other as Proxy-DR. If you want the multicast traffic to flow through VSX primary, assign higher IP addresses to the interfaces in VSX primary. When the VSX peer that is acting as the DR goes down, traffic is recovered faster since the multicast routes are synchronized.

Parameter	Description
`bfd all-interfaces`	Enables BFD on all PIM interfaces. BFD can be disabled at individual PIM interface using the **ip pim-sparse bfd disable** command. **NOTE:** Not supported on the Aruba 6200 Switch Series.
`bsr-candidate`	Configure settings for a router that operates as the BSR in a domain.
`bsm-interval <INTERVAL-VALUE>`	Configures the interval in seconds to send periodic RP-Set messages to all PIM-SM interfaces on a router that operates as the BSR in a domain. This setting must be smaller than the **rp-candidate hold-time** settings (range of 30 to 255; default 150) configured in the RPs operating in the domain. Default: 60 seconds. Range: 5-300.
`hash-mask-length <LENGTH-VALUE>`	Controls the distribution of multicast groups among the C-RP, in a domain where there is overlapping coverage of the groups among the RPs. This value specifies the length (number of significant bits) when allocating this distribution. A longer hash-mask-length results in fewer multicast groups, for each block of group addresses assigned to the RPs. Multiple blocks of addresses assigned to each C-RP results in wider dispersal of addresses. Includes enhanced load-sharing for the multicast traffic for the different groups that are used in the domain at the same time. Default: 30 bits. Range: 1-32.
`priority <PRIORITY-VALUE>`	Configures the priority to apply to the router when a BSR election process occurs in the PIM-SM domain. The candidate with the highest priority becomes the BSR for the domain. If the highest priority is shared by multiple routers, the candidate having the highest IP address becomes the BSR of the domain. Zero (0) is the lowest priority. To make BSR selection easily predictable, use this command to assign a different priority to each candidate BSR in the PIM-SM domain. Default: 0. Range: 0-255
`source-ip-interface <INTERFACE-NAME>`	Configures the router to advertise itself as a candidate PIM-SM BSR on the interface specified, and enables BSR candidate operation. The result makes the router eligible to be elected as the BSR for the PIM-SM domain in which it operates. One BSR candidate interface is allowed per-router. The Interface can be a VLAN interface (such as vlan15) or routed interfaces (such as lag 1 or 1 / 1 / 19). PIM-SM must be enabled on this interface (use the **ip pim-sparse enable** command).
`enable|disable`	Enables or disables PIM globally on the router.

Parameter	Description
`join-prune-interval <INTERVAL-VALUE>`	Configures the frequency at which the router will send periodic join or prune-interval messages. Range 5 to 65535 Default: 60.
`multicast-route-limit <limit>`	Configures the limit on the maximum number of multicast route entries that can be programmed. When the limit is configured, multicast route entries created because of IGMP or MLD membership reports, and multicast route entries created because of multicast streams are restricted to the configured limit. Flows exceeding the configured multicast route limit will be programmed as a bridge entry and will not have the outgoing interfaces list populated. This configuration prevents creation of new multicast routes when limits are reached. At the time of configuration, if the device has more multicast routes than the configured limit, existing multicast routes continue to exist until they are removed. The flows are programmed in the HW on a FCFS basis. There could be scenarios where the flow is forwarded in neighbor router, but it may not be forwarded on the current router because of exceeding the limits configured on the current router. In such cases, it is recommended to configure higher limits to avoid traffic outage. Range: 1 to 4294967295.
`no...`	Negates any configured parameter.
`register-rate-limit <limit>`	Configures the limit on the maximum number of register messages sent per second for every unique (S,G) entry. By default, there is no maximum rate set. When the limit is configured, register messages generation is limited to the configured value. Range: 1 to 4294967295.
`rp-address`	Statically configures the router as the RP for a specified multicast group or range of multicast groups. When a static RP and a C-RP are configured to support the same multicast groups and the multicast group mask for the static RP is equal to or greater than the same mask for the applicable C-RPs, this command assigns the higher precedence to the static RP, resulting in the C-RP operating only as a backup RP for the configured group. Without override, the C-RP has precedence over a static RP configured for the same multicast group or groups. This must be configured on all PIM-SM routers in the domain. If group address is not specified, it applies to all IPv4 multicast addresses (224.0.0.0 - 239.255.255.255). PIM-SM supports a maximum of 8 static RPs per VRF.
<IP-ADDR>	Specifies the address of the static RP in IPv4 format (**x.x.x.x**).
<GRP-ADDR/GRP-MASK>	Specifies the multicast group address in IPv4 format (**x.x.x.x**) and the address mask in CIDR format (**x**),

Parameter	Description
	where **x** is a decimal number from 0 to 128.
override	Specifies higher precedence to static RP over Candidate RP.
rp-candidate	Configure Candidate Rendezvous Point (C-RP) settings.
group-prefix *<GRP-ADDR/GRP-MASK>*	Adds multicast group address to the current Candidate Rendezvous Point (C-RP) configuration by specifying the the multicast group address in IPv4 format (**x.x.x.x**) and the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.
hold-time *<TIME-VALUE>*	Changes the hold-time a C-RP includes in its advertisements to the BSR. Hold-time is included in the advertisements the C-RP periodically sends to the elected BSR for the domain. Also updates the BSR on how long to wait after the last advertisement from the reporting RP before assuming it has become unavailable. Range: 30 to 250. Default: 150.
priority *<PRIORITY-VALUE>*	Changes the current priority setting for a C-RP. Where multiple C-RP configurations are used to support the same multicast groups, the candidate having the highest priority is elected. Zero (0) is the highest priority, and 255 is the lowest priority. Range: 0 to 255. Default: 192.
source-ip-interface	Enables the Candidate Rendezvous Point (C-RP) operation, and configures the router to advertise itself as a C-RP to the Bootstrap Router (BSR) for the current domain. This step includes the option to allow the C-RP to be a candidate for all possible multicast groups, or for up to four multicast groups, or ranges of groups. If group-prefix is not given, it considers for all multicast group addresses.
<INTERFACE-NAME>	Specifies the interface to use as a source for the C-RP router IP address.
group-prefix *<GRP-ADDR/GRP-MASK>*	Specifies the multicast group address in IPv4 format (**x.x.x.x**) and the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.
rpf-override	The Reverse Path Forward (RPF) override allows overriding the normal RPF lookup mechanism, and indicates to the router that it may accept multicast traffic on an interface other than the one that the RPF lookup mechanism would normally select. This includes accepting traffic from an invalid source IP address for the subnet or VLAN that is directly connected to the router. Traffic may also be accepted from a valid PIM neighbor that is not on the reverse path towards the source of the received

Parameter	Description
	multicast traffic.
`<SRC-ADDR/SRC-MASK>`	Specifies the multicast source IPv4 address in IPv4 format (**x.x.x.x**) and the number of bits in the address mask in CIDR format (**x**), where **x** is a decimal number from 0 to 128.
`<RPF-ADDR|INTERFACE-NAME>`	Specifies the RPF override IP address or interface.

Usage

When a register ACL is associated with a PIM Router, the PIM protocol will store the source and destination address details along with the action (permit or deny). If there are any existing flows, the user will need to disable and enable PIM on the interface to apply the ACL.

Upon receiving the register messages, a look up is made to check if the S and G in the packet is in the permitted list. If there is no match or if there is a deny rule match, a register stop message is immediately sent and the packet is dropped and no further action is taken. Permitted packets will go through the normal flow.

Loopback interfaces are special interfaces where only unicast PIM messages are updated. This includes Register, Register Stop, and Candidate RP Advertisements.

When a loopback interface is configured as the RP, the ACL drop counters will be updated on the interface on which the packets are received.

Recommendations for the active-active mechanism:

- Do not configure the DR priority of interfaces when **active-active** is enabled. The DR priority will be set to high on DR and default on Proxy-DR and any user-configured DR priority will be ignored.
- Always configure **keepalive** between VSX peers. If the ISL goes down when **keepalive** is not configured, both VSX peers start acting independently as DRs, resulting in duplicate traffic.
- Do not configure IGMP joins on transit VLANS.
- RP redundancy is not supported on the **active-active** mechanism. If one of the VSX peers is configured as RP and it goes down, the new traffic flows will not be converged until the RP is elected. For a static RP, new flows will never be converged until the VSX peer is back up.

Reverse Path Forward (RPF) override usage details:

- Reverse Path Forward (RPF) checking is a core multicast routing mechanism. The RPF ensures that the multicast traffic received arrives on the expected router interface before further processing. If the RPF check fails for a multicast packet, the packet is discarded. For multicast traffic flow that arrives on the SPT, the expected incoming interface for a given source or group is the interface towards the source address of the traffic (determined by the unicast routing system). For traffic arriving on the RP tree, the expected incoming interface is the interface towards the RP.
- RPF checking is applied to all multicast traffic and is significant in preventing network loops. Up to eight manual RPF overrides can be specified. The RPF-address indicates one of two distinct RPF candidates:
    1. A valid PIM neighbor address from which forwarded multicast traffic is accepted with a source address of ***<source-addr/src-mask>***.
    2. A local router address on a PIM-enabled interface to which ***<source-addr/src-mask>*** is directly connected. If configured, the local router will assume the role of DR for this flow and registers the flow with an RP.

Examples

Configuring and enabling default router PIM:

```
switch(config)# router pim
switch(config-pim)#enable
```

Configuring specified router PIM:

```
switch(config)# router pim vrf green
switch(config-pim)#
```

Configuring ACL on RP with an ACL rule named **pim_reg_acl**:

```
switch(config)# access-list ip pim_reg_acl
switch(config-acl-ip)# 10 permit any 20.1.1.1 225.1.1.2
switch(config-acl-ip)# 20 deny any 30.1.1.1 225.1.1.3
switch(config)# router pim
switch(config-pim)# accept-register acces
```

Configuring ACL on a RP with an ACL rule named **pim_rp_grp_acl** to filter join/prune messages:

```
switch(config)# access-list ip pim_rp_grp_acl
switch(config-acl-ip)# 10 permit any any 225.1.1.2/255.255.255.0
switch(config-acl-ip)# 20 permit any any 239.1.1.2/255.255.255.0
switch(config)-acl-ip# router pim
switch(config-pim)# accept-rp 30.1
```

On the 6400 Switch Series, interface identification differs.

Configuring and removing the BSR-candidate interface:

```
switch(config)# router pim
switch(config-pim)# bsr-candidate source-ip-interface 1/1/4
switch(config-pim)# bsr-candidate source-ip-interface vlan5
switch(config-pim)# no rp-candidate source-ip-interface 1/1/4
```

Configuring and removing sub-interface 1/1/4.10 as the BSR-candidate:

Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# router pim
switch(config-pim)# bsr-candidate source-ip-interface 1/1/4.10
switch(config-pim)#
switch(config-pim)# no rp-candidate source-ip-interface 1/1/4.10
```

Configuring and removing the multicast route rate limit:

```
switch(config)# router pim
switch(config-pim)# multicast-route-limit 1024
switch(config-pim)# no multicast-route-limit
```

Configuring and removing the register rate limit:

```
switch(config)# router pim
switch(config-pim)# register-rate-limit 10
switch(config-pim)# no register-rate-limit
```

Configuring and removing candidate-RP router priority and hold times

```
switch(config)# router pim
switch(config-pim)# rp-candidate priority 250
switch(config-pim)# rp-candidate hold-time 200
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config	Administrators or local user group members with execution rights for this command.

show ip mroute

`show ip mroute [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows multicast routing information. Optionally, you can show specific information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows mroute information for all VRFs. Optional.
`vrf <VRF-NAME>`	Shows mroute information for a particular VRF. If the **<VRF-NAME>** is not specified, it shows information for the default VRF. Optional.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not

Parameter	Description
	have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing IP mroute for all VRFs:

```
switch# show ip mroute  all-vrfs
VRF : blue
Total number of entries : 1

Group Address           : 239.1.1.1
Source Address          : 40.0.0.5
Incoming interface      : vlan3
Downstream Interface
Interface   State
---------   -----
vlan2       forwarding

VRF : green
Total number of entries : 2

Group Address           : 239.1.1.1
Source Address          : 40.0.0.4
Neighbor                : 10.1.1.1
Incoming interface      : vlan2
Downstream Interface
Interface   State
---------   -----
vlan5       forwarding

Group Address           : 239.1.1.1
Source Address          : 40.0.0.5
Neighbor                : 10.1.1.2
Incoming interface      : vlan1
Downstream Interface
Interface   State
---------   -----
vlan6       forwarding

VRF : default
Total number of entries : 1

Group Address           : 10.1.1.14
Source Address          : 40.0.0.6
Neighbor                : 10.1.1.2
Incoming interface      : 1/1/5
Downstream Interface
Interface   State
---------   -----
1/1/3       forwarding
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip mroute group-addr

```
show ip mroute <GROUP-ADDR> [<SOURCE-ADDR>] [all-vrfs | vrf <vrf-name>] [vsx-peer]
```

Description

Shows the multicast routing information for the given group address. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
<GROUP-ADDR>	Specifies a group address in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255.
<SOURCE-ADDR>	Specifies show information for the group from this source in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255.
`all-vrfs`	Shows mroute information for the group for all VRFs.
`vrf` *<VRF-NAME>*	Specifies the name of a VRF.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing information for group 239.1.1.1 and VRF green:

```
switch# show ip mroute 239.1.1.1 vrf green

VRF : green

Group Address                 : 239.1.1.1
Source Address                : 40.0.0.5
Neighbor                      : 10.1.1.2
Incoming interface            : vlan1
Unicast Routing Protocol      : connected
Metric                        : 1234
Metric  Pref                  : 1234
Downstream Interface
Interface   State
```

```
---------   -----
vlan6       forwarding
```

Showing information for group 239.1.1.1 from source 40.0.0.5 and all VRFs:

```
switch# show ip mroute 239.1.1.1 40.0.0.5 all-vrfs

VRF : blue

Group Address                 : 239.1.1.1
Source Address                : 40.0.0.5
Incoming interface            : vlan3
Unicast Routing Protocol      : connected
Metric                        : 1234
Metric  Pref                  : 1234
Downstream Interface
Interface   State
---------   -----
vlan2       forwarding


VRF : green

Group Address                 : 239.1.1.1
Source Address                : 40.0.0.5
Neighbor                      : 10.1.1.2
Incoming interface            : vlan1
Unicast Routing Protocol      : connected
Metric                        : 1234
Metric  Pref                  : 1234
Downstream Interface
Interface   State
---------   -----
vlan6       forwarding
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip mroute brief

```
show ip mroute brief [al-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows brief version of the multicast routing information. Optionally, you can specify the display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows mroute information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing the IP mroute brief:

```
switch# show ip mroute  brief
VRF : default
Total number of entries : 1

Group Address      Source Address     Neighbor          Interface
-------------      --------------     --------          ---------
239.1.1.1          40.0.0.6           10.1.1.2          vlan5
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim

```
show ip pim [all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows the PIM router information. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Optional. Shows PIM router information on all VRFs.
`vrf <VRF-NAME>`	Optional. Shows PIM router information for a particular VRF. If the **<VRF-NAME>** is not specified, it shows information for the default VRF.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing IP PIM router:

```
switch# show ip pim

PIM Global Parameters

VRF                          :  default
PIM Status                   :  Enabled
Join/Prune Interval (sec)    :  60
SPT Threshold                :  Enabled
State Refresh Interval (sec) :  60
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim interface

`show ip pim interface [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the information about PIM interfaces currently configured in the router. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

BIDIR PIM is not supported on the 8320 and 8400 switch series.

Parameter	Description
`all-vrfs`	(Optional) Shows PIM interface information for all VRFs.
`vrf <VRF-NAME>`	(Optional) Shows PIM interface information for a particular VRF. If the **<VRF-NAME>** is not specified, it shows the default VRF information.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM interface for the 6200, 6300, 6400,8100, 8325, 8360, 9300, 10000 switch series:

```
switch# show ip pim interface


PIM Interfaces

VRF: default
Total Number of interfaces: 1

Interface               : vlan10
Neighbor count          : 0
IP Address              : 100.100.1.2/24
Mode                    : bidir
Proxy DF                : false
Hello Interval(sec)     : 30
Hello Delay(sec)        : 5
Override Interval(msec) : 2500
Lan Prune Delay         : Yes
Propagation Delay (msec): 500
Neighbor Timeout        : 0
PIM Interfaces

VRF: default

Interface          IP Address         mode
------------------ -----------------  ----------
1/1/1              40.0.0.4/24        sparse
1/1/2              50.0.0.4/24        sparse
```

Showing PIM interface- for the 8320. 8400 switch series:

Showing PIM interface:

```
switch# show ip pim interface

PIM Interfaces
```

```
VRF: default

Interface          IP Address         mode
------------------ -----------------  ----------
1/1/1              40.0.0.4/24        dense
1/1/2              50.0.0.4/24        dense
```

Command History

Release	Modification
10.13	Added support for BIDIR PIM on the 6200, 6300, 6400,8100, 8325, 8360, 9300, 10000 switch series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim interface interface-name

`show ip pim interface <INTERFACE-NAME> [vsx-peer]`

Description

Shows detailed information about the PIM interface currently configured.

Parameter	Description
<INTERFACE-NAME>	Specifies an interface for showing PIM interface information. Interface can also be a LAG or VLAN.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM interface information for interface 1/1/2:

```
switch# show ip pim interface 1/1/2

PIM Interfaces

VRF: default

Interface  : 1/1/2
IP Address : 50.0.0.4/24
Mode       : dense

Designated Router :
Hello Interval (sec)       : 30
Hello Delay (sec)          : 5
Graft Retry Interval(sec)  : 3
Max Graft Retries          : 5
SR TTL Threshold           : 8

Override Interval (msec)   : 2500              Lan Prune Delay     : Yes
Propagation Delay (msec)   : 500               DR Priority         : 1
Neighbor Timeout           : 105
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim interface interface-name counters

`show ip pim interface <INTERFACE-NAME> counters [vsx-peer]`

Description

Shows the PIM packet counters information for the specified interface.

Parameter	Description
<INTERFACE-NAME>	Specifies the interface to show packet counter information.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM packet counters:

```
switch# show ip pim interface vlan1 counters
Interface           : vlan1
VRF                 : default
                                      Rx        Tx        Drops
                                      --------  --------  --------
Hello                                  21        21        0
BSM                                    12        10        0
Register                               0         0         0
SSM Register                           5         0         0
Register Stop                          0         0         0
SSM Register Stop                      0         5         0
Join/Prune                             0         0         0
SSM Join/Prune                         2         2         0
C-RP Advertisement                     0         0         0
Graft                                  0         0         0
Graft Ack                              0         0         0
Assert                                 0         0         0
State Refresh                          0         0         0
Register Drops(Register ACL hitcount)  0         0         4
Join/Prune Drops(RP ACL hitcount)      0         0         7
Unknown Multicast                      0         0         0
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim neighbor

`show ip pim neighbor [<IP-ADDRESS>] [brief | all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows PIM neighbor information. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
<IP-ADDRESS>	Specifies an IP address.
`brief`	Specifies PIM neighbor information display in brief format.
`all-vrfs`	Selects all VRFs.
`vrf` *<VRF-NAME>*	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM neighbor information for the 6200, 6300, 6400,8100, 8325, 8360, 9300, 10000 switch series.:

```
switch# show ip pim neighbor

PIM Neighbor

VRF                         : default
Total number of neighbors   : 1

IP Address                  : 30.1.1.3
Interface                   : vlan30
Up Time (HH:MM:SS)          : 03:55:40
Expire Time (HH:MM:SS)      : 00:01:23
DR Priority                 : NA
Hold Time (HH:MM:SS)        : 00:01:45
Bidir Capable               : True
```

Showing PIM neighbor information for the 8320. 8400 switch series:

```
switch# show ip pim neighbor

PIM Neighbor

VRF                  : default
IP Address           : 40.0.0.44
Interface            : 1/1/1
Up Time (sec)        : 544
Expire Time (sec)    : 80
DR Priority          : 40
```

Showing PIM neighbor information in brief for the default VRF:

```
switch# show ip pim neighbor brief
--------------------------------------------------------------------------------
-
 VRF: default                 Total number of neighbor : 2
--------------------------------------------------------------------------------
-
```

```
Interface   Neighbor   Uptime      Expires    DR       Hold Time  Secondary
Address
            (IPV4)     (HH:MM:SS)  (HH:MM:SS) Priority (HH:MM:SS)  (IPV4)
----------  --------   ---------   ---------  ------   ---------  ----------------
-
29091/1/1   40.0.0.5   11:54:21    00:01:31   NA       00:01:45   Nil
29101/1/2   50.0.0.5   00:03:23    00:01:23   NA       00:01:45
60.0.0.4,70.0.0.4
-------------------------------------------------------------------------------
-
```

Command History

Release	Modification
10.13	Added support for BIDIR PIM on the 6200, 6300, 6400,8100, 8325, 8360, 9300, 10000 switch series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim rpf

`show ip pim rpf [<IP-ADDRESS>][all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Displays PIM RPF details for the specified source or RP address in the given VRF and shows the nexthop and interface through which the shortest path to the source is available. It also displays if a PIM neighbor is present on the nexthop. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
<IP-ADDRESS>	(Optional) Specifies an IP address in IPv4 format (**x.x.x.x**), where **x** is a decimal number from 0 to 255. Shows PIM RPF details for the given IP address.
`all-vrfs`	(Optional) Shows PIM interface information for all VRFs.

Parameter	Description
`vrf <VRF-NAME>`	(Optional) Shows PIM interface information for a particular VRF. If the **<VRF-NAME>** is not specified, it shows the default VRF information.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing PIM RPF information for the default VRF:

```
switch# show ip pim rpf
Multicast RPF Details
Origin Codes: C - connected, SM - static-multicast, SU - static-unicast
              O - OSPF, B - BGP, R - RIP
VRF: default
IP Address       RPF Interface  RPF Nexthop   PIM Neighbor  RPF Route/Mask
Origin  In Use
---------------  -------------  ------------  ------------  ---------------  -----
-  ---
1.1.1.1          vlan10         10.1.1.1      yes           1.1.1.1/32       O
  yes
10.1.1.1         vlan10                       no            10.1.1.0/24      C
  yes
10.1.1.2         vlan10                       no            10.1.1.2/32      C
  yes
```

Showing PIM RPF information for the specified IP address:

```
switch# show ip pim rpf 1.1.1.1
Multicast RPF Details
Origin Codes: C - connected, SM - static-multicast, SU - static-unicast
O - OSPF, B - BGP, R - RIP

VRF: default
IP Address   RPF Interface  RPF Nexthop  PIM Neighbor  RPF Route/Mask    Origin
In Use
-----------  -------------  -----------  ------------  ----------------  ------  -
-----
1.1.1.1      vlan10         10.1.1.1         yes       1.1.1.1/32        O
yes
```

Showing PIM RPF information for all VRFs:

```
switch# show ip pim rpf all-vrfs
Multicast RPF Details
Origin Codes: C - connected, SM - static-multicast, SU - static-unicast
O - OSPF, B - BGP, R - RIP

VRF: default
IP Address   RPF Interface  RPF Nexthop   PIM Neighbor  RPF Route/Mask  Origin  In
Use
-----------  -------------  ------------  ------------  --------------  ----    --
--
```

```
1.1.1.1      vlan10         10.1.1.1      yes           1.1.1.1/32      O
yes
10.1.1.1     vlan10                       no            10.1.1.0/24     C
yes
10.1.1.2     vlan10                       no            10.1.1.2/32     C
yes

VRF: red
IP Address   RPF Interface  RPF Nexthop   PIM Neighbor  RPF Route/Mask  Origin  In
Use
-----------  -------------  ------------  ------------  --------------  ------  --
----
2.2.2.2      vlan20         20.0.0.1      yes           2.2.2.2/32      SU
yes
20.0.0.1     vlan20                       no            20.0.0.0/24     C
yes
20.0.0.2     vlan20                       no            20.0.0.2/32     C
yes
```

Command History

Release	Modification
10.09.1000	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

state-refresh-interval

```
state-refresh <INTERVAL-VALUE>
no state-refresh
```

Description

Configures the interval between successive state-refresh messages originated by the routing switch. Only the routing switch connected directly to the multicast source initiates state-refresh packets. All other PIM routers in the network only propagate these state-refresh packets.

The **no** form of this command sets the interval to the default value of 60 seconds.

Parameter	Description
<INTERVAL-VALUE>	Specifies the state refresh interval in seconds. Default: 60 seconds. Range 10-100.

Examples

Configuring the state refresh interval:

```
switch(config)# router pim
switch(config-pim)# state-refresh 30
switch(config-pim)# no state-refresh
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim`	Administrators or local user group members with execution rights for this command.

PIM-DM commands for IPv6

Only the default VRF is supported on the Aruba 6200 Switch Series.

disable

`disable`

Description

Disables PIMv6 globally on the router.

Using the **disable** command will cause all the multicast routes to be erased from hardware.

Example

Disabling PIM router:

```
switch(config)# router pim6
switch(config-pim6)# disable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim6`	Administrators or local user group members with execution rights for this command.

enable

`enable`

Description

Enables PIMv6 globally on the router.

Example

Enabling PIM router:

```
switch(config)# router pim6
switch(config-pim6)# enable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim6`	Administrators or local user group members with execution rights for this command.

ipv6 pim6-dense

```
ipv6 pim6-dense {enable | disable}
no ipv6 pim6-dense [enable]
```

Description

Enables or disables PIM-DM on the current interface. PIM-DM is disabled by default on an interface. An IPv6 address must be configured on the interface to enable PIM-DM.

Parameter	Description
`enable`	Enables PIM-DM on the interface. IPv6 address must be configured on the interface to enable PIM-SM (use the **ipv6 address <X:X::X:X/M>** command).
`disable`	Disables PIM-DM on the interface.

Examples

Enabling and disabling PIM-DM on an interface:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 address 2001::01/64
switch(config-if-vlan)# ipv6 pim6-dense enable
switch(config-if-vlan)# ipv6 pim6-dense disable
```

Enabling and disabling PIM-DM on a sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ipv6 address 1001::01/64
switch(config-subif)# ipv6 pim6-dense enable
switch(config-subif)# ipv6 pim6-dense disable
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
9300 10000		

ipv6 pim6-dense bfd

Not supported on the Aruba 6200 Switch Series.

```
ipv6 pim6-dense bfd [disable]
no ipv6 pim6-dense bfd
```

Description

Configures BFD on a per-interface basis for an interface associated with the PIM process.

The **no** form of this command removes the BFD configuration on the interface and sets it to the default configuration.

If BFD is enabled globally, it will be enabled by default on all interfaces. The only exception is when it is disabled specifically on an interface using the **ipv6 pim6-dense bfd disable** command.
If BFD is disabled globally, it will be disabled by default on all interfaces. The only exception is when it is enabled specifically on an interface using the **ipv6 pim6-dense bfd** command.

Parameter	Description
`disable`	Disables the BFD configuration on the interface.

Examples

Enabling the BFD configuration on the interface:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 pim6-dense bfd
```

Disabling the BFD configuration on the interface:

```
switch(config-if-vlan)# ipv6 pim6-dense bfd disable
```

Removing the BFD configuration on the interface:

```
switch(config-if-vlan)# no ipv6 pim6-dense bfd
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
		Administrators or local user group members with execution rights for this command.

ipv6 pim6-dense graft-retry-interval

```
ipv6 pim6-dense graft-retry-interval <INTERVAL-VALUE>
no ipv6 pim6-dense graft-retry-interval
```

Description

Configures the interval for which the routing switch waits for the graft acknowledgment from another router before resending the graft request.

The **no** form of this command removes the currently configured value and sets to the default of 3 seconds.

Parameter	Description
<INTERVAL-VALUE>	Specifies the interval the routing switch waits for the graft acknowledgment. Default: 3 seconds. Range: 1-10.

Usage

Graft packets result when a downstream router transmits a request to join a flow. The upstream router responds with a graft acknowledgment packet. If the graft acknowledgment is not received within the time period of the graft-retry-interval, it resends the graft packet.

Example

Configuring and removing dense graft retry interval:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 pim6-dense graft-retry-interval 5
switch(config-if-vlan)# no ipv6 pim6-dense graft-retry-interval
```

Configuring and removing dense graft retry interval on the sub-interface:

Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ipv6 pim6-dense graft-retry-interval 5
switch(config-subif)#
switch(config-subif)# no ipv6 pim6-dense graft-retry-interval
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

ipv6 pim6-dense hello-delay

```
ipv6 pim6-dense hello-delay <DELAY-VALUE>
no ipv6 pim6-dense hello-delay
```

Description

Configures the maximum time in seconds before the router actually transmits the initial PIM hello message on the current interface.

The **no** form of this command removes currently configured value and sets to the default of 5 seconds.

Parameter	Description
<DELAY-VALUE>	Specifies the hello-delay in seconds, which is the maximum time before a triggered PIM Hello message is transmitted on this interface. Default: 5 seconds. Range: 0-5.

Usage

- In cases where a new interface activates connections with multiple routers, if all the connected routers sent hello packets at the same time, the receiving router could become momentarily overloaded.
- This command randomizes the transmission delay to a time between zero and the hello delay setting. Using zero means no delay. After the router sends the initial hello packet to a newly detected interface, it sends subsequent hello packets according to the current hello interval setting.

Example

Configuring and removing hello-delay on the interface:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 pim6-dense hello-delay 4
switch(config-if-vlan)# no ipv6 pim6-dense hello-delay
```

Configuring and removing hello-delay on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ipv6 pim6-dense hello-delay 4
switch(config-subif)#
switch(config-subif)# no ipv6 pim6-dense hello-delay
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

ipv6 pim6-dense hello-interval

```
ipv6 pim6-dense hello-interval <INTERVAL-VALUE>
no ipv6 pim6-dense hello-interval
```

Description

Configures the frequency at which the router transmits PIM hello messages on the current interface.

The **no** form of this command removes the currently configured value and sets to the default of 30 seconds.

Parameter	Description
<INTERVAL-VALUE>	Specifies the frequency at which PIM Hello messages are transmitted on this interface. Default: 30 seconds. Range: 5-300.

Usage

- The router uses hello packets to inform neighbor routers of its presence.
- The router also uses this setting to compute the hello holdtime, which is included in hello packets sent to neighbor routers.

- Hello holdtime tells neighbor routers how long to wait for the next hello packet from the router. If another packet does not arrive within that time, the router removes the neighbor adjacency on that interface from the PIM adjacency table, which removes any flows running on that interface.
- Shortening the hello interval reduces the hello holdtime. If they do not receive a new hello packet when expected, it changes how quickly other routers stop sending traffic to the router.

Example

Configuring and removing dense hello-interval:

```
switch(config)# interface 1/1/4
switch(config-if)# ipv6 pim6-dense hello-interval 60
switch(config-if)# no ipv6 pim6-dense hello-interval
```

Configuring and removing dense hello-interval on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config-subif)# interface 1/1/10.10
switch(config-subif)# ipv6 pim6-dense hello-interval 60
switch(config-subif)#
switch(config-subif)# no ipv6 pim6-dense hello-interval
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ipv6 pim6-dense ipv6-addr

```
ipv6 pim6-dense ipv6-addr {<IPV6-ADDR-VALUE> | any}
no ipv6 pim6-dense ipv6-addr
```

Description

Enables the router to dynamically determine the source IP address to use for PIM packets sent from the interface or to use the specific IP address.

The **no** form of this command removes the currently configured value and sets to the default of **any**.

Parameter	Description
<IPV6-ADDR-VALUE>	Specifies an IPv6 address as the source IP for the interface.
`any`	Specifies dynamically determining the source IP from the current IPv6 address of the interface.

Examples

Configuring and removing the source IP address:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 pim6-dense ip-addr 2001::02
switch(config-if-vlan)# no ipv6 pim6-dense ipv6-addr
```

Configuring and removing the source IP address for the sub-interface:

Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ipv6 pim6-dense ipv6-addr 1001::01
switch(config-subif)#
switch(config-subif)# no ipv6 pim6-dense ipv6-addr
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

ipv6 pim6-dense lan-prune-delay

`ipv6 pim6-dense lan-prune-delay`

```
no ipv6 pim6-dense lan-prune-delay
```

Description

Enables the LAN prune delay option on the current interface. The default status is enabled.

The **no** form of this command disables the LAN prune delay option.

Usage

With LAN-prune-delay enabled, the router informs downstream neighbors how long it will wait before pruning a flow after receiving a prune request. Other downstream routers on the same interface must send a join to override the prune before the LAN-prune-delay time to continue the flow. Prompts any downstream neighbors with multicast receivers continuing to belong to the flow to reply with a join. If no joins are received after the LAN-prune-delay period, the router prunes the flow. The propagation-delay and override-interval settings determine the LAN-prune-delay setting.

Example

Enabling and disabling the LAN prune delay:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 pim6-dense lan-prune-delay
switch(config-if-vlan)# no ipv6 pim6-dense lan-prune-delay
```

Enabling and disabling the LAN prune delay on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# no ipv6 pim6-dense lan-prune-delay
switch(config-subif)#
switch(config-subif)# ipv6 pim6-dense lan-prune-delay
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ipv6 pim6-dense max-graft-retries

```
ipv6 pim6-dense max-graft-retries <ATTEMPT-VALUE>
no ipv6 pim6-dense max-graft-retries
```

Description

Configures the number of attempts the routing switch will retry sending the same graft packet to join a flow.

The **no** form of this command removes the currently configured value and sets to the default of 3 attempts.

Parameter	Description
<INTERVAL-VALUE>	Specifies the number of retries for the routing switch to resend the graft packet. Default: 3 attempts. Range: 1-10.

Usage

If a graft acknowledgment response is not received after the specified number of retries, the routing switch ceases trying to join the flow. In this case the flow is removed until either a state-refresh from upstream re-initiates the flow or an upstream router floods the flow. Increasing this value helps to improve multicast reliability.

Example

Configuring and removing the dense graft retry interval:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 pim6-dense max-graft-retries 6
switch(config-if-vlan)# no ipv6 pim6-dense max-graft-retries
```

Configuring and removing the dense graft retry interval on the sub-interface:

Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ipv6 pim6-dense max-graft-retries 6
switch(config-subif)# no ipv6 pim6-dense max-graft-retries
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300	config-if	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
6400 8100 8320 8325 8360 8400 9300 10000	config-if-vlan config-lag-if config-subif	

ipv6 pim6-dense override-interval

```
ipv6 pim6-dense override-interval <INTERVAL-VALUE>
no ipv6 pim6-dense override-interval
```

Description

Configures the override interval that gets inserted into the Override Interval field of a LAN Prune Delay option.

The **no** form of this command removes the currently configured value and sets the value to the default of 2500 ms.

Parameter	Description
<INTERVAL-VALUE>	Specifies the override interval of a LAN Prune Delay option in ms. Default: 2500 ms. Range: 500-6000.

Usage

Each router on the LAN expresses its view of the amount of randomization necessary in the Override Interval field of the LAN Prune Delay option. When all routers on a LAN use the LAN Prune Delay Option, all routers on the LAN MUST set their Override_Interval to the largest Override value on the LAN.

Example

Configuring and removing the override interval:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 pim6-dense override-interval 4000
switch(config-if-vlan)# no ipv6 pim6-dense override-interval
```

Configuring and removing the override interval on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ipv6 pim6-dense override-interval 4000
switch(config-subif)#
switch(config-subif)# no ipv6 pim6-dense override-interval
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

ipv6 pim6-dense propagation-delay

```
ipv6 pim6-dense propagation-delay <DELAY-VALUE>
no ipv6 pim6-dense propagation-delay
```

Description

Configures the propagation delay that gets inserted into the LAN prune delay field of a LAN Prune Delay option.

The **no** form of this command removes currently configured value and sets to the default of 500 ms.

Parameter	Description
<DELAY-VALUE>	Specifies the propagation delay value in ms. Default: 500 ms. Range: 250-2000.

Usage

The LAN Delay inserted by a router in the LAN Prune Delay option expresses the expected message propagation delay on the link. When all routers on a link use the LAN Prune Delay Option, all routers on the LAN MUST set Propagation Delay to the largest LAN Delay on the LAN.

Examples

Configuring and removing the propagation delay:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 pim6-dense propagation-delay 400
switch(config-if-vlan)# no ipv6 pim6-dense propagation-delay
```

Configuring and removing the propagation delay on the sub-interface:

Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ipv6 pim6-dense propagation-delay 400
switch(config-subif)#
switch(config-subif)# no ipv6 pim6-dense propagation-delay
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

ipv6 pim6-dense ttl-threshold

```
ipv6 pim6-dense ttl-threshold <THRESHOLD-VALUE>
no ipv6 pim6-dense ttl-threshold
```

Description

Configures the multicast datagram time-to-live (router hop-count) threshold for the interface. Any IP multicast datagrams or state-refresh packets with a TTL less than this threshold will not be forwarded out the interface.

The **no** form of this command removes the currently configured value and sets to the default of 3 attempts.

Parameter	Description
<THRESHOLD-VALUE>	Specifies the time-to-live threshold. Default: 3 attempts. Range: 0-255.

Usage

The VLAN connected to the multicast source does not receive state refresh packets and thus is not state-refresh capable. Downstream VLANs in the switches are state-refresh capable. This parameter provides a method for containing multicast traffic within a network, or even within specific areas of a network. Initially, the multicast traffic source sets a TTL value in the packets it transmits. Each time one of these packets passes through a multicast routing device, the TTL setting decrements by 1. If the packet arrives with a TTL lower than the ttl-threshold, the routing switch does not forward the packet. The following aspects of the TTL setting of incoming multicast packets must be considered, before

changing this parameter on a routing switch:

- A value that is too high will allow multicast traffic to go beyond the internal network.
- A value that is too low may prevent some intended hosts from receiving the desired multicast traffic.
- A value of 0 will forward multicast traffic regardless of the packet TTL setting.

Example

Configuring and removing the time-to-live threshold:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 pim6-dense ttl-threshold 8
switch(config-if-vlan)# no ipv6 pim6-dense ttl-threshold
```

Configuring and removing the time-to-live threshold on the sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# ipv6 pim6-dense ttl-threshold 8
switch(config-subif)# no ipv6 pim6-dense ttl-threshold
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority

6300
6400
8100
8320
8325
8360
8400
9300
10000
	`config-if`
	`config-if-vlan`
	`config-lag-if`
	`config-subif`
		Administrators or local user group members with execution rights for this command.

no ipv6 pim6-dense

`no ip pim-dense`

Description

Removes PIM-DM for all IPv6 related configurations for the interface.

Examples

Removing all PIM-DM configurations on an interface:

```
switch(config)# interface vlan40
switch(config-if-vlan)# no ipv6 pim6-dense
```

Removing all PIM-DM configurations on a sub-interface:



Applies only to the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# interface 1/1/1.10
switch(config-subif)# no ipv6 pim6-dense
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if config-if-vlan config-lag-if config-subif	Administrators or local user group members with execution rights for this command.

show ipv6 pim6

`show ipv6 pim6 [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the PIM router information. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing the IPv6 PIM router:

```
switch# show ipv6 pim6

PIM Global Parameters

VRF                          :  default
PIM Status                   :  Enabled
Join/Prune Interval (sec)    :  46
SPT Threshold                :  Disabled
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 interface

`show ipv6 pim6 interface [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows the information about PIM interfaces currently configured in the router. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Optional. Shows mroute information for the group for all VRFs.
`vrf <VRF-NAME>`	Optional. Shows mroute information for the group for a particular VRF. If the **<VRF-NAME>** is not specified, it shows information for the default VRF.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM interface:

```
switch# show ipv6 pim6 interface
PIM Interfaces

VRF: default

Interface          IP Address
mode
------------------ ------------------------------------------------------------
----------
1/1/1              fe80::a00:9ff:feec:dc0e/64
dense
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 interface *<INTERFACE-NAME>*

`show ipv6 pim6 interface <INTERFACE-NAME> [vsx-peer]`

Description

Shows detailed information about the PIM interface currently configured.

Parameter	Description
<INTERFACE-NAME>	Specifies an interface for showing PIM interface information. Interface can also be a LAG or VLAN.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing PIM interface information for interface 1/1/1:

```
switch# show ipv6 pim6 interface 1/1/1

PIM Interfaces

VRF: default

Interface             : 1/1/1
IPv6 Address          : fe80::a00:9ff:feec:dc0e/64
Mode                  : dense

Designated Router     : fe80::a00:9ff:febd:8364
Hello Interval        : 30 sec
Hello Delay           : 4 sec

Override Interval     : 500 msec              LAN Prune Delay     : Yes
Propagation Delay     : 350 msec              DR Priority         : 3
Neighbor Timeout      : 0                     TTL Threshold       : 250
Graft Retry Interval  : 9                     Max Graft Retries   : 9
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 mroute

`show ipv6 mroute [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows multicast routing information. Optionally, you can show specific information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not

Parameter	Description
	have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing IPv6 mroute information for the default VRF:

```
Switch# show ipv6 mroute
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address           : ff32::10
Source Address          : fd00:192:168:20::2
SSM Mroute              : True
Neighbor                : fe80::f403:4301:1422:2600
Uptime                  : 00:14:05
State                   : route
Incoming interface      : 1/1/5
Outgoing Interface List :
Interface       State
-----------     ----------
vlan20          forwarding
```

Showing IPv6 mroute information for all VRFs:

```
switch# do show ipv6 mroute all-vrfs
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address           : ff32::10
Source Address          : fd00:192:168:2::100
SSM Mroute              : True
Neighbor                : fe80::eceb:b801:14e4:2900
Uptime                  : 00:19:20
State                   : route
Incoming interface      : 1/1/4
Outgoing Interface List :
Interface       State
-----------     ----------
vlan20          forwarding

VRF : red
Total number of entries : 1

Group Address           : ff32::11
Source Address          : 30::3
SSM Mroute              : True
Neighbor                : fe80::eceb:b880:1fe4:2900
Uptime                  : 00:01:13
State                   : route
Incoming interface      : vlan31
Outgoing Interface List :
Interface       State
```

```
-----------     ----------
vlan32          forwarding
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 mroute brief

`show ipv6 mroute brief [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows brief version of the multicast routing information. Optionally, you can specify the display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows mroute information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing the IPv6 mroute brief:

```
switch# show ipv6 mroute brief all-vrfs
IP Multicast Route Entries

VRF : blu
Total number of entries : 2
```

```
Group Address  : ff08::1:3
Source Address : 2002::04
Neighbor       : 2003::04
Interface       : 1/1/2

Group Address  : ff08::1:4
Source Address : 2002::03
Neighbor       : 2003::05
Interface       : 1/1/3

VRF : default
Total number of entries : 1

Group Address  : ff08::1:5
Source Address : 2001::03
Neighbor       : 2002::01
Interface       : 1/1/1
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 mroute <GROUP-ADDR>

```
show ipv6 mroute <GROUP-ADDR> [<SOURCE-ADDR>]
     [all-vrfs | vrf <vrf-name>] [vsx-peer]
```

Description

Shows the multicast routing information for the given group address. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
<GROUP-ADDR>	Specifies show information for the group address. Format: X:X::X:X
<SOURCE-ADDR>	Optional. Specifies show information for the group from this source. Format: X:X::X:X

Parameter	Description
`all-vrfs`	Optional. Shows mroute information for the group for all VRFs.
`vrf <VRF-NAME>`	Optional. Shows mroute information for the group for a particular VRF. If the **<VRF-NAME>** is not specified, it shows information for the default VRF.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing information for group ff08::1:3 and VRF green:

```
switch# show ipv6 mroute  ff08::1:3 vrf green

IP Multicast Route Entries

VRF : green

Group Address                 : ff08::1:3
Source Address                : 2001::03
Neighbor                      : 2003::04
Incoming Interface            : 1/1/1
Multicast Routing Protocol    : PIM-DM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0

Downstream Interface
Interface      State
---------      -----
1/1/4          pruned
```

Showing information for group ff08::1:3 from source 2001::03 and all VRFs:

```
switch# show ipv6 mroute  ff08::1:3 2001::03 all-vrfs

IP Multicast Route Entries

VRF : blue

Group Address                 : ff08::1:3
Source Address                : 2001::03
Neighbor                      : 2003::04
Incoming Interface            : 1/1/1
Multicast Routing Protocol    : PIM-DM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0

Downstream Interface
Interface      State
---------      -----
1/1/4          pruned
```

```
VRF : green

Group Address                 : ff08::1:3
Source Address                : 2001::03
Neighbor                      : 2003::04
Incoming Interface            : 1/1/2
Multicast Routing Protocol    : PIM-DM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0

Downstream Interface
Interface      State
---------      -----
1/1/4          pruned

VRF : red

Group Address                 : ff08::1:6
Source Address                : 2001::04
Neighbor                      : 2003::04
Incoming Interface            : 1/1/2
Multicast Routing Protocol    : PIM-DM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0

Downstream Interface
Interface      State               By_Proxy_Dr
---------      -----               -----------
vlan10         forwarding          false
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 neighbor

`show ipv6 pim6 neighbor [<IPv6-ADDR>] [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows PIM neighbor information. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
<IPv6-ADDR>	Specifies a neighbor address in IPv6 format (**xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx**), where **x** is a hexadecimal number from 0 to F.
`all-vrfs`	Shows information for all VRFs.
`vrf` *<VRF-NAME>*	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

On the 6400 Switch Series, interface identification differs.

Showing PIM neighbor information:

```
switch# show ipv6 pim6 neighbor

PIM Neighbor

VRF                 : default
IP Address          : 2001::02
Interface           : 1/1/1
Up Time (sec)       : 0
Expire Time (sec)   : 0
DR Priority         : 44
```

Showing PIM neighbor information (including the presence of anycast neighbors) for all VRFs:

```
switch# show ipv6 pim6 neighbor all-vrfs

PIM Neighbor


VRF                       : red
Total number of neighbors : 2

IPv6 Address              : fe80::5:5:5:5
Interface                 : vni10000
Up Time (HH:MM:SS)        : 06:57:07
Expire Time (HH:MM:SS)    : 00:03:26
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:03:30

IPv6 Address              : fe80::3821:c780:a5c:18c0
Interface                 : vlan10
Up Time (HH:MM:SS)        : 00:01:46
Expire Time (HH:MM:SS)    : 00:01:29
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses    :100:100::3
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 rpf

```
show ipv6 pim6 rpf [<IP-ADDRESS>][all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Displays PIM RPF details for the specified source or RP address in the given VRF and shows the nexthop and interface through which the shortest path to the source is available. It also displays if a PIM neighbor is present on the nexthop. Optionally, you can specify display information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
<IP-ADDRESS>	Optional. Specifies an IP address in IPv6 format (xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx), where x is a hexadecimal number from 0 to F. Shows PIM RPF details for the given IP address.
`all-vrfs`	Optional. Shows PIM interface information for all VRFs.
`vrf` *<VRF-NAME>*	Optional. Shows PIM interface information for a particular VRF. If the **<VRF-NAME>** is not specified, it shows the default VRF information.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing PIM RPF information for the VRF named 'red':

```
switch# show ipv6 pim6 rpf vrf red
Multicast RPF Details
```

```
Origin Codes: C - connected, SM - static-multicast, SU - static-unicast
O - OSPF, B - BGP, R - RIP
VRF: red
IP Address       : 2000::2
RPF Interface    : vlan20
RPF Nexthop      :
RPF Route/Mask   : 2000::2/128
Origin           : C
In Use           : yes
IP Address       : 2222::2
RPF Interface    : vlan20
RPF Nexthop      : fe80::94f1:2880:141d:a800(PIM Neighbor)
RPF Route/Mask   : 2222::2/128
Origin           : O
In Use           : yes
```

Showing PIM RPF information for the specified IP address:

```
switch# show ipv6 pim6 rpf 2222::2 vrf red
Multicast RPF Details
Origin Codes: C - connected, SM - static-multicast, SU - static-unicast
O - OSPF, B - BGP, R - RIP
VRF: red
IP Address       : 2222::2
RPF Interface    : vlan20
RPF Nexthop      : fe80::94f1:2880:141d:a800(PIM Neighbor)
RPF Route/Mask   : 2222::2/128
Origin           : O
In Use           : yes
```

Showing PIM RPF information for all VRFs:

```
switch# show ipv6 pim6 rpf all-vrfs
Multicast RPF Details

Origin Codes: C - connected, SM - static-multicast, SU - static-unicast
              O - OSPF, B - BGP, R - RIP

VRF: default
IP Address       : 1001::2
RPF Interface    : vlan10
RPF Nexthop      :
RPF Route/Mask   : 1001::2/128
Origin           : C
In Use           : yes

IP Address       : 1111::1
RPF Interface    : vlan10
RPF Nexthop      : fe80::94f1:2880:a1d:a800(PIM Neighbor)
RPF Route/Mask   : 1111::1/128
Origin           : O
In Use           : yes

VRF: red
IP Address       : 2000::2
RPF Interface    : vlan20
RPF Nexthop      :
RPF Route/Mask   : 2000::2/128
Origin           : C
```

```
In Use          : yes

IP Address      : 2222::2
RPF Interface   : vlan20
RPF Nexthop     : fe80::94f1:2880:141d:a800(PIM Neighbor)
RPF Route/Mask  : 2222::2/128
Origin          : O
In Use          : yes
```

Command History

Release	Modification
10.09.1000	Command introduced

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

router pim6

```
router pim6 [vrf <VRF-NAME>]
no router pim6 [vrf <VRF-NAME>]
```

Description

Changes the current context to the PIMv6 configuration context. If no VRF is specified, the default VRF is assumed.

The **no** form of this command removes the PIM configuration from the specified context or the default VRF.

Parameter	Description
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.

Examples

Configuring default router PIM:

```
switch(config)# router pim6
switch(config-pim6)#
```

Configuring specified router PIM:

```
switch(config)# router pim6 vrf Green
switch(config-pim6)#
```

Removing router PIM:

```
switch(config)# no router pim6
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config	Administrators or local user group members with execution rights for this command.

state-refresh-interval

```
state-refresh <INTERVAL-VALUE>
no state-refresh
```

Description

Configures the interval between successive state-refresh messages originated by the routing switch. Only the routing switch connected directly to the unicast source initiates state-refresh packets. All other PIM routers in the network only propagate these state-refresh packets.

The **no** form of this command sets the interval to the default value of 60 seconds.

Parameter	Description
<INTERVAL-VALUE>	Specifies the state refresh interval in seconds. Default: 60 seconds. Range 10-100.

Examples

Configuring the state refresh interval:

```
switch(config)# router pim6
switch(config-pim6)# state-refresh 30
switch(config-pim6)# no state-refresh
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-pim6`	Administrators or local user group members with execution rights for this command.

Chapter 9
Protocol Independent Multicast - Source-Specific Multicast

Protocol Independent Multicast - Source-Specific Multicast (PIM-SSM) uses a subset of PIM sparse mode and IGMP version 3 (IGMPv3)/MLD version 2 (MLDv2) to allow multicast receivers to receive traffic from specified source addresses.

Protocol and feature details

PIM-SSM uses the PIM sparse-mode functionality to create a Shortest Path Tree (SPT) between the receiver and the source, but builds the SPT without the help of a (Rendezvous Point (RP). If the group address is in the SSM group range, the DR sends a subscribe message hop-by-hop toward the multicast source S. All devices along the path from the DR to the source create an (S, G) entry to build an SPT. The SPT is rooted at the multicast source S and has the receivers as its leaves. This SPT is the transmission channel in PIM-SSM. In SSM, receivers can receive traffic only from (S, G) channels to which they are subscribed, whereas in PIM-SM, receivers need not know the IP addresses of sources from which they receive their traffic.



In PIM-SSM, the term **subscribe message** refers to a join message.

When PIM-SSM is enabled:

- The RP configuration is ignored/not required for a particular range of multicast addresses (SSM range addresses).
- For the SSM range for multicast groups, the following behavior is observed:
  - PIM joins/prunes are directly sent towards the Source. No (*,G) joins/prunes are sent towards the RP.
  - Only IGMPv3/MLDv2 joins with the "source include" filter are considered for SSM.

The SSM range is a range of addresses defined for use with the SSM model. By default the PIM SSM group range is 232.0.0.0/8 for IPv4 and FF3x::/32 for IPv6. Applying SSM-range ACL configuration, users can modify the SSM group range according to the requirement.

To deploy PIM-SSM users need to configure PIM sparse mode on all router interfaces and configure the necessary SSM commands, including specifying IGMPv3/MLDv2 on the receiver's LAN. If PIM sparse mode is not explicitly configured on both the source and group member interfaces, multicast packets are not forwarded.



PIM-SSM interoperates only with IGMPv3/MLDv2 joins with an include source filter. If IGMPv2/MLDv1 or IGMPv3/MLDv2 exclude source filter joins are present in the network, traffic inconsistency is seen.

Supported platforms and standards

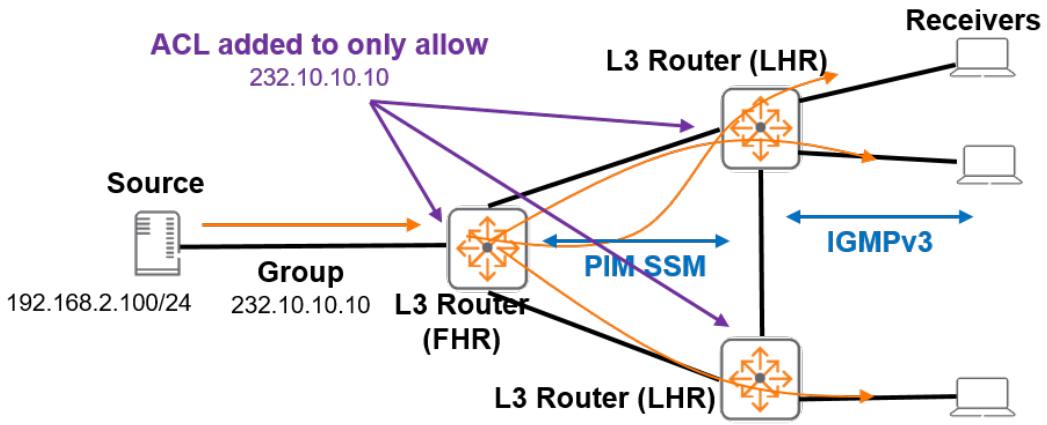
PIM-SSM is supported by the 6200, 6300, 6400, 8100, 8320, 8325, 8360, 8400, 9300 and 10000 Switch Series.

Configuration examples

The following examples show

PIM-SSM IPv4 configurations

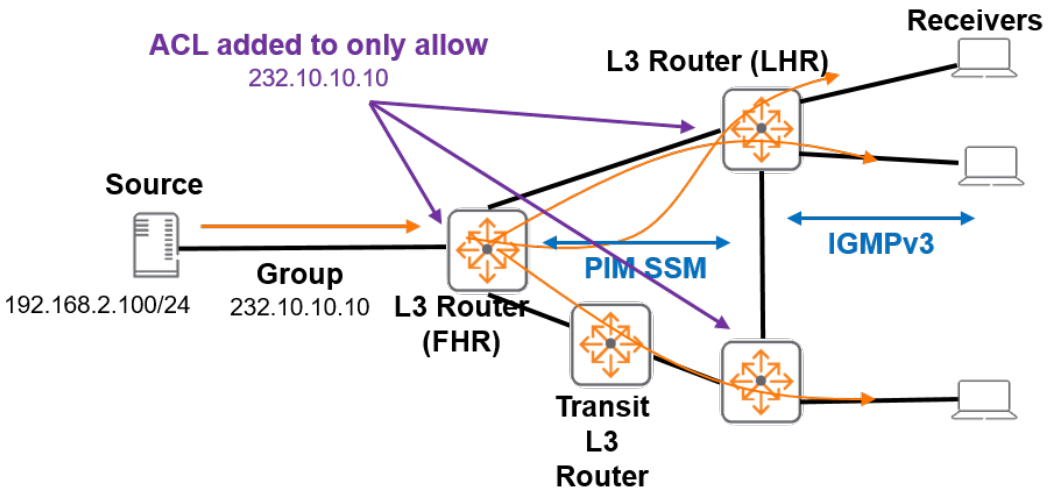
Figure 1 *PIM-SSM IPv4 configuration – First Hop Router (FHR)*



Configuration:

```
vlan 1,20
!
access-list ip ssm
     20 permit any any 232.10.10.10
!
interface 1/1/49
    no shutdown
    description Downlink to LHR
    ip address 192.168.3.0/31
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
!
interface vlan 20
    description Source subnet
    ip address 192.168.2.1/24
    ip ospf 1 area 0.0.0.0
    ip igmp enable
    ip pim-sparse enable
!
router ospf 1
    area 0.0.0.0
!
router pim
    enable
    pim-ssm
    pim-ssm range-access-list ssm
```

Figure 2 *PIM-SSM IPv4 configuration – transit router or Last Hop Router (LHR)*

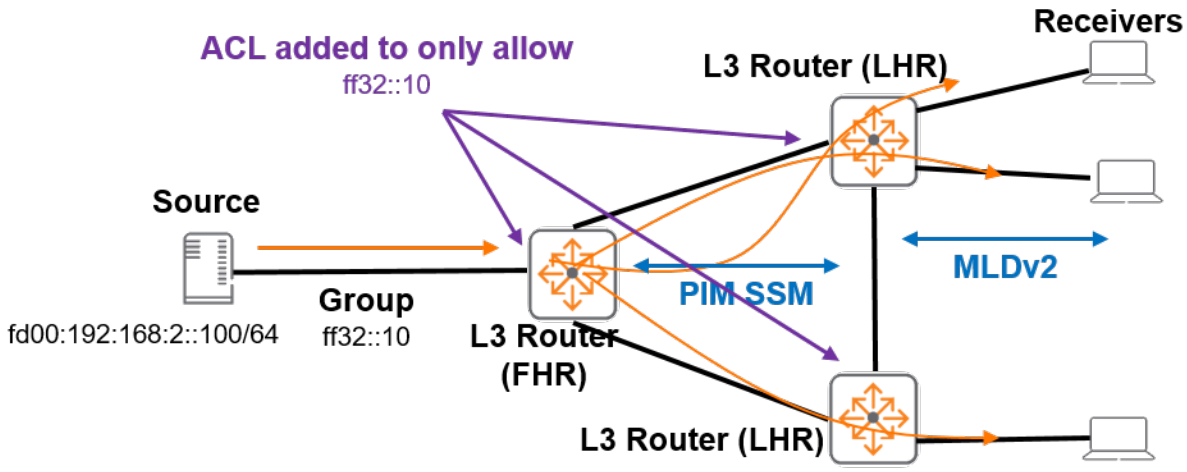


Configuration:

```
vlan 1,20
!
access-list ip ssm
     20 permit any any 232.10.10.10
1
interface 1/1/49
    no shutdown
    description Uplink to FHR
    ip address 192.168.3.1/31
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
!
interface vlan 20
    description Receiver subnet
    ip address 20.1.1.220/24
    active-gateway ip mac 20:00:00:00:20:20
    active-gateway ip 20.1.1.254
    ip ospf 1 area 0.0.0.0
    ip igmp enable
    ip pim-sparse enable
!
router ospf 1
    area 0.0.0.0
!
router pim
    enable
    pim-ssm
    pim-ssm range-access-list ssm
```

PIM-SSM IPv6 configurations

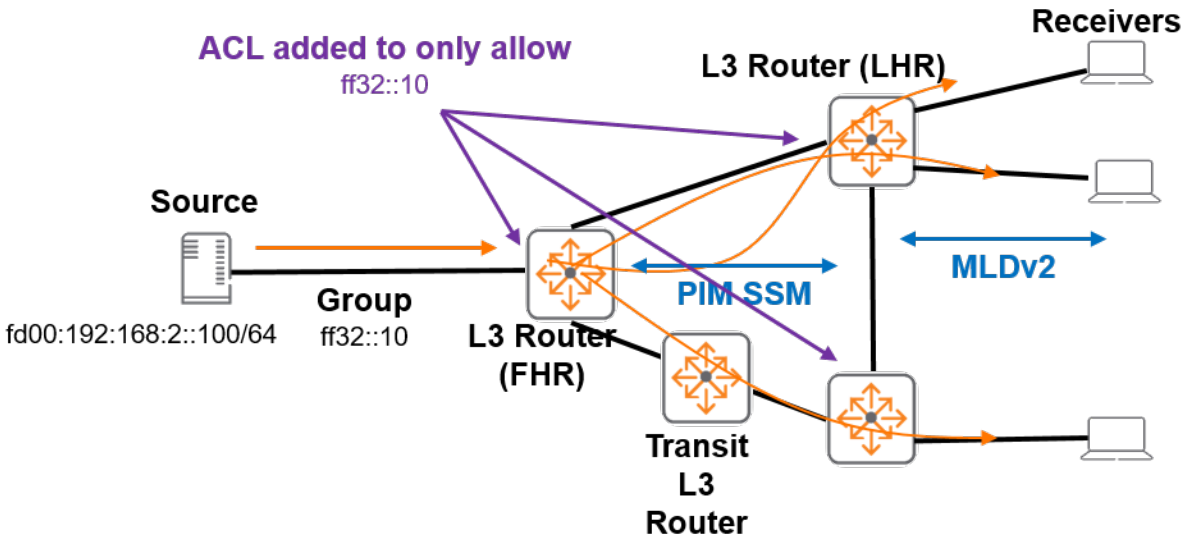
Figure 3 *PIM-SSM IPv6 configuration – First Hop Router (FHR)*



Configuration:

```
vlan 1,20
!
access-list ipv6 ssm
    20 permit any any ff32::10
!
interface 1/1/49
    no shutdown
    description Downlink to LHR
    ipv6 address fd00:192:168:3::/127
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 pim6-sparse enable
!
interface vlan20
    description Source subnet
    ipv6 address fd00:192:168:2::1/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 pim6-sparse enable
    ipv6 mld enable
!
router ospfv3 1
    area 0.0.0.0
!
router pim6
    enable
    pim-ssm
    pim-ssm range-access-list ssm
```

Figure 4 *PIM-SSM IPv6 configuration – transit router or Last Hop Router (LHR)*



Example configuration:

```
vlan 1,20
!
access-list ipv6 ssm
    20 permit any any ff32::10
!
interface 1/1/49
    no shutdown
    description Uplink to FHR
    ipv6 address fd00:192:168:3::1/127
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 pim6-sparse enable
!
interface vlan 20
    description Receiver subnet
    ipv6 address fd00:20:1:1::220/64
    active-gateway ipv6 mac 20:00:00:00:20:20
    active-gateway ipv6 fd00:20:1:1::254
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 mld enable
    ipv6 pim6-sparse enable
!
router ospfv3 1
    area 0.0.0.0
!
router pim6
    enable
    pim-ssm
    pim-ssm range-access-list ssm
```

Considerations and best practices

- Configuring/unconfiguring PIM-SSM can lead to momentary traffic loss until PIM rebuilds the states.
- Modifying the PIM-SSM range can lead to momentary traffic loss until PIM rebuilds the states.
- In the ACL used to specify PIM SSM range, ACEs should contain only multicast group addresses in the destination IP field, else the ACE will be ignored.

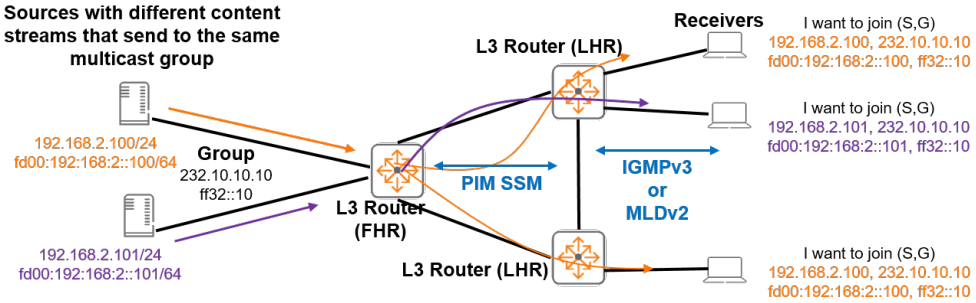
- It is recommended to enable pim-ssm only in the network where SSM-aware hosts (IGMPv3/MLDv2 include source filer) are present.
- It is recommended that all the PIM-SSM routers maintain same SSM range.
- It is recommended to enable PIM-SSM only in the network where SSM-aware hosts are present.
- It is recommended that all the PIM-SSM routers maintain the same ssm-range.

PIM-SSM is not supported with VXLAN.

Use case

The following use case provides an example of a network using multicast PIM-SSM configuration.

Figure 5 *Use case—PIM-SSM example*



- PIM-SSM best supports one-to-many applications such as audio and video services.
- Receivers typically join their interested stream through a web page.
- PIM-SSM enables elimination of cross-delivery of traffic when two sources simultaneously use the same source-specific destination address.

PIM-SSM commands

ip igmp apply ssm-map access-list

```
ip igmp apply ssm-map access-list<ACL-NAME>
no ip igmp apply ssm-map access-list<ACL-NAME>
```

Description

Configures SSM-map ACL on a specific interface.

The **no** form of this command removes the currently configured ACL rule.

Existing classifier commands are used to configure ACL.

Parameter	Description
<ACL-NAME>	Required. Specifies the ACL rule name.

Restrictions

- ACE using mask for source address will be ignored.
- ACE must include unicast source (address/source group) and multicast destination (address/destination group) as matching criteria. Entries using "any" for source address or destination address will be ignored.
- IGMPv3/MLDv2 dynamic joins will be ignored for groups in SSM-map (SSM-map is higher priority).

Usage

- When configured, every incoming IGMPv2/v1 join packet sent to the SSM range group address is converted to (S, G) channels where S is the source address specified in the SSM-map ACL.
- Object-groups can be used to group multiple sources or multiple destination addresses.

Recommendations related to SSM-map:

- Interfaces with SSM-map configured should use version 3 for IGMP and version 2 for MLD. If older versions are used, sources will not be learned.
- If SSM-map configuration is dynamically changed by adding or deleting sources associated with a group, the change will take effect when the next incoming join packet is received.
- SSM-map configuration must be consistent across all L3 nodes in the network.
- Multiple ACEs with same destination (address/destination object group) are not recommended as only the first match will be implemented. If a group must be mapped with multiple sources, source object group can be used instead of having multiple ACEs with the same destination match.

Examples

Creating SSM map ACL:

```
switch(config)# access-list ip SSM_MAP
switch(config-acl-ip)# permit ip 30.1.1.1 232.1.1.1
switch(config-acl-ip)# permit ip 20.1.1.1 232.1.1.2
```

Applying SSM_MAP ACL on a SVI:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ip igmp apply ssm-map access-list SSM_MAP
```

Creating SSM map ACL using object groups:

```
switch(config)# object-group ip address source-group
switch(config-addrgroup-ip)# 10.1.1.1
switch(config-addrgroup-ip)# 10.1.1.2
switch(config)# object-group ip address destination-group
switch(config-addrgroup-ip)# 232.2.1.1
switch(config-addrgroup-ip)# 232.3.1.1
switch(config)# access-list ip SSM_MAP_OB
switch(config-acl-ip)# permit ip source-group 232.1.1.3
switch(config-acl-ip)# permit ip 20.1.1.1 destination-group
```

In the above configuration:

- When lower version joins are received for group 232.1.1.3, they will be converted to (S,G) channels (10.1.1.1, 232.1.1.3) and (10.1.1.2, 232.1.1.3).
- When lower version joins are received from group 232.2.1.1 and 232.3.1.1, they will be converted to (S, G) channels (20.1.1.1, 232.2.1.1) and (20.1.1.1, 232.3.1.1)

Applying SSM_MAP_OB ACL on a SVI:

```
switch(config)# interface vlan 10
switch(config-if-vlan)# ip igmp apply ssm-map access-list SSM_MAP_OB
```

Command History

Release	Modification
10.11	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config-if-vlan	Administrators or local user group members with execution rights for this command.

show ip igmp ssm-map

```
show ip igmp [ssm-map [vrf <VRF-NAME> | all-vrfs]]
```

Description

Shows IGMP SSM map.

Parameter	Description
<VRF-NAME>	(Optional) Shows SSM map in a specific VRF.
all-vrfs	(Optional) Shows SSM map in all VRFs.

Examples

Showing IGMP SSM map:

```
switch# show ip igmp ssm-map
IGMP SSM-map Information
VRF Name   :default
Interface Name   SSM-map ACL name
---------------- -----------------
vlan10            ssm-map-1
vlan20            ssm-map-2
1/1/1             ssm-map-1
2/1/1.1           ssm-map-3
```

Showing IGMP SSM map for all VRFs:

```
switch# show ip igmp ssm-map all-vrfs
IGMP SSM-map Information
VRF Name   :test
Interface Name   SSM-map ACL name
---------------- -----------------
vlan30            ssm-map-1
VRF Name   :default
Interface Name   SSM-map ACL name
---------------- ------------------
vlan10            ssm-map-1
vlan20            ssm-map-2
1/1/1             ssm-map-1
2/1/1.1           ssm-map-3
```

Command History

Release	Modification
10.11	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Administrators or local user group members with execution rights for this command.

PIM-SSM commands for IPv4

Only the default VRF is supported on the Aruba 6200 Switch Series.

pim-ssm

`pim-ssm`

```
no pim-ssm
```

Description

Enables PIM source-specific multicast globally on the router. When PIM SSM is enabled, the RP configuration is ignored/ not required for a particular range of multicast addresses.

The **no** form of this command disables PIM-SSM globally on the router.

When PIM-SSM is enabled for the SSM range for multicast groups, the following behavior is observed:

- PIM joins and prunes are directly sent towards the source. No (*,G) joins or prunes are sent towards RP.
- Only IGMPv3/MLDv2 joins with source include filter are considered for SSM.

Usage

- PIM-SSM is recommended to be configured only on the last hop router or receiver DR if the topology contains a combination of IGMPv2 and IGMPv3, or MLDv1 and MLDv2, clients.
- Configuring or unconfiguring PIM SSM can lead to momentary traffic loss until PIM rebuilds the states.
- PIM-SSM is not supported with VxLAN.

Example

Enabling PIM-SSM on the router:

```
switch(config)# router pim
switch(config-pim)# pim-ssm
```

Disabling PIM-SSM on the router:

```
switch(config)# router pim
switch(config-pim)# no pim-ssm
```

Command History

Release	Modification
10.09	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

pim-ssm range-access-list

```
pim-ssm range-access-list <ACL-RULE>
no pim-ssm range-access-list <ACL-RULE>
```

Description

Enables the PIM router to modify the default SSM range. The IPv4 default PIM-SSM group range is 232.0.0.0/8.

The **no** form of this command removes the currently configured ACL rule.

Parameter	Description
<ACL-RULE>	(Required) Specifies the ACL rule name.

Usage

- In the ACL used to specify the PIM-SSM range, ACEs should contain only multicast group addresses in the destination IP field, else the ACE is ignored.
- Modifying the PIM-SSM range can lead to momentary traffic loss until PIM rebuilds the states.
- It is recommended to keep the SSM range the same across the network.

Examples

Creating an IPv4 ACL named **pim_ssm_grp_range_acl** and applying the ACL as a PIM-SSM range ACL:

```
switch# configure terminal
switch(config)# access-list ip pim_ssm_grp_range_acl
switch(config-acl-ip)# 10 permit any any 225.1.1.2/255.255.255.0
switch(config-acl-ip)# 20 permit any any 239.1.1.2/255.255.255.0

switch(config)# router pim
switch(config-pim)# pim-ssm range-access-list pim_ssm_grp_range_acl
switch(config-pim)# pim-ssm range-access-list pim_ssm_grp_range_acl_1
Failed to configure PIM-SSM Range ACL. ACL pim_ssm_grp_range_acl_1 does not exist.
```

Command History

Release	Modification
10.09	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400	config-pim	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
9300 10000		

show ip mroute

```
show ip mroute [all-vrfs | vrf <VRF-NAME>] [vsx-peer]
```

Description

Shows multicast routing information. Optionally, you can show specific information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows mroute information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing IP mroute for the default VRF:

```
Switch(config-vlan-20)# show ip mroute
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address           : 232.10.10.10
Source Address          : 192.168.20.2
SSM Mroute              : True
Neighbor                : 192.168.3.0
Uptime                  : 02:08:31
State                   : route
Incoming interface      : 1/1/5
Outgoing Interface List :
Interface       State
-----------     ----------
vlan20          forwarding
```

Showing IP mroute for all VRFs:

```
switch# do show ip mroute all-vrfs
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address           : 232.10.10.10
Source Address          : 192.168.2.100
```

```
SSM Mroute              : True
Neighbor                : 192.168.3.0
Uptime                  : 00:38:24
State                   : route
Incoming interface      : 1/1/4
Outgoing Interface List :
Interface       State
-----------     ----------
vlan20          forwarding

VRF : red
Total number of entries : 1

Group Address           : 232.11.11.11
Source Address          : 30.0.0.3
SSM Mroute              : True
Neighbor                : 31.0.0.1
Uptime                  : 00:32:55
State                   : route
Incoming interface      : vlan31
Outgoing Interface List :
Interface       State
-----------     ----------
vlan32          forwarding

switch#
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip multicast summary

```
show ip multicast summary
```

Description

Displays multicast summary information.

Example

Showing multicast summary information:

```
Switch# show ip multicast summary

Total number of IGMP interfaces                              : 1
Total number of IGMP snooping VLANS                          : 0
Total number of IGMP joins                                   : 1
Total number of IGMP snooping joins                          : 0
Total number of PIM SM enabled VRFs                          : 1
Total number of PIM SSM enabled VRFs                         : 1
Total number of PIM DM enabled VRFs                          : 0
Total number of PIM SM interfaces                            : 2
Total number of PIM DM interfaces                            : 0
Total number of PIM SM neighbors                             : 1
Total number of PIM DM neighbors                             : 0
Total number of PIM A/A enabled VRF                          : 0
Total number of PIM A/A enabled interfaces                   : 0
Total number of PIM SM Mroutes in route state                : 1
Total number of PIM SM Mroutes in bridge state               : 0
Total number of PIM SSM Mroutes in route state               : 1
Total number of PIM SSM Mroutes in bridge state              : 0
Total number of PIM DM Mroutes in route state                : 0
Total number of PIM DM Mroutes in bridge state               : 0
Total number of local multicast flows registered in this RP  : 0
Total number of MLD interfaces                               : 1
Total number of MLD snooping VLANS                           : 1
Total number of MLD joins                                    : 1
Total number of MLD snooping joins                           : 1
Total number of PIMv6 SM enabled VRFs                        : 1
Total number of PIMv6 SSM enabled VRFs                       : 0
Total number of PIMv6 DM enabled VRFs                        : 0
Total number of PIMv6 SM interfaces                          : 2
Total number of PIMv6 DM interfaces                          : 0
Total number of PIMv6 SM neighbors                           : 1
Total number of PIMv6 DM neighbors                           : 0
Total number of PIMv6 A/A enabled VRF                        : 0
Total number of PIMv6 A/A enabled interfaces                 : 0
Total number of PIMv6 SM Mroutes in route state              : 1
Total number of PIMv6 SM Mroutes in bridge state             : 0
Total number of PIMv6 SSM Mroutes in route state             : 1
Total number of PIMv6 SSM Mroutes in bridge state            : 0
Total number of PIMv6 DM Mroutes in route state              : 0
Total number of PIMv6 DM Mroutes in bridge state             : 0
Total number of MSDP peers                                   : 0
Total number of SA's learned by MSDP                         : 0

VRF: default
Total number of IGMP interfaces                              : 1
Total number of IGMP snooping VLANS                          : 0
Total number of IGMP joins                                   : 1
Total number of IGMP snooping joins                          : 0
Total number of PIM SM interfaces                            : 2
Total number of PIM DM interfaces                            : 0
Total number of PIM SM neighbors                             : 1
Total number of PIM DM neighbors                             : 0
Total number of PIM A/A enabled interfaces                   : 0
Total number of PIM SM Mroutes in route state                : 1
Total number of PIM SM Mroutes in bridge state               : 0
Total number of PIM SSM Mroutes in route state               : 1
Total number of PIM SSM Mroutes in bridge state              : 0
Total number of PIM DM Mroutes in route state                : 0
Total number of PIM DM Mroutes in bridge state               : 0
Total number of local multicast flows registered in this RP  : 0
Total number of MLD interfaces                               : 1
```

```
Total number of MLD snooping VLANS                              : 1
Total number of MLD joins                                       : 1
Total number of MLD snooping joins                              : 1
Total number of PIMv6 SM interfaces                             : 2
Total number of PIMv6 DM interfaces                             : 0
Total number of PIMv6 SM neighbors                              : 1
Total number of PIMv6 DM neighbors                              : 0
Total number of PIMv6 A/A enabled interfaces                    : 0
Total number of PIMv6 SM Mroutes in route state                 : 1
Total number of PIMv6 SM Mroutes in bridge state                : 0
Total number of PIMv6 SSM Mroutes in route state                : 1
Total number of PIMv6 SSM Mroutes in bridge state               : 0
Total number of PIMv6 DM Mroutes in route state                 : 0
Total number of PIMv6 DM Mroutes in bridge state                : 0
Total number of MSDP peers                                      : 0
Total number of SA's learned by MSDP                            : 0

Switch#
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim interface interface-name counters

`show ip pim interface <INTERFACE-NAME> counters [vsx-peer]`

Description

Shows the PIM packet counters information for the specified interface.

Parameter	Description
<INTERFACE-NAME>	Specifies the interface to show packet counter information.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Usage

Loopback interfaces are special interfaces where only unicast PIM messages are updated. This includes Register, Register Stop, and Candidate RP Advertisements.

When a loopback interface is configured as the RP, the ACL drop counters will be updated on the interface on which the packets are received.

Example

Showing PIM packet counters for interface 1/1/5:

```
Switch(config)# show ip pim interface 1/1/5 counters

Interface  : 1/1/5
VRF        : default

Tx Counters :

Hello                                   310
State Refresh                           0
Join/Prune                              141
SSM Join/Prune                          141
RP Advertisement                        0
Graft                                   0
Graft Ack                               0
Assert                                  0
Bsm                                     0
Register                                0
Register Stop                           0
SSM Register Stop                       0

Rx Counters :

Hello                                   308
State Refresh                           0
Join/Prune                              0
SSM Join/Prune                          0
RP Advertisement                        0
Graft                                   0
Graft Ack                               0
Assert                                  0
Bsm                                     0
Register                                0
SSM Register                            0
Register Stop                           0
Register Drops(Register ACL hitcount)   0
Join/Prune Drops(RP ACL hitcount)       0

Rx Drop Counters :

Hello                                   0
State Refresh                           0
Join/Prune                              0
RP Advertisement                        0
Graft                                   0
Graft Ack                               0
Assert                                  0
Bsm                                     0
Switch(config)#
```

Showing PIM packet counters for interface VLAN 1:

```
switch# show ip pim interface vlan1 counters

Interface           : vlan1
VRF                 : default

Rx Counters :

Hello                                 4
State Refresh                         0
Join/Prune                            1
RPadv                                 0
Graft                                 0
GraftAck                              0
Assert                                0
Bsm                                   0
Register                              0
Register Stop                         0
Register Drops(Register ACL hitcount)  10
Join/Prune Drops(RP ACL hitcount)      5


Tx Counters :

Hello               9
State Refresh       0
Join/Prune          0
RPadv               0
Graft               0
GraftAck            0
Assert              0
Bsm                 0
Register            0
Register Stop       0

Invalid Rx Counters :

Hello               0
State Refresh       0
Join/Prune          0
RPadv               0
Graft               0
GraftAck            0
Assert              0
Bsm                 0
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

Platforms	Command context	Authority
8320 8325 8360 8400 9300 10000		

PIM-SSM commands for IPv6

Only the default VRF is supported on the Aruba 6200 Switch Series.

ipv6 mld apply ssm-map access-list

```
ipv6 mld apply ssm-map access-list <ACL-NAME>
no ipv6 mld apply ssm-map access-list <ACL-NAME>
```

Description

Configures SSM-map ACL on a specific interface.

The **no** form of this command removes the currently configured ACL.

Existing calssifier commands are used to configure ACL.

Parameter	Description
<ACL-NAME>	Required. Specifies the ACL name.

Restrictions

- ACE using mask for source address will be ignored.
- ACE must include unicast source (address/source group) and multicast destination (address/destination group) as matching criteria. Entries using "any" for source address or destination address will be ignored.
- IGMPv3/MLDv2 dynamic joins will be ignored for groups in SSM-map (SSM-map is higher priority).

Usage

- When configured, every incoming MLDv1 join packet sent to the same SSMv6 range group address is converted to (S, G) channels where S is the source address specified in the SSM-map ACL.
- Object-groups can be used to group multiple sources or multiple destination addresses.

Recommendations related to SSM-map:

- Interfaces with SSM-map configured should use version 3 for IGMP and version 2 for MLD. If older versions are used, sources will not be learned.
- If SSM-map configuration is dynamically changed by adding or deleting sources associated with a group, the change will take effect when the next incoming join packet is received.
- SSM-map configuration must be consistent across all L3 nodes in the network.

- Multiple ACEs with same destination (address/destination object group) are not recommended as only the first match will be implemented. If a group must be mapped with multiple sources, source object group can be used instead of having multiple ACEs with the same destination match.

Examples

Creating SSM map v6 ACL:

```
switch(config)# access-list ipv6 SSM_MAP_V6
switch(config-acl-ip)# permit ipv6 2003::1 ff34::1
switch(config-acl-ip)# permit ipv6 2002::1 ff36::1
switch(config-acl-ip)# exit
```

Applying SSM_MAP_V6 ACL on SVI 2:

```
switch(config)# interface vlan 2
switch(config-if-vlan)# ipv6 mld apply ssm-map access-list SSM_MAP_V6
```

Creating SSM map V6 ACL with object groups:

```
switch(config)# object-group ipv6 address source-group-ipv6
switch(config-addrgroup-ipv6)# 2001::1
switch(config-addrgroup-ipv6)# 2001::2
switch(config)# object-group ipv6 address destination-group-ipv6
switch(config-addrgroup-ipv6)# ff31::1
switch((config-addrgroup-ipv6)# ff32::1
switch(config)# access-list ipv6 SSM_MAP_V6_OB
switch(config-acl-ip)# permit ipv6 source-group-ipv6 ff36::1
switch(config-acl-ip)# permit ipv6 2004::1 destination-group-ipv6
```

Applying SSM_MAP_V6_OB ACL on SVI 10:

```
switch(config)# interface vlan 10
switch(config-if-vlan)# ipv6 mld apply ssm-map access-list SSM_MAP_V6_OB
```

In the above configuration:

- When lower version joins are received for group ff36::1, they will be converted to (S, G) channels (2001::1, ff36::1) and (2001::2, ff36::1).
- When lower version joins are received for group ff31::1 and ff32::1, they will be converted to (S, G) channels (2003::1, ff31::1) and (2003::1, ff32::1).

Command History

Release	Modification
10.11	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

pim-ssm

```
pim-ssm
no pim-ssm
```

Description

Enables PIM-SSM globally on the router. When PIM-SSM is enabled, the RP configuration is ignored/ not required for a particular range of multicast addresses.

The **no** form of this command disables PIM-SSM globally on the router.

When PIM-SSM is enabled for the SSM range for multicast groups, the following behavior is observed:

- PIM joins and prunes are directly sent towards the source. No (*,G) joins or prunes are sent towards RP.
- Only IGMPv3/MLDv2 joins with source include filter are considered for SSM.

Usage

- PIM-SSM is recommended to be configured only on the last hop router or receiver DR if the topology contains a combination of IGMPv2 and IGMPv3, or MLDv1 and MLDv2, clients.
- Configuring or unconfiguring PIM SSM can lead to momentary traffic loss until PIM rebuilds the states.
- PIM-SSM is not supported with VxLAN.

Example

Entering the PIMv6 configuration context and enabling PIM-SSM on the router:

```
switch(config)# router pim6
switch(config-pim6)# pim-ssm
```

Disabling PIM-SSM on the router:

```
switch(config)# router pim6
switch(config-pim6)# no pim-ssm
```

Command History

Release	Modification
10.09	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim6	Administrators or local user group members with execution rights for this command.

pim-ssm range-access-list

```
pim-ssm range-access-list <ACL-RULE>
no pim-ssm range-access-list <ACL-RULE>
```

Description

Enables the PIM router to modify the default SSM range. The IPv6 default PIM-SSM group range is FF3x::/32.

The **no** form of this command removes the currently configured ACL rule.

Parameter	Description
<ACL-RULE>	Required. Specifies the ACL rule name.

Usage

- In the ACL used to specify the PIM-SSM range, ACEs should contain only multicast group addresses in the destination IP field, else the ACE will be ignored.
- Modifying the PIM-SSM range can lead to momentary traffic loss until PIM rebuilds the states.
- It is recommended to keep the SSM range the same across the network.

Examples

Creating an IPv6 ACL named **pim_ssm_v6grp_range_acl** with two entries and applying the ACL as a PIM-SSM range ACL:

```
switch# configure terminal
switch(config-pim)# access-list ipv6 pim_ssm_v6grp_range_acl
switch(config-acl-ipv6)# 10 permit any any ff2e::2/64
switch(config-acl-ipv6)# 20 permit any any ff1e::1/64

switch(config)# router pim6
switch(config-pim6)# pim-ssm range-access-list pim_ssm_v6grp_range_acl
```

Command History

Release	Modification
10.09	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config-pim6	Administrators or local user group members with execution rights for this command.

show ipv6 mld ssm-map

```
show ipv6 mld [ssm-map [vrf <VRF-NAME> | all-vrfs]]
```

Description

Shows MLD SSM map.

Parameter	Description
<VRF-NAME>	Optional. Shows MLD SSM map in a specific VRF.
all-vrfs	Optional. Shows MLD SSM map in all VRFs.

Examples

Showing MLD SSM-map:

```
switch# show ipv6 mld ssm-map
MLD SSM-map Information
VRF Name   :default
Interface Name   SSM map ACL name
---------------- ------------------
vlan10           ipv6-ssm-map-1
vlan20           ipv6-ssm-map-2
1/1/1            ipv6-ssm-map-3
2/1/1.1          ipv6-ssm-map-1
```

Showing MLD SSM-map for all VRFs:

```
switch# show ipv6 mld ssm-map all-vrfs
MLD SSM-map Information
VRF Name   :test
```

```
Interface Name   SSM map ACL name
---------------- ------------------
vlan30           ipv6-ssm-map-1
VRF Name   :default
Interface Name   SSM map ACL name
---------------- ------------------
vlan10           ipv6-ssm-map-1
vlan20           ipv6-ssm-map-2
1/1/1            ipv6-ssm-map-3
2/1/1.1          ipv6-ssm-map-1
```

Release	Modification
10.11	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Administrators or local user group members with execution rights for this command.

show ipv6 mroute

`show ipv6 mroute [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows multicast routing information. Optionally, you can show specific information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows information for all VRFs.
`vrf <VRF-NAME>`	Specifies the name of a VRF. Default: default.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Example

Showing IPv6 mroute information for the default VRF:

```
Switch# show ipv6 mroute
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address           : ff32::10
Source Address          : fd00:192:168:20::2
SSM Mroute              : True
Neighbor                : fe80::f403:4301:1422:2600
Uptime                  : 00:14:05
State                   : route
Incoming interface      : 1/1/5
Outgoing Interface List :
Interface       State
-----------     ----------
vlan20          forwarding
```

Showing IPv6 mroute information for all VRFs:

```
switch# do show ipv6 mroute all-vrfs
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address           : ff32::10
Source Address          : fd00:192:168:2::100
SSM Mroute              : True
Neighbor                : fe80::eceb:b801:14e4:2900
Uptime                  : 00:19:20
State                   : route
Incoming interface      : 1/1/4
Outgoing Interface List :
Interface       State
-----------     ----------
vlan20          forwarding

VRF : red
Total number of entries : 1

Group Address           : ff32::11
Source Address          : 30::3
SSM Mroute              : True
Neighbor                : fe80::eceb:b880:1fe4:2900
Uptime                  : 00:01:13
State                   : route
Incoming interface      : vlan31
Outgoing Interface List :
Interface       State
-----------     ----------
vlan32          forwarding
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim interface counters

`show ipv6 pim interface <INTERFACE-NAME> counters [vsx-peer]`

Description

Shows the PIM packet counters information for the specified interface.

Parameter	Description
<INTERFACE-NAME>	Specifies the interface to show packet counter information.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Usage

Loopback interfaces are special interfaces where only unicast PIM messages are updated. This includes Register, Register Stop, and Candidate RP Advertisements.

When a loopback interface is configured as the RP, the ACL drop counters will be updated on the interface on which the packets are received.

Example

Showing IPv6 PIM packet counters:

```
Switch#
Switch# show ipv6 pim interface 1/1/5 counters

Interface  : 1/1/5
VRF        : default

Tx Counters :

Hello                                    275
State Refresh                            0
Join/Prune                               32
SSM Join/Prune                           32
RP Advertisement                         0
Graft                                    0
Graft Ack                                0
Assert                                   0
```

```
Bsm                                     0
Register                                0
Register Stop                           0
SSM Register Stop                       0

Rx Counters :

Hello                                   272
State Refresh                           0
Join/Prune                              0
SSM Join/Prune                          0
RP Advertisement                        0
Graft                                   0
Graft Ack                               0
Assert                                  0
Bsm                                     0
Register                                0
SSM Register                            0
Register Stop                           0
Register Drops(Register ACL hitcount)   0
Join/Prune Drops(RP ACL hitcount)       0

Rx Drop Counters :

Hello                                   0
State Refresh                           0
Join/Prune                              0
RP Advertisement                        0
Graft                                   0
Graft Ack                               0
Assert                                  0
Bsm                                     0
Switch#
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

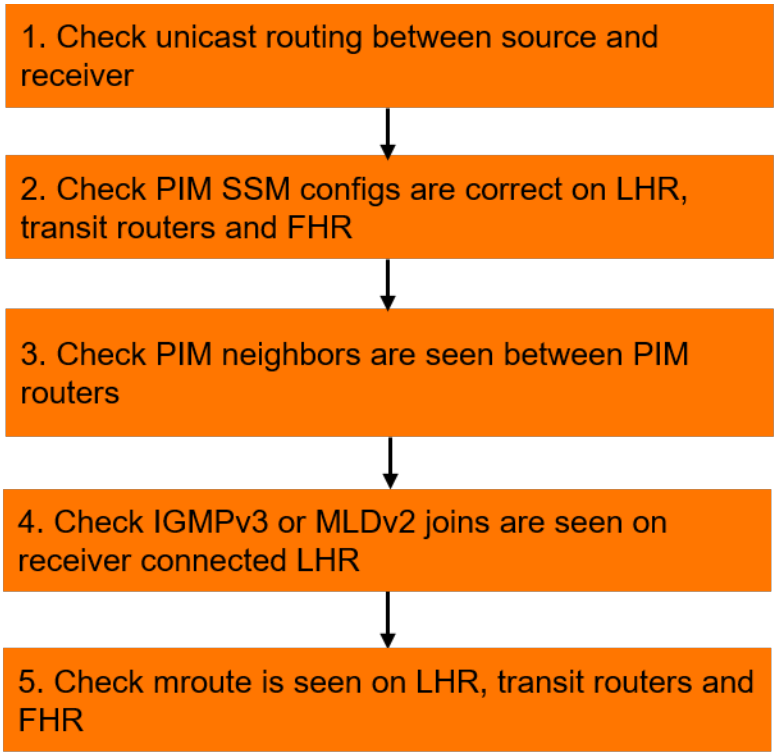
Debugging and troubleshooting

The recommended PIM-SSM troubleshooting flow is provided in Figure 1, Recommended IPv4 multicast VXLAN troubleshooting flow. Additional tips and guidance for each step are provided below.

Prerequisites

- Have a topology diagram with interface and IP details ready
- Check physical cabling and generate “show tech”
- Check network: show LLDP neighbor, ensure unicast network works using ping and traceroute between loopbacks and interfaces, fix any issues found.

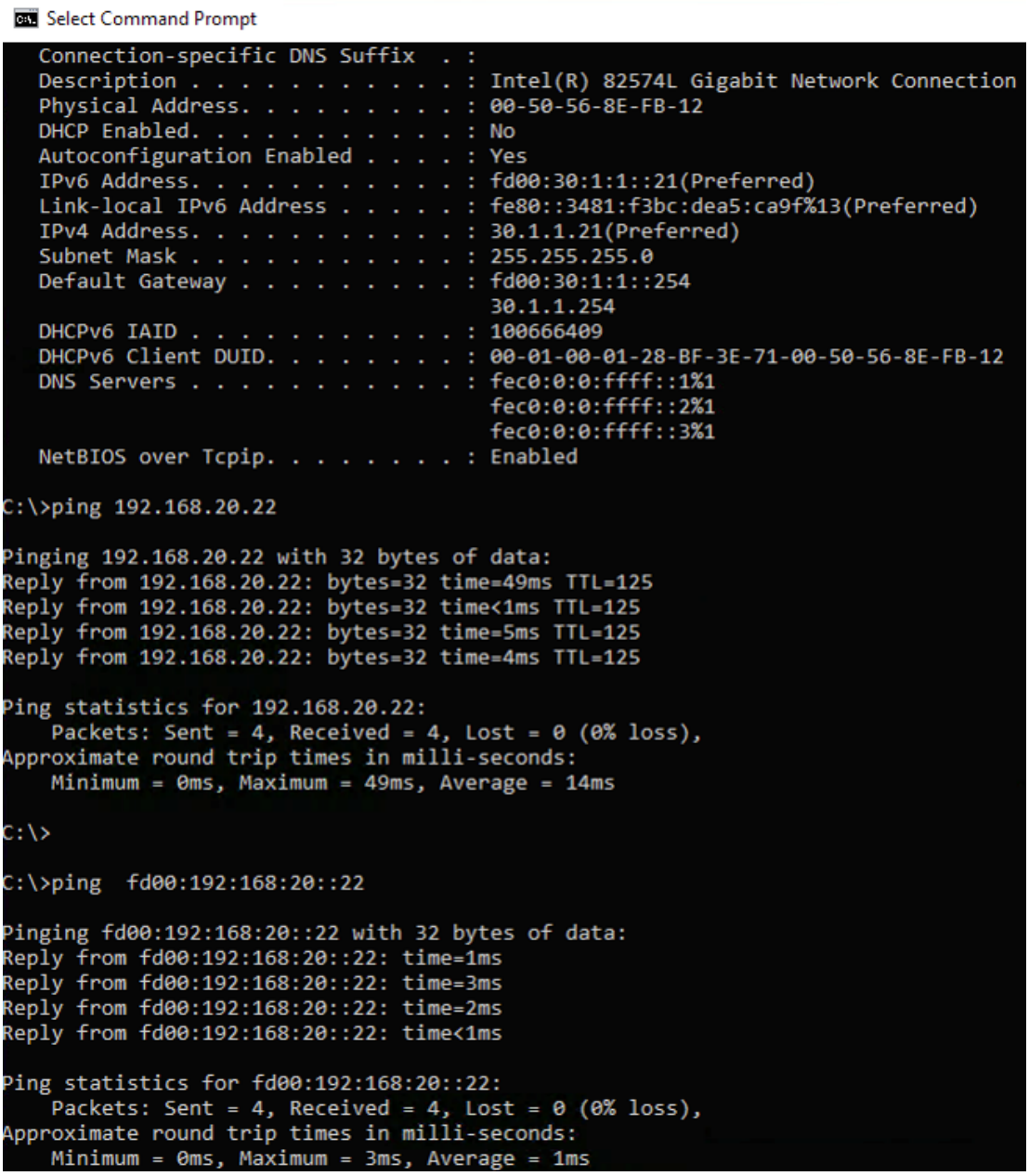
Figure 1 *Recommended PIM_SSM troubleshooting flow*



The recommended PIM-SSM troubleshooting procedure includes the following sequence of steps:

Step 1: Check unicast routing between source and receiver. This applies to both IPv4/IPv6 PIM SSM

- In order for PIM SSM to correctly forward traffic from source towards receivers:
  - Ensure source/destination IPs are correctly advertised in the network
  - e.g. “sh ip route”, test pings using between source and receiver IPs
- Fix connectivity issues if discovered



Step 2: Check PIM SSM configs are correct on LHR, transit routers and FHR.

- See configuration section sample configurations for LHR, transit, and FHR.

Step 3: Check PIM neighbors are seen between PIM routers

- In order for PIM traffic to correctly flow down the multicast tree PIM neighbors should be up on all interfaces between PIM routers. This applies to both IPv4/IPv6 PIM SSM.
- IPv6 equivalent command: **sh ipv6 pim6 neighbor**

```
SW1A# sh ip pim neighbor

PIM Neighbor

VRF                          : default
Total number of neighbors    : 4

IP Address                   : 20.1.1.221
Interface                    : vlan20
Up Time (HH:MM:SS)           : 4 days 06:04:09
Expire Time (HH:MM:SS)       : 00:01:41
DR Priority                  : 1
Hold Time (HH:MM:SS)         : 00:01:45
Secondary IP Addresses :
 20.1.1.254

IP Address                   : 30.1.1.221
Interface                    : vlan30
Up Time (HH:MM:SS)           : 4 days 06:04:09
Expire Time (HH:MM:SS)       : 00:01:42
DR Priority                  : 1
Hold Time (HH:MM:SS)         : 00:01:45
Secondary IP Addresses :
 30.1.1.254

IP Address                   : 192.168.3.4
Interface                    : 1/1/49
Up Time (HH:MM:SS)           : 4 days 06:05:00
Expire Time (HH:MM:SS)       : 00:01:21
DR Priority                  : 1
Hold Time (HH:MM:SS)         : 00:01:45

IP Address                   : 192.168.3.12
Interface                    : 1/1/50
Up Time (HH:MM:SS)           : 4 days 06:04:30
Expire Time (HH:MM:SS)       : 00:01:24
DR Priority                  : 1
Hold Time (HH:MM:SS)         : 00:01:45
```

Step 4: Check IGMPv3 or MLDv2 joins are seen on LHR

- In order for PIM traffic to correctly flow down the multicast tree IGMPv3 or MLDv2 joins should be seen on LHR . This applies to both IPv4/IPv6 PIM SSM
- IPv6 equivalent command: `sh ipv6 mld groups`

```
SW1A#  sh ip igmp groups

IGMP group information for group 239.255.255.250

Interface Name   : vlan20
VRF Name         : default

Group Address    : 239.255.255.250
Last Reporter    : 20.1.1.21

                                V1        V2        Sources   Sources
Vers Mode Uptime    Expires     Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    EXC  4d 6h 12m 3m 43s

IGMP group information for group 232.10.10.10

Interface Name   : vlan30
VRF Name         : default

Group Address    : 232.10.10.10
Last Reporter    : 30.1.1.21

                                V1        V2        Sources   Sources
Vers Mode Uptime    Expires     Timer     Timer     Forwarded Blocked
---- ---- --------- --------- --------- --------- --------- --------
3    INC  52m 26s   3m 36s                        1

Group Address  : 232.10.10.10
Source Address : 192.168.20.22

Mode Uptime    Expire
---- -------- --------
INC  52m 28s   3m 34s
```

- Packet captures might be required to check if receiver sends joins correctly to LHR

```
    17 11.571125    30.1.1.21          224.0.0.22         IGMPv3     58 Membership Report / Group 232.10.10.10, new source {192.168.2…
    18 11.637364    30.1.1.21          224.0.0.22         IGMPv3     58 Membership Report / Group 232.10.10.10, new source {192.168.2…
    19 12.394914    192.168.20.22      232.10.10.10       UDP      1370 65492 → 5004 Len=1328
    20 12.394916    192.168.20.22      232.10.10.10       UDP      1370 65492 → 5004 Len=1328
    21 12.398786    192.168.20.22      232.10.10.10       UDP      1370 65492 → 5004 Len=1328
    22 12.398788    192.168.20.22      232.10.10.10       UDP      1370 65492 → 5004 Len=1328
    23 12.398932    192.168.20.22      232.10.10.10       UDP      1370 65492 → 5004 Len=1328
    24 12.398933    192.168.20.22      232.10.10.10       UDP      1370 65492 → 5004 Len=1328

> Frame 17: 58 bytes on wire (464 bits), 58 bytes captured (464 bits) on interface \Device\NPF_{E417155C-6750-4480-B8C6-9C1CFC9EF982}, id 0
> Ethernet II, Src: VMware_8e:fb:12 (00:50:56:8e:fb:12), Dst: IPv4mcast_16 (01:00:5e:00:00:16)
> Internet Protocol Version 4, Src: 30.1.1.21, Dst: 224.0.0.22
v Internet Group Management Protocol
    [IGMP Version: 3]
    Type: Membership Report (0x22)
    Reserved: 00
    Checksum: 0x122a [correct]
    [Checksum Status: Good]
    Reserved: 0000
    Num Group Records: 1
  v Group Record : 232.10.10.10  Allow New Sources
      Record Type: Allow New Sources (5)
      Aux Data Len: 0
      Num Src: 1
      Multicast Address: 232.10.10.10
      Source Address: 192.168.20.22
```

Configuration to mirror traffic:

```
mirror session 1
    enable
    destination interface 1/1/40
    source interface 1/1/51 both
```

Step 5: Check mroute is seen on LHR, transit routers, and FHR.

- Ensure expected incoming and outgoing interfaces are seen on each router.
- IPv6 equivalent command: **sh ipv6 mroute**

FHR

```
SW4# sh ip mroute
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address            : 232.10.10.10
Source Address           : 192.168.20.22
SSM Mroute               : True
Neighbor                 :
Incoming interface       : vlan20
Outgoing Interface List :
Interface       State
-----------     ----------
1/1/49          forwarding
```

Transit router

```
SW2# sh ip mroute
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address            : 232.10.10.10
Source Address           : 192.168.20.22
SSM Mroute               : True
Neighbor                 : 192.168.3.0
Incoming interface       : 1/1/4
Outgoing Interface List :
Interface       State
-----------     ----------
1/1/1           forwarding
```

LHR

```
SW1B#   sh ip mroute
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address            : 232.10.10.10
Source Address           : 192.168.20.22
SSM Mroute               : True
Neighbor                 : 192.168.3.2
Incoming interface       : 1/1/49
Outgoing Interface List :
Interface       State
-----------     ----------
vlan30          forwarding
```

- On VSX switches, only the DR will state outgoing interface in mroute

```
SW1A#  sh ip mroute
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address            : 232.10.10.10
Source Address           : 192.168.20.22
SSM Mroute               : True
Neighbor                 :
Incoming interface       : vlan30
```

```
SW1B#   sh ip mroute
IP Multicast Route Entries

VRF : default
Total number of entries : 1

Group Address            : 232.10.10.10
Source Address           : 192.168.20.22
SSM Mroute               : True
Neighbor                 : 192.168.3.2
Incoming interface       : 1/1/49
Outgoing Interface List :
Interface       State
-----------     ----------
vlan30          forwarding
```

- Method to check which VSX switch is DR for an SVI:

```
SW1A#  sh ip pim int vlan 30

PIM Interfaces

VRF: default

Interface  : vlan30
Neighbor count : 1
IP Address : 30.1.1.220/24
Mode       : sparse
Designated Router : 30.1.1.221
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500            Lan Prune Delay     : Yes
Propagation Delay (msec)  : 500             Configured DR Priority    : 1
Operational DR Priority   : 1
Neighbor Timeout          : 80
```

```
SW1B# sh ip pim int vlan 30

PIM Interfaces

VRF: default

Interface  : vlan30
Neighbor count : 1
IP Address : 30.1.1.221/24
Mode       : sparse
Designated Router : 30.1.1.221
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500            Lan Prune Delay     : Yes
Propagation Delay (msec)  : 500             Configured DR Priority    : 1
Operational DR Priority   : 1
Neighbor Timeout          : 100
```

Bidirectional PIM

In a network where IP multicast traffic is transmitted for multimedia applications, such traffic is blocked at routed interface boundaries unless a multicast routing protocol is running. Protocol Independent Multicast (PIM) is a family of routing protocols that form multicast tress to forward traffic from multicast sources to subnets that have used a protocol, such as IGMP, to request the traffic. PIM relies on the unicast routing tables created by any of several unicast routing protocols to identify the path back to a multicast source (reverse path forwarding (RPF)). With this information, PIM sets up the distribution tree for the multicast traffic.

Bidirectional PIM (BIDIR-PIM) is a variant of PIM that builds bidirectional shared trees connecting multicast sources and receivers.

BIDIR-PIM Mode can be configured on physical ports, VLAN interfaces, LAG interfaces, and loopback interfaces. All such configurations work in the mentioned interfaces context.

When a PIM-BIDIR downstream VLAN interface is IGMP/MLD snooping enabled, the source specific joins cannot be honoured as the BIDIR multicast route is maintained as a starg state in both hardware and software. To co-exist with those clients, the source specific join internally triggers starg join events.

Therefore when a IGMPv3/MLDv2 source specific join receives the source traffic, it receives other source traffic as well.

Below is an example of configuring static RP:

```
router pim
   enable
   rp-address 100.100.100.100
```



Only static rp-address configuration is supported for bidirectional PIM. BSR and dynamic RP support is not present.

BIDIR-PIM commands

ip pim-bidir

```
ip pim-bidir [enable | disable]
```

Description

Enables or disables PIM-Bidir in the designated interface. This command works in the interface context, including loopback. The IP address must be configured on the interface to enable BIDIR-PIM.

Parameter	Description
[enable]	Enables PIM Bidirectional on the interface.
[disable]	Disables PIM Bidirectional on the interface.

Example

Enabling PIM-Bidir:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip address 40.0.0.4/24
switch(config-if-vlan)# ip pim-bidir enable
```

Disabling PIM-Bidir:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip address 40.0.0.4/24
switch(config-if-vlan)# ip pim-bidir disable
```

Command History

Release	Modification
10.13	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8325 8360 9300 10000	config-if-vlan	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

ip pim-bidir hello-delay

```
ip pim-bidir hello-delay <DELAY-VALUE>
no ip pim-bidir hello-delay <DELAY-VALUE>
```

Description

Changes the maximum time, in seconds, before the router transmits the initial PIM hello message on the current interface. The **no** form of this command removes the currently configured value and sets it to default. The default value is 5.

Parameter	Description
<DELAY-VALUE>	Configures the given value as the hello interval. Range: <0-5>.

Usage

In cases where a new L3 interface activates with connections to multiple routers, if all of the connected routers sent hello packets at the same time, the receiving router could momentarily become overloaded. This value randomizes the transmission delay to a time between 0 and the hello delay setting. Using 0 means no delay. After the router sends the initial hello packet to a newly detected L3 interface, it sends subsequent hello packets according to the current Hello Interval setting.

Example

Changing the maximum time before the router transmits the initial PIM hello message on the current interface to 4 seconds:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip pim-bidir hello-delay 4
```

Removing the maximum time before the router transmits the initial PIM hello message on the current interface from 4 seconds and reverting to the default:

Disabling hello-delay:

```
switch(config)# interface vlan40
switch(config-if-vlan)# no ip pim-bidir hello-delay
```

Command History

Release	Modification
10.13	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8325 8360 9300 10000	`config-if-vlan`	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

ip pim-bidir lan-prune-delay

```
ip pim-bidir lan-prune-delay
no ip pim-bidir lan-prune-delay
```

Description

Enables the LAN prune delay option on the current interface. The **no** form of this command disables the LAN prune delay option.

Usage

With LAN prune delay enabled, the router informs the downstream neighbors how long it waits before pruning a flow after receiving a prune request. Other downstream routers on the same subnet must send a join to override the prune before the LAN prune delay time for the flow to continue. This prompts any downstream neighbors with multicast receivers that continue to belong to the flow to reply with a join. If no joins are received after the LAN prune delay and override-interval period, the router prunes the flow. The propagation-delay and override-interval settings determine the LAN prune delay setting. It is enabled by default.

Example

Enabling the LAN prune delay option:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip pim-bidir lan-prune-delay
```

Disabling the LAN prune delay option:

```
switch(config)# interface vlan40
switch(config-if-vlan)# no ip pim-bidir lan-prune-delay
```

Command History

Release	Modification
10.13	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8325 8360 9300 10000	config-if-vlan	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

ip pim-bidir override-interval

```
ip pim-bidir override-interval <INTERVAL-VALUE>
no ip pim-bidir override-interval <INTERVAL-VALUE>
```

Description

Configures the override interval that gets inserted into the Override Interval field of a LAN prune delay option. The no form of this command removes the currently configured value and sets it to the default. The default value is 2500 milliseconds.

Parameter	Description
<INTERVAL-VALUE>	Specifies override interval value. Range: 500-6000. Default: 2500.

Example

Configuring the override interval value to 4000:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip pim-bidir override-interval 4000
```

Removing the override interval value and setting to default:

```
switch(config)# interface vlan40
switch(config-if-vlan)# no ip pim-bidir override-interval
```

Command History

Release	Modification
10.13	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8325 8360 9300 10000	config-if-vlan	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

ip pim-bidir propagation-delay

```
ip pim-bidir propagation-delay <DELAY-VALUE>
no ip pim-bidir propagation-delay <DELAY-VALUE>
```

Description

Configures the propagation delay that gets inserted into the propagation delay field of a LAN prune delay option. The **no** form of this command removes any configuration and resets to the default. Default: 500 milliseconds.

Parameter	Description
<DELAY-VALUE>	Specifies the propagation delay in milliseconds. Range: 250-2000. Default: 500.

Example

Configuring the propagation delay to to 400 milliseconds:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip pim-bidir propagation-delay 400
```

Removing the propagation delay and setting to default:

```
switch(config)# interface vlan40
switch(config-if-vlan)# no ip pim-bidir propagation-delay
```

Command History

Release	Modification
10.13	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300	config-if-vlan	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this

Platforms	Command context	Authority
6400 8100 8325 8360 9300 10000		command from the operator context (>) only.

no ip pim-bidir

```
no ip pim-bidir
```

Description

Removes all PIM-Bidir configurations for the interface.

Example

Removing PIM-Bidir configurations for the interface:

```
switch(config)# interface vlan40
switch(config-if-vlan)# no ip pim-bidir
```

Command History

Release	Modification
10.13	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8325 8360 9300 10000	config-if-vlan	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim dfe

```
show ip pim dfe [vrf <VRF-NAME> | all-vrfs]
```

Description

Displays the Designated Forwarder information for a given interface and RP address in the topology. This prints the winner address along with winner metric details to reach RPA and its uptime details for a given VRF. If a VRF is not specified, the default is displayed.

Parameter	Description
<VRF-NAME>	Specifies the VRF.
[all-vrfs]	Specifies all VRFs.

Example

Displaying the Designated Forwarder information for the default VRF:

```
switch# show ip pim dfe
PIM BIDIR DFE Information

VRF                          : default
Total number of DFE entries  : 2

Interface         RPA               DF Winner         Metric            Uptime
(HH:MM:SS)
vlan10            1.1.1.1           10.1.1.3          100               00:33:15
vlan30            1.1.1.1           30.1.1.1          0                 00:33:16
```

Displaying the Designated Forwarder information for VRF red:

```
switch# show ip pim dfe vrf red
PIM BIDIR DFE Information

VRF                          : red
Total number of DFE entries  : 1

Interface         RPA               DF Winner         Metric            Uptime
(HH:MM:SS)
vlan50            5.5.5.5           50.1.1.5          200               00:34:42
```

Command History

Release	Modification
10.13	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8325 8360 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim dfe

`show ip pim dfe <INTERFACE-NAME> <RP-ADDRESS>`

Description

Displays the Designated Forwarder information for all interfaces of an RP address in the topology. This prints the winner address along with winner metric details to reach RPA and its uptime details for a given VRF. If a VRF is not specified, the default is displayed.

Parameter	Description
<INTERFACE-NAME>	Specifies the interface.
<RP-ADDRESS>	Specifies the RP address.

Example

Displaying the Designated Forwarder information for 1.1.1.1:

```
switch# show ip pim dfe vlan10 1.1.1.1
PIM BIDIR DFE Information

VRF                          : default

Interface          RPA               DF Winner          Metric            Uptime
(HH:MM:SS)
vlan10             1.1.1.1           10.1.1.3           100               00:33:15
```

Command History

Release	Modification
10.13	Command introduced

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8325 8360 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show running-config pim

```
show running-config pim
```

Description

Displays the current running configuration in the router pim context.

Example

Displaying the current running configuration in the router pim context:

```
switch# show running-config pim
router pim
       enable
       rp-address 10.0.0.4
       rp-candidate source-ip-interface loopback1 group-prefix 239.1.1.1/32
       multicast-route-limit 1024
       active-active
       anycast-rp source-directly-connected
router pim vrf green
       enable
       rp-address 30.0.0.4
       rp candidate source-ip-interface loopback1 group-prefix 224.0.0.0/4
       multicast-route-limit 1024
       active-active
       anycast-rp source-directly-connected
interface loopback11
       ip pim-bidir enable
interface loopback44
       ip pim-bidir enable
interface vlan30
       ip pim-bidir enable
interface vlan500
       ip pim-bidir enable
```

Command History

Release	Modification
10.13	BIDIR PIM introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8325 8360 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

Chapter 10
Multicast Source Discovery Protocol (MSDP)

Multicast Source Discovery Protocol (MSDP) is a mechanism to connect multiple Protocol Independent Multicast sparse mode (PIM-SM) domains. MSDP allows multicast sources for a group to be known to all rendezvous points (RPs) in different domains. An RP runs MSDP over TCP to discover multicast sources in other domains. The main advantage of MSDP is that it reduces the complexity of interconnecting multiple PIM-SM domains by allowing PIM-SM domains to use an interdomain source tree (rather than a common shared tree).



Not supported on the Aruba 6200 Switch Series.

Multicast Source Discovery Protocol (MSDP) overview

When MSDP is configured in a network, RPs running MSDP exchange source information with MSDP enabled RPs in other domains. An RP can join the interdomain source tree for sources that are sending to groups for which it has receivers. The RP can do that because it is the root of the shared tree within its domain, which has branches to all points in the domain where there are active receivers. When a last-hop device learns of a new source outside the PIM-SM domain (through the arrival of a multicast packet from the source down the shared tree), it then can send a join toward the source and join the interdomain source tree, which behaves similar to a local PIM register packet.

Benefits of Using MSDP to Interconnect Multiple PIM-SM Domains:

- Allows a rendezvous point (RP) to dynamically discover active sources outside of its domain.
- Introduces a more manageable approach for building multicast distribution trees between multiple domains and thus provides administrative independence.
- Allows filtering.

PIM Anycast RP is supported with the help of MSDP mesh groups. The main purpose of an Anycast RP implementation is that the downstream multicast routers will see just one address for an RP.

MSDP router config commands

disable

```
disable
```

Description

Disables MSDP on the VRF.

Example

Disabling MSDP:

```
switch(config)# router msdp
switch(config-msdp)# disable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-msdp	Administrators or local user group members with execution rights for this command.

enable

enable

Description

Enables MSDP on the VRF.

Example

Enabling MSDP:

```
switch(config)# router msdp
switch(config-msdp)# enable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320	config-msdp	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
8325 8360 8400 9300 10000		

router msdp

```
router msdp [vrf <VRF-NAME>]
no router msdp [vrf <VRF-NAME>]
```

Description

Changes the current context to the MSDP router context. If no VRF is specified, the default VRF MSDP context of the router is assumed.

The **no** form of this command removes the MSDP configuration from the specified context or the default VRF.

Parameter	Description
`vrf <VRF-NAME>`	Specifies the context to the specified VRF.

Examples

Configuring default MSDP router context:

```
switch(config)# router msdp
switch(config-msdp)#
```

Configuring specified router MSDP:

```
switch(config-msdp)# router msdp vrf red
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360	`config`	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
8400 9300 10000		

sa-interval

```
sa-interval <INTERVAL-VALUE>
no sa-interval
```

Description

Configures the sa-interval for the frequency at which MSDP source-active messages are sent.

The **no** form of this command sets the interval to the default value of 60 seconds.

Parameter	Description
<INTERVAL-VALUE>	Specifies the sa-interval in seconds. Default: 60 seconds. Range 60-65535.

Examples

Configuring the sa-interval:

```
switch(config)# router msdp
switch(config-msdp)# sa-interval 400
switch(config-msdp)# no sa-interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-msdp	Administrators or local user group members with execution rights for this command.

sa-limit

```
sa-limit <LIMIT-VALUE>
no sa-limit <LIMIT-VALUE>
```

Description

Configures the SA (Source Active) cache limit for the MSDP peer.

The **no** form of this command sets the cache limit to the default value.

Parameter	Description
<LIMIT-VALUE>	Specifies the sa cache limit. MSDP peer limit: 128, Cache limit: 16K MSDP peer limit: 64, Cache Limit: 8K

Usage

This command is used to limit the overall number of (S, G) entries that a device can accept from specified MSDP peers and store in a sa-cache. When configured, the device maintains a per-peer count of (S, G) messages stored in the SA cache and ignores new messages from a peer if the configured sa-limit for that peer has been reached. This command protects MSDP-enabled devices from denial of service (DOS) attacks.

By default, there is no limit configured per peer. All (S, G) entries within the system capacities are allowed. If there is a reboot or HA switchover, the (S, G) cache allocation occurs based on FCFS basis. When configured via CLI or REST, (S, G) entries are allocated until they reach the system capacity or peer limit based on whichever is reached first and new sets of (S, G) requests are discarded.

Examples

Configuring the sa cache limit to 1000:

```
switch(config)# router msdp
switch(config-msdp)# ip msdp peer 10.1.1.1
switch(config-msdp-peer)#
switch(config-msdp-peer)# sa-limit 1000
```

Removing the configured sa cache limit of 1000:

```
switch(config)# router msdp
switch(config-msdp)# ip msdp peer 10.1.1.1
switch(config-msdp-peer)#
switch(config-msdp-peer)# no sa-limit 1000
```

Configuring the sa cache limit outside system capacities:

```
switch(config)# router msdp
switch(config-msdp)# ip msdp peer 10.1.1.1
switch(config-msdp-peer)#
switch(config-msdp-peer)# sa-limit 20000
Specified value exceeds the system capacities. Maximum SA Allowed on the system is
16384.
```

Command History

Release	Modification
10.11	Command introduced.

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-msdp`	Administrators or local user group members with execution rights for this command.

MSDP peer configuration commands

connection-retry-interval

```
connection-retry-interval <INTERVAL-VALUE>
no connection-retry-interval
```

Description

Configures the connection-retry-interval for which MSDP peers will wait after peering sessions are reset, before attempting to re-establish the peering sessions.

The **no** form of this command removes the currently configured value and sets it to the default value of 30 seconds.

Parameter	Description
<INTERVAL-VALUE>	Specify connection-retry-interval in seconds. Range: 1-65535.

Example

Configuring the connection-retry-interval:

```
switch(config-msdp-peer)# connection-retry-interval 120
switch(config-msdp-peer)# no connection-retry-interval
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-msdp-peer`	Administrators or local user group members with execution rights for this command.

connect-source

`connect-source <INTERFACE-NAME>`

Description

Configures the connection source interface for the MSDP Peer.

The **no** form of this command removes the existing connection source interface and resets the peer connection.

Parameter	Description
<INTERFACE-NAME>	Specifies the interface to use as a source.

Examples

Configuring the connection source interface:

```
switch(config-msdp-peer)# connect-source 1/1/1
```

Configuring the connection source as ROP:

```
switch(config)# router msdp
switch(config-msdp)# ip msdp peer 10.1.1.1
switch(config-msdp-peer)# connect-source 1/1/1
```

Configuring the connection source as a sub-interface:

Supported only on the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series.

```
switch(config)# router msdp
switch(config-msdp)# ip msdp peer 20.1.1.1
switch(config-msdp-peer)# connect-source 1/1/10.10
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-msdp-peer`	Administrators or local user group members with execution rights for this command.

clear ip msdp peer statistics

`clear ip msdp peer [all-vrfs | vrf <VRF-NAME> | <PEER-IP>]`

Description

Clears MSDP SA counters of peer information for the given VRF. If VRF is not specified, it clears SA counters of peers in the default VRF. It also clears MSDP SA counters for a specified peer address.

Parameter	Description
`all-vrfs`	Clears MSDP peer information for all VRFs. Optional.
`vrf <VRF-NAME>`	Clears MSDP peer information for a particular VRF. If the **<VRF-NAME>** is not specified, it clears information for the default VRF. Optional
`<PEER-IP>`	Clears MSDP peer information for the specified Peer IP. Format: A.B.C.D. Optional.

Examples

Showing MSDP peer information for VRFs:

```
switch# clear ip msdp peer statistics all-vrfs
switch# clear ip msdp peer statistics 2.2.2.2
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Auditors or Administrators or local user group members with execution rights for this command. Auditors can execute this command from the auditor context (auditor>) only.

description

```
description <TEXT>
no description
```

Description

Configures a description for a specified MSDP peer to make it easier to identify in a configuration or show command output.

The **no** form of this command removes the peer description.

Parameter	Description
<TEXT>	Specifies a description for the MSDP Peer.

Example

Configuring the MSDP peer description:

```
switch(config-msdp)# ip msdp peer 10.1.1.1
switch(config-msdp-peer)#
switch(config-msdp-peer)# description Peer_1
switch(config-msdp-peer)# no description
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400	config-msdp-peer	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
9300 10000		

disable

```
disable
```

Description

Disables MSDP peer on the L3 interface.

Example

Disabling MSDP peering:

```
switch(config)# router msdp
switch(config-msdp)#
switch(config-msdp)# ip msdp peer 10.1.1.1
switch(config-msdp-peer)#
switch(config-msdp-peer)# disable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-msdp-peer`	Administrators or local user group members with execution rights for this command.

enable (ip msdp peer)

```
enable
```

Description

Enables MSDP peer on the L3 interface.



Only one MSDP peering session per VRF should be configured between two routers to avoid loops.

Example

Enabling MSDP peering:

```
switch(config)# router msdp
switch(config-msdp)#
switch(config-msdp)# ip msdp peer 10.1.1.1
switch(config-msdp-peer)#
switch(config-msdp-peer)# enable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-msdp-peer	Administrators or local user group members with execution rights for this command.

ip msdp peer

```
ip msdp peer <IP-ADDR>
no ip msdp peer
```

Description

Changes the current context to the MSDP peer context.

The **no** form of this command removes the MSDP peer configuration from the specified context.

Parameter	Description
<IP-ADDR>	Specifies the IPv4 address of the MSDP peer. Format: A.B.C.D

Examples

Enabling the MSDP peer context:

```
switch(config)# router msdp
switch(config-msdp)#
switch(config-msdp)# ip msdp peer 10.1.1.1
switch(config-msdp-peer)#
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-msdp`	Administrators or local user group members with execution rights for this command.

keepalive

```
keepalive <KEEPALIVE-INTERVAL> <HOLD-TIME>
no keepalive
```

Description

Configures the interval at which a MSDP peer will send keepalive messages, and the interval at which the MSDP peer will wait for keepalive messages from other peers before declaring them down.

The **no** form of this command removes the currently configured value and sets it to the default value.

Parameter	Description
<KEEPALIVE-INTERVAL>	Specifies the value for the keepalive interval.
<HOLD-TIME>	Specifies the value for the hold time.

Example

Configuring the keepalive interval and the hold time for MSDP peer:

```
switch(config-msdp-peer)# keepalive 30 45
switch(config-msdp-peer)# no keepalive
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-msdp-peer`	Administrators or local user group members with execution rights for this command.

mesh-group

```
mesh-group <MESH-NAME>
no mesh-group <MESH-NAME>
```

Description

Associates the given mesh group with the MSDP peer. This feature is used to reduce the amount of SA traffic in an intra-domain setting.

The **no** form of this command removes the peer from the currently configured mesh.

Parameter	Description
<MESH-NAME>	Specifies the MSDP mesh group name.

Usage

All MSDP peers on the router that participate in the mesh group must be fully meshed with all other peers in the mesh group. When MSDP mesh groups are used, SA messages are not flooded to other mesh group peers. It also eliminates RPF checks on arriving SA messages. With MSDP mesh group configured, SA messages are always accepted from mesh group peers.

Example

Associating a mesh group with an MSDP peer:

```
switch(config-msdp-peer)# mesh-group test-mesh-group
```

Removing the MSDP peer from the configured mesh:

```
switch(config-msdp-peer)# no mesh-group test-mesh-group
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	`config-msdp-peer`	Administrators or local user group members with execution rights for this command.

password (router msdp)

```
password {ciphertext | plaintext} <password>
no password
```

Description

Enables MD5 password encryption for a TCP connection between two MSDP peers.

The **no** form of this command removes MD5 password encryption.

Parameter	Description
`{ciphertext | plaintext}`	Selects the password type.
<password>	Specifies the password.



When the password is not provided on the command line, plaintext password prompting occurs upon pressing Enter. The entered password characters are masked with asterisks.

Examples

Configuring MD5 password encryption with a provided plaintext password:

```
switch(config)# router msdp
switch(config-msdp)#
switch(config-msdp)# ip msdp peer 10.1.1.1
switch(config-msdp-peer)#
switch(config-msdp-peer)# password plaintext F82#4eva
```

Configuring MD5 password encryption with a prompted plaintext password:

```
switch(config)# router msdp
switch(config-msdp)#
switch(config-msdp)# ip msdp peer 10.1.1.1
switch(config-msdp-peer)#
switch(config-msdp-peer)# password
Enter the MD5 password: ********
Re-Enter the MD5 password: ********
```

Removing MD5 password encryption:

```
switch(config)# router msdp
switch(config-msdp)#
switch(config-msdp)# ip msdp peer 10.1.1.1
switch(config-msdp-peer)#
switch(config-msdp-peer)# no password
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-msdp-peer	Administrators or local user group members with execution rights for this command.

sa-filter access-list

```
sa-filter {in|out} access-list <ACL-RULE>
no sa-filter {in|out} access-list <ACL-RULE>
```

Description

Associates the given ACL to filter MSDP SA messages on the peer.

The **no** form of this command removes the currently configured ACL entry.

Parameter	Description
{in|out}	Enables the filter for incoming or outgoing SA messages.
<ACL-RULE>	Specifies the ACL rule name.

Usage

By default, the MSDP enabled router forwards all the SA messages, and the peer router processes all the received messages. This command allows the user to configure an ACL on the MSDP peer to filter SA messages. User can prevent the incoming/outgoing SA messages on MSDP router by creating incoming/outgoing filter lists using an ACL.

Example

Filtering incoming SA messages on the MSDP peer for the specified ACL:

```
switch(config-msdp-peer)# sa-filter in access-list msdp_sa_filter1
```

Filtering outgoing SA messages on the MSDP peer for the specified ACL:

```
switch(config-msdp-peer)# sa-filter out access-list msdp_sa_filter2
```

Removing filter on the MSDP peer for the specified ACL:

```
switch(config-msdp-peer)# no sa-filter in access-list msdp_sa_filter2
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-msdp-peer	Administrators or local user group members with execution rights for this command.

MSDP show commands

show ip msdp count

`show ip msdp count [all-vrfs | vrf <VRF-NAME>]`

Description

Shows MSDP Peer (S,G) learnt count for a given VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows MSDP (S,G) entries count for all VRFs. Optional.
`vrf <VRF-NAME>`	Shows MSDP (S,G) entries count for a particular VRF. If the **<VRF-NAME>** is not specified, it shows information for the default VRF. Optional.

Examples

Showing the MSDP learnt count:

```
switch# show ip msdp count

VRF: default
SA state per Peer counters
<Peer>:<#SA learned>
10.1.1.1: 30
20.1.1.1: 100
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Administrators or local user group members with execution rights for this command.

show ip msdp peer

`show ip msdp peer [all-vrfs | vrf <VRF-NAME> | <PEER-IP>]`

Description

Shows MSDP Peer information for the given VRF. Optionally, you can show specific information by VRF.

Parameter	Description
`all-vrfs`	Shows MSDP peer information for all VRFs. Optional.
`vrf <VRF-NAME>`	Shows MSDP peer information for a particular VRF. If the **<VRF-NAME>** is not specified, it shows information for the default VRF. Optional.
`<PEER-IP>`	Shows MSDP Peer information for specified Peer IP. Format: A.B.C.D. Optional.

Examples

Showing MSDP peer information for VRFs:

(Sub-interface is supported only on the Aruba 6300, 6400, 8100, 8325, 8360, and 10000 Switch Series)

```
switch# show ip msdp peer

VRF: default

MSDP Peer: 10.1.1.1
Connection status
State: up  Resets: 0  Connection Source: 1/1/1
Uptime(Downtime): 0m 25s    SA Messages sent: 0
SA's learned from this peer: 0
SA Filtering
Input (S,G) filter: msdp_sa_filter1  (S,G) entries dropped: 0
Output (S,G) filter: msdp_sa_filter2  (S,G) entries dropped: 30
Mesh group: test-mesh-group


MSDP Peer: 30.1.1.1
Connection status
State: up  Resets: 0  Connection Source: 1/1/10.10(30.1.1.2)
Uptime(Downtime): 0m 25s    SA Messages sent: 0
SA's learned from this peer: 0
Peer Keepalive interval: 70
Peer Hold time: 90
Peer Connection Retry interval: 40
SA Filtering
Input (S,G) filter: msdp_sa_filter1  (S,G) entries dropped: 0
Output (S,G) filter: msdp_sa_filter2  (S,G) entries dropped: 30
Mesh group: test-mesh-group1

switch# show ip msdp peer 20.1.1.1

VRF: default

MSDP Peer: 20.1.1.1
Connection status
State: down  Resets: 0  Connection Source: 1/1/2
Uptime(Downtime): 1m 25s    SA Messages sent: 0
SA's learned from this peer: 0
SA Filtering
Input (S,G) filter: msdp_sa_filter1  (S,G) entries dropped: 0
Output (S,G) filter: msdp_sa_filter2  (S,G) entries dropped: 20
Mesh group: test-mesh-group
```

Command History

Release	Modification
10.11	Sub-interface support extended to 8325 and 10000 Switch Series.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320	Operator (>) or Manager (#)	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
8325 8360 8400 9300 10000		

show ip msdp sa-cache

`show ip msdp sa-cache [all-vrfs | vrf <VRF-NAME> | <SRC-OR-GRP-IP>]`

Description

Shows MSDP Peer SA-Cache information for the given VRF. Optionally, you can show specific information by VRF. The SA-Cache output can be filtered based on the source or group IPv4 address.

Parameter	Description
`all-vrfs`	Shows MSDP SA-Cache information for all VRFs. Optional.
`vrf <VRF-NAME>`	Shows MSDP SA-Cache information for a particular VRF. If the **<VRF-NAME>** is not specified, it shows information for the default VRF. Optional.
<SRC-OR-GRP-IP>	Shows the filtered SA-cache output for the specified source or group IPv4 address. Format: A.B.C.D. Optional.

Examples

Showing MSDP SA-Cache information for VRFs:

```
switch# show ip msdp sa-cache

VRF: default
(30.0.0.1, 230.1.1.1)  RP: 10.1.1.1  Peer: 10.1.1.2
(20.0.0.1, 229.1.1.1)  RP: 10.1.1.1  Peer: 10.1.1.2
(10.0.0.1, 229.1.1.1)  RP: 10.1.1.1  Peer: 10.1.1.2

Total entries: 3

switch# show ip msdp sa-cache 229.1.1.1
(20.0.0.1, 229.1.1.1)  RP: 10.1.1.1  Peer: 10.1.1.2
(10.0.0.1, 229.1.1.1)  RP: 10.1.1.1  Peer: 10.1.1.2

Total entries: 2
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Administrators or local user group members with execution rights for this command.

show ip msdp summary

`show ip msdp summary [all-vrfs | vrf <VRF-NAME>]`

Description

Shows MSDP peer summary for a given VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows the MSDP peer summary for all VRFs. Optional.
`vrf <VRF-NAME>`	Shows the MSDP peer summary for a particular VRF. If the **<VRF-NAME>** is not specified, it shows information for the default VRF. Optional.

Examples

Showing the MSDP peer summary:

```
switch# show ip msdp summary

VRF: default

MSDP Peer Status Summary
Peer address    State    Uptime(Downtime)      Reset Count     SA Count

10.1.1.1        down     34m 34s               0               0
20.1.1.1        up       50m 24s               0               50
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300	Operator (>) or Manager	Administrators or local user group members with execution rights

Platforms	Command context	Authority
6400 8100 8320 8325 8360 8400 9300 10000	(#)	for this command.

Chapter 11
mDNS gateway

Multicast DNS (mDNS) gateway helps users to discover various servers such as printers and Apple TV, across VLANs. mDNS gateway uses the reflection mechanism to achieve service discovery across VLANS.

This feature is supported on the 6200, 6300, 6400, 8100, 8325, 8360, 9300 and 10000 Switch Series only.

mDNS gateway overview

Reflection mechanism

With the reflection mechanism, the mDNS packets received in one VLAN are reflected to all the other mDNS gateway-enabled VLANs based on filters. Only the packets containing the following records are supported for reflection:

- PTR record—Contains service-name to service-instance-name mapping.
- SRV record—Contains service-instance-name to UDP/TCP port number and hostname mapping.
- TXT record—Contains more information about the service-instance, such as, vendor information.
- A record—Contains hostname to host IP address mapping.

Filters

Filters are used to control the service discovery both within and across VLANs. You can configure filter rules in the service profiles based on service-name and service-instance-names. If a profile is configured for a VLAN, then the filter rules in the profile will be used to filter packets transmitted out of the VLAN interface.



Filtering is performed based on parameters extracted from the first record.

Example of mDNS service discovery

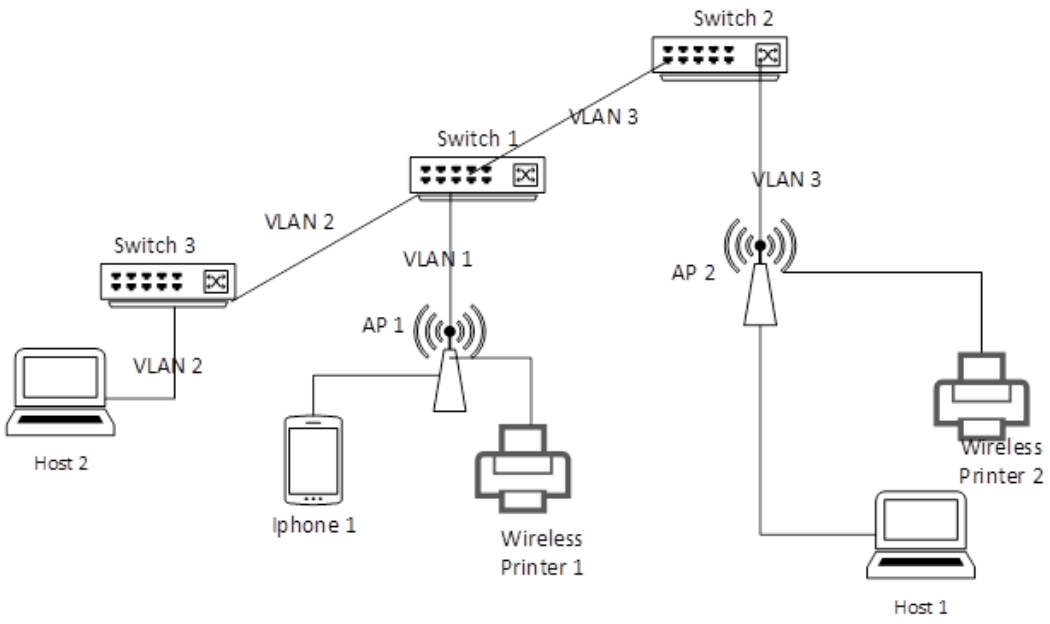
The following figure shows an example topology where mDNS gateway is useful. Consider the following:

- Enable mDNS only on Switch 1 in VLAN 1, 2, and 3.
- Create a configuration rule in Switch 1 for VLAN 3—No host in VLAN 3 must discover any external printers.

When Host 1 in VLAN 3 sends an mDNS query to Switch 1, the query is reflected in VLAN 1 and VLAN 2. The Wireless Printer 1 in VLAN 1 generates a response that the Switch 1 receives and reflects to VLAN 2 and not to VLAN 3, because a rule is configured for VLAN 3 to not allow any printer service.

However, Host 1 will still be able to access Wireless Printer 2, because it is present in the same VLAN 3.

Figure 1 *Example of mDNS service discovery*



Limitations

Following are a few limitations when configuring mDNS gateway:

- Filtering is performed only based on parameters extracted in the first mDNS record.
- Filtering is applied only on the egress mDNS packets.
- Only IPv4 mDNS packets are supported.
- mDNS gateway is recommended for deployments where mDNS is enabled on lesser VLANs. This is because the switch allows the mDNS packets to be reflected to a maximum of 256 VLANs for the 6300, 6400, 8325, 8100, 8360, 9300 and 10000 Switch Series, and 128 VLANs for the 6200 Switch Series, in incremental order of VLAN IDs, and in the VLAN from where the packet was initiated.
- mDNS packets are rate limited at 150 packets per second.
- When switches are connected directly with each other, you must enable mDNS only on one switch to prevent a reflection loop.
- You must enable debug logging only for troubleshooting an issue. Enabling debug logging on a high scale mDNS configuration might lead to high CPU utilization and the system may slow down.

Configuring mDNS gateway

Perform the following steps to configure mDNS gateway:

Procedure

1. Create a service for the mDNS gateway with the **mdns-sd service** command. You can group multiple service IDs into a single service. Add description to the service and create service IDs with the following commands:

a. Add a description to the service with the **description** command.
b. Create unique service IDs with the **id** command.

2. Create a profile to be applied on a VLAN with the **mdns-sd profile** command. Add rules to the profile with the **<sequence-number>** command.
3. Enable mDNS gateway on a VLAN with the **mdns-sd** command.
4. Apply a profile on the VLAN with the **mdns-sd apply-profile tx** command.
5. Enable mDNS gateway globally with the **mdns-sd enable** command.

mDNS gateway commands

debug mdns

```
debug mdns {all | config | init | packet | timer}
```

Description

Enables mDNS gateway debug logs for all or specific debug modules.

Parameter	Description
`all`	Enables debug logs for all mDNS gateway modules.
`config`	Enables debug logs to trace mDNS gateway configuration changes.
`init`	Enables debug logs to trace mDNS gateway initialization.
`packet`	Enables debug logs to trace mDNS gateway packet processing.
`timer`	Enables debug logs to trace mDNS gateway timer events.

Examples

Enabling debug logs for all modules:

```
switch# debug mdns all
```

Enabling debug logs for config module:

```
switch# debug mdns config
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	Manager (#)	Administrators or local user group members with execution rights for this command.

description

```
description <SERVICE-DESCRIPTION>
no description <SERVICE-DESCRIPTION>
```

Description

Adds description to a service.

The **no** form of this command deletes the description of a service.

Parameter	Description
<SERVICE-DESCRIPTION>	Specifies the service description. Maximum 128 characters.

Examples

Add a service description:

```
switch(config-mdns-sd-service)# description students-airplay-service
```

Remove the service description from a service:

```
switch(config-mdns-sd-service)# no description students-airplay-service
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	config-mdns-sd-service	Administrators or local user group members with execution rights for this command.

id

```
id <SERVICE-ID>
no id <SERVICE-ID>
```

Description

Adds a service identifier to a service. The service ID configured here must be same as the service ID that is present in the packet.

The **no** form of this command removes a service ID from the service.

Parameter	Description
<SERVICE-ID>	Specifies the service ID. Maximum 128 characters.

Examples

Add a service ID:

```
switch(config-mdns-sd-service)# id _appletv-v2._tcp
```

Remove a service ID from a service:

```
switch(config-mdns-sd-service)# no id _appletv-v2._tcp
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	config-mdns-sd-service	Administrators or local user group members with execution rights for this command.

mdns-sd

```
mdns-sd
no mdns-sd
```

Description

Enables mDNS gateway on a VLAN interface.

The **no** form of this command disables mDNS gateway on a VLAN interface.

This command is applicable only to VLAN interfaces.
The switch will not process mDNS packets until the mDNS gateway is enabled globally.

Examples

Enabling mDNS gateway on VLAN 10:

```
switch(config)# interface vlan 10
switch(config-if-vlan)# mdns-sd
```

Disabling mDNS gateway on VLAN 10:

```
switch(config)# interface vlan 10
switch(config-if-vlan)# no mdns-sd
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	config-if-vlan	Administrators or local user group members with execution rights for this command.

mdns-sd apply-profile tx

```
mdns-sd apply-profile <PROFILE-NAME> tx
no mdns-sd apply-profile <PROFILE-NAME> tx
```

Description

Configures mDNS gateway profile on the VLAN interface. When a profile is applied in the transmit direction, all the mDNS traffic transmitted on the VLAN interface will be filtered based on the rules specified in the transmit profile.

The **no** form of this command deletes the profile configuration from the VLAN interface in the transmit direction.

This command is applicable only to VLAN interfaces.
When no profile is configured on an interface then the default action is permit.

Parameter	Description
<PROFILE-NAME>	Specifies the profile name. Maximum 32 characters.

Examples

Configuring mDNS gateway profile on VLAN 10:

```
switch(config)# interface vlan 10
switch(config-if-vlan)# mdns-sd
switch(config-if-vlan)# mdns-sd apply-profile student tx
```

Deleting mDNS gateway profile on VLAN 10:

```
switch(config)# interface vlan 10
switch(config-if-vlan)# no mdns-sd apply-profile student tx
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	config-if-vlan	Administrators or local user group members with execution rights for this command.

mdns-sd enable

```
mdns-sd enable
no mdns-sd enable
```

Description

Enables mDNS gateway.

The **no** form of this command disables mDNS gateway. Once the **no** form of this command is executed, all the SVI VLANs, even though enabled with mDNS gateway, will stop reflecting mDNS packets to the enabled VLANs.

Examples

Enable mDNS gateway:

```
switch(config)# mdns-sd enable
```

Disable mDNS gateway:

```
switch(config)# no mdns-sd enable
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	config	Administrators or local user group members with execution rights for this command.

mdns-sd profile

`mdns-sd profile <PROFILE-NAME>`

Description

Creates a profile that can be applied on one or more L3 VLAN interfaces.

The profile contains a set of rules that define various match parameters such as service-name and service-instance-name.

Parameter	Description
<PROFILE-NAME>	Specifies the name of the profile. Maximum 32 characters.

Examples

Creating a profile:

```
switch(config)# mdns-sd profile student
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	`config`	Administrators or local user group members with execution rights for this command.

mdns-sd service

```
mdns-sd service <SERVICE-NAME>
no mdns-sd service
```

Description

Configures a service for mDNS gateway. You can group multiple service IDs into a single user-defined service name.

The **no** form of this command deletes a service.



A service cannot be deleted if it is being used as a match parameter in a filter rule in any profile.

Parameter	Description
<SERVICE-NAME>	Specifies the name of the service. Maximum 32 characters.

Examples

Configure a service for mDNS gateway:

```
switch(config)# mdns-sd service students
```

Delete a service:

```
switch(config)# no mdns-sd service students
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400	`config`	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
8325 8360 9300 10000		

clear mdns-sd statistics

```
clear mdns-sd statistics
```

Description

Clears all mDNS gateway statistics.

Examples

Clear mDNS gateway statistics:

```
switch(config)# clear mdns-sd statistics
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	config	Administrators or local user group members with execution rights for this command.

sequence-number

```
<SEQUENCE_NUMBER> {permit | deny}
 {service-name <SERVICE-NAME> | service-instance-name <SERVICE-INSTANCE-NAME>}
no <SEQUENCE-NUMBER> {permit | deny}
 {service-name <SERVICE-NAME> | service-instance-name <SERVICE-INSTANCE-NAME>}
```

Description

Adds a filter rule to the service profile. The sequence number configured determines the priority with which the rule is matched. Lower the sequence number, higher is the priority.

Following are the filter match parameters:

- **Service-name:** mDNS packets are matched against the service IDs configured under the service name.

- **Service-instance-name:** mDNS packets are matched against the service instance name present in the mDNS packets.

When no match criteria is specified in the rule, then the rule can be matched against any mDNS packet. Once the match is found then either the packet can be permitted or denied based on the action specified in the rule.

The **no** form of this command deletes the filter configured in the service profile.



When an mDNS packet does not match any of the filters configured in the profile, then the packet is denied.

Parameter	Description
<SERVICE-NAME>	Specifies the service name. Maximum 32 characters.
<SERVICE-INSTANCE-NAME>	Specifies the service instance name. Maximum 128 characters.

Examples

Adding filter rules to a service profile:

```
switch(config)# mdns-sd profile student
switch(config-mdns-sd-profile)# 10 permit service-name default-appletv
switch(config-mdns-sd-profile)# 20 deny service-name default-appletv service-
instance-name office._pdl-datastream._tcp.local
switch(config-mdns-sd-profile)# 30 permit service-instance-name library._pdl-
datastream._tcp.local
switch(config-mdns-sd-profile)# 40 deny
```

Deleting filter rules to a service profile:

```
switch(config)# mdns-sd profile student
switch(config-mdns-sd-profile)# 10 permit service-name default-appletv
switch(config-mdns-sd-profile)# 20 deny service-name default-appletv service-
instance-name office._pdl-datastream._tcp.local
switch(config-mdns-sd-profile)# 30 permit service-instance-name library._pdl-
datastream._tcp.local
switch(config-mdns-sd-profile)# no 30 permit service-instance-name library._pdl-
datastream._tcp.local
switch(config-mdns-sd-profile)# 40 deny
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300	`config-mdns-sd-profile`	Administrators or local user group members with execution rights for this command.

Platforms	Command context	Authority
6400 8325 8360 9300 10000		

show mdns-sd service-entries

```
show mdns-sd service-entries {service-id <SERVICE-ID> | record-type <RECORD-TYPE>}
```

Description

Shows all the services exchanged in the mDNS gateway enabled VLANs.

Parameter	Description
<SERVICE-ID>	Specifies the service ID. Maximum 128 characters
<RECORD-TYPE>	Specifies the type of record. Record can be one of the following values: PTR SRV TXT A

Examples

Displaying service entries learnt from mDNS gateway enabled VLANS:

```
switch# show mdns-sd service-entries
MAC-Address : 01:00:00:0e:21:23
VLAN Id     : 10
Record Name : _touch-able._tcp.local
Record Type : PTR
TTL         : 4500

MAC-Address : 01:00:00:0e:21:23
VLAN Id     : 10
Record Name : 523899E219D4C562._touch-able._tcp.local
Record Type : SRV
TTL         : 4500

MAC-Address : 01:00:00:0e:21:23
VLAN Id     : 10
Record Name : 523899E219D4C562._touch-able._tcp.local
Record Type : TXT
TTL         : 4500
```

Displaying service entries for a service and record type:

```
switch# show mdns-sd service-entries service-id _touch-able._tcp record-type ptr
MAC-Address : 01:00:00:0e:21:23
VLAN Id     : 10
Record Name : _touch-able._tcp.local
```

```
Record Type : PTR
TTL         : 4500
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show mdns-sd statistics

```
show mdns-sd statistics [vlan [<VLAN-ID>]]
```

Description

Shows the mDNS packets received and sent globally, and per VLAN.

Parameter	Description
<VLAN-ID>	Specifies the VLAN ID. Required. Range 1 to 4094.

Examples

Displays total packets:

```
switch# show mdns-sd statistics
Packets Recieved    : 100
Packets Sent        : 150
Packets Dropped     :  50
```

Displays total packets for all VLANs:

```
switch# show mdns-sd statistics vlan
VLAN 10
Packets Recieved    : 100
Packets Sent        : 100
Packets Dropped     :   0

VLAN 20
Packets Recieved    :   0
```

```
Packets Sent         :  50
Packets Dropped      :  50
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show mdns-sd statistics profile

`show mdns-sd statistics profile <PROFILE-NAME>`

Description

Displays the number of packets permitted or denied by various filter rules in a profile.

Parameter	Description
<PROFILE-NAME>	Specifies the profile name. Maximum 32 characters.

Examples

Displaying statistics for a profile:

```
switch# show mdns-sd statistics profile student
--------------------------
Sequence-Number Hit-Count
--------------------------
10              100
20               25
30              150

Total number of packets permitted by the profile : 250
Total number of packets denied by the profile    :  50
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show mdns-sd summary

```
show mdns-sd summary
```

Description

Shows whether mDNS gateway is enabled globally and at the VLAN interface level. It also shows the profile applied on various VLAN interfaces.

Examples

Displaying mDNS gateway summary:

```
switch# show mdns-sd summary
global mdns-sd status: enabled
------------------------------
VLAN-Id Status   Tx-Profile
------------------------------
1       enabled  student
2       enabled  employee
3       disabled teacher
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show running-config interface

```
show running-config interface <INTERFACE-NAME>
```

Description

Shows the configuration of profiles for an interface.

Parameter	Description
<INTERFACE-NAME>	Specifies the interface name.

Examples

Displaying configuration of profile at VLAN 10:

```
switch# show running-config interface vlan10
interface vlan10
    mdns-sd
    mdns-sd apply-profile teacher tx
    ip address 10.1.1.1/24
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show running-config mdns-sd profile

`show running-config mdns-sd profile <PROFILE-NAME>`

Description

Shows the configuration of all or a specific profile.

Parameter	Description
<PROFILE-NAME>	Specifies the profile name. Maximum 32 characters.

Examples

Displaying configuration of all profiles:

```
switch# show running-config mdns-sd profile
mdns-sd profile student
  10 deny service-type default-print service-instance-name office._pdl-
datastream._tcp.local
  50 permit service-type default-airplay
  51 permit service-type default-print

mdns-sd profile teacher
  10 deny service-type default-print service-instance-name office._pdl-
datastream._tcp.local
  50 permit service-type default-airplay
  51 permit service-type default-print
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show running-config mdns-sd service

`show running-config mdns-sd service <SERVICE-NAME>`

Description

Shows the running configuration of all or a specific mDNS service.

Parameter	Description
<SERVICE-NAME>	Specifies the service name. Maximum 32 characters.

Examples

Displaying running configuration of all mDNS services:

```
switch# show running-config mdns-sd service
mdns-sd service default-airplay
  id _airplay._tcp
  id _appletv-v2._tcp
  id _roap._tcp

mdns-sd service itunes
```

```
id _home-sharing._tcp
id _apple-mobdev._dev
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8325 8360 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

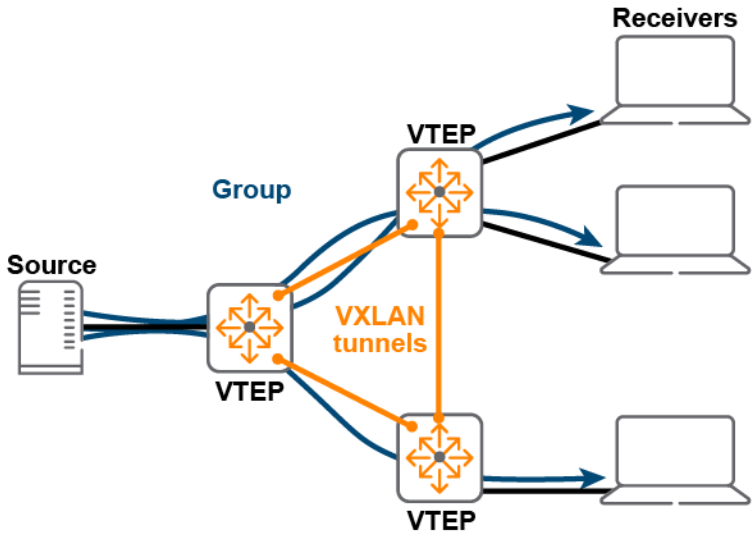
Chapter 12
Single fabric Multicast VXLAN (V4 and V6)

The Aruba 6200 and 8320 Switch Series do not support VXLAN.

IPv4 and IPv6 multicast forwarding for both L2 and L3 are supported with AOS-CX VXLAN/EVPN deployments. Refer to the *VXLAN Guide* for more info on VXLAN/EVPN and overlays/underlays.

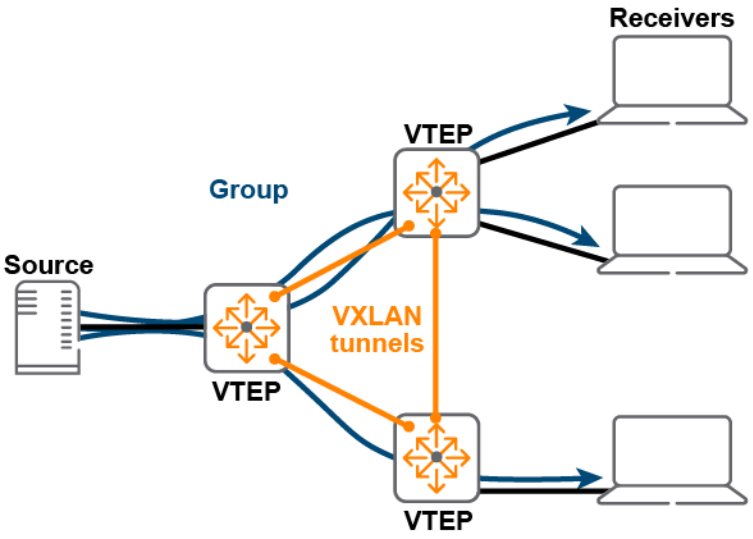
L2 multicast over VXLAN refers to deployments where the multicast sources/receivers are on the same L2 subnet/VLAN and bridging is required between switches that function as VXLAN Tunnel End Points (VTEPs), as seen in Figure 1, L2 multicast over VXLAN:

Figure 1 *L2 multicast over VXLAN*



L3 multicast over VXLAN refers to deployments where the multicast sources/receivers are on different subnets/VLANs and routing is required between VTEPs as seen in Figure 2, L3 multicast over VXLAN.

Figure 2 *L3 multicast over VXLAN*



Protocol and feature details

Broadcast, unknown unicast, multicast (BUM) traffic replication

The AOS-CX implementation uses head end replication where BUM packets are replicated from the source connected VTEP towards all destination VTEPs interested in the same VXLAN Network Identifier (VNI). The underlay network between VTEPs should only be configured for unicast routing, multicast PIM should not be configured in the underlay network.

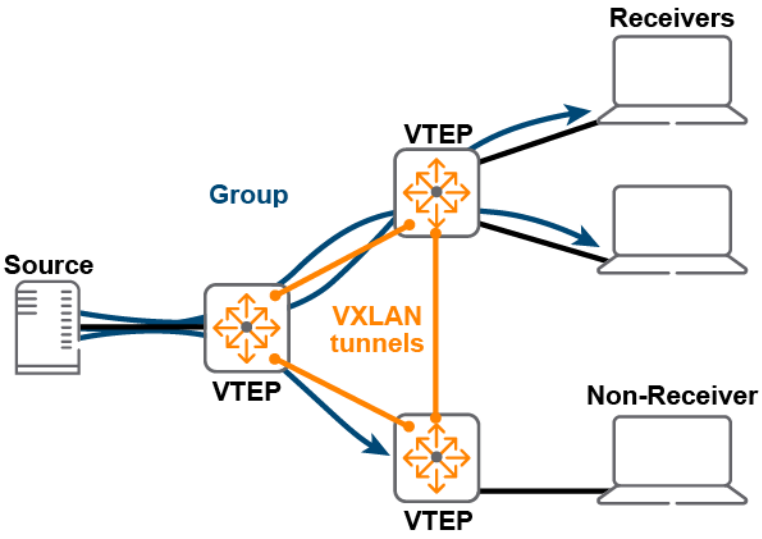
Overlay multicast support

The AOS-CX implementation runs native L2 and L3 multicast protocols over VXLAN tunnels, this is done to make the configuration and debugging of overlay and underlay multicast simpler. With this implementation, multicast traffic will not be part of regular BUM flows and will only be forwarded based on PIM and IGMP or MLD forwarding needs. IGMP or MLD and PIM-SM (v4) support are added to VXLAN to route and bridge traffic across the tunnels.

L2 multicast over VXLAN

By default, L2 multicast data streams are sent by the source connected VTEP to all other remote VTEPs interested in the same VNI, even if there are devices that are non-receivers (devices that are not interested in that multicast stream).

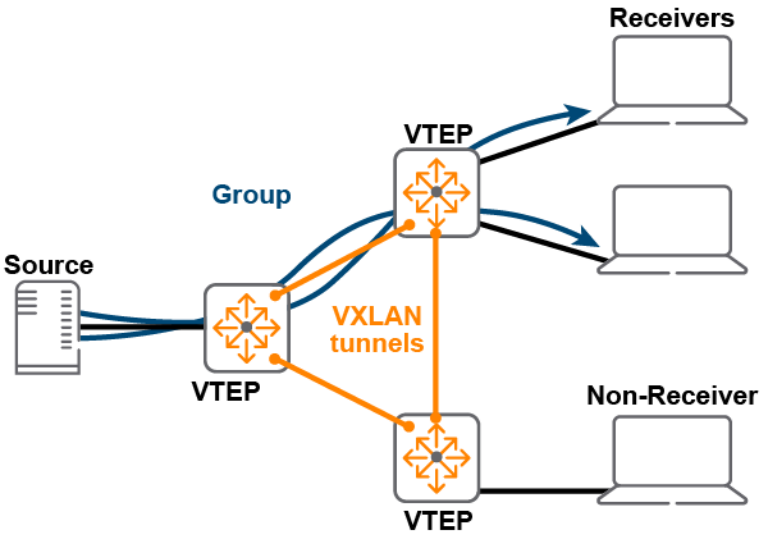
Figure 1 *L2 multicast over VXLAN with non-receiver*



L2 multicast over VXLAN enabled with IGMP or MLD snooping

IGMP or MLD snooping can be configured at the VLAN level with L2 multicast over VXLAN tunnels, this will prevent the source connected VTEP from sending the multicast stream to VTEPs without any interested receivers (non-receivers).

Figure 2 *L2 multicast over VXLAN enabled with IGMP snooping*



L2 multicast over VXLAN enabled with IGMP snooping has the following characteristics:

- IGMP or MLD snooping, once enabled prevents flooding over the L2 VNI; multicast data is only forwarded to ports where IGMP or MLD joins are received.
- VTEPs have full meshed VXLAN tunnels between them.
- IGMP or MLD snooping is enabled per VLAN; the VLAN is mapped with L2 VNIs.
- Joins and leaves are learned over VTEPs.
- Packets (data and control) are sent over VXLAN tunnels and regular physical ports.
- All versions of IGMP or MLD snooping (v1/v2/v3) are supported over VXLAN.

- The querier can be inside or outside the VXLAN network.
- VSX is supported and can be L2 extended.
- When IGMP or MLD snooping is enabled on a VLAN (L2 VNI), all the tunnels are added as forwarded ports (forwarded tunnels) for control packets; the control packets are flooded to all VTEPs.
- As the network is meshed, joins from a non-querier VTEP is sent to the source VTEP, even if is not the querier.
- Multicast data packets are sent from source VTEP to remote VTEPs.
- Split horizon is implemented at the L2 level such that packets that ingress a VXLAN tunnel will not get re-forwarded to other VTEPs.

Split horizon and L2 multicast

AOS-CX implements split horizon in VXLAN networks to prevent loops; ingressing traffic on a VXLAN tunnel is not sent to another VXLAN tunnel. This can cause traffic loss to both unknown multicast and L2 multicast as IGMP or MLD joins are sent to querier. The querier typically is the middle device that transmits packets from one port to another. In case of IGMP or MLD over an L2 VXLAN tunnel, this is blocked by split horizon. To prevent this, the receiver-connected VTEP forwards IGMP or MLD joins to all VTEPs irrespective of whether they are queriers or not. This prevents tunnel hop as every source VTEP is only a single tunnel hop away from every receiver and source data is sent to the receiver VTEP directly without the involvement of the IGMP or MLD querier.

VSX and L2 multicast

In the AOS-CX implementation, two switches/VTEPs configured with Virtual Switching Extension (VSX) are configured as a single logical VTEP. AOS-CX does not use EVPN route type 1 and 4 for load balancing and multihoming; regular VSX-based syncing is used for those purposes. The VSX switches can be access or distribution/core VTEPs in a campus network, and are typically VSX leaf switches in a data center.

There are two scenarios that need to be considered for an L2 VNI that is stretched across VTEPs where one (or more) of the VTEPs have a VSX Link Aggregation Group (LAG).

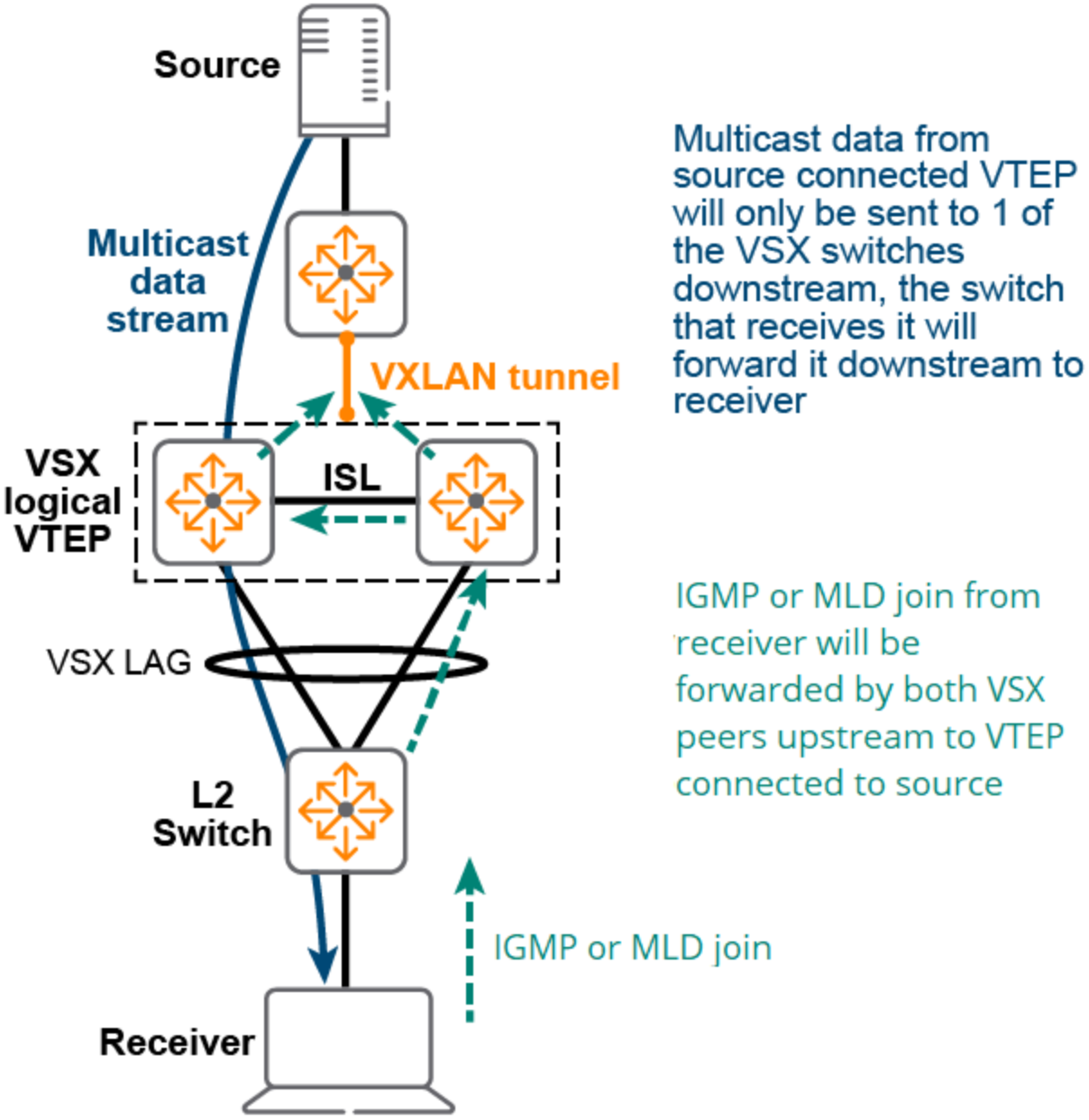
- Scenario 1: Receivers connected to VSX LAG and source on the VXLAN overlay network.
- Scenario 2: Source connected to VSX LAG and receivers on the VXLAN overlay network.

Scenario 1: Receivers connected to VSX LAG and source on the VXLAN overlay network

There are two cases to consider: dual homed VSX LAG and single homed VSX LAG.

Dual-homed VSX LAG with receivers

Figure 3 *Dual-homed VSX LAG with receivers*

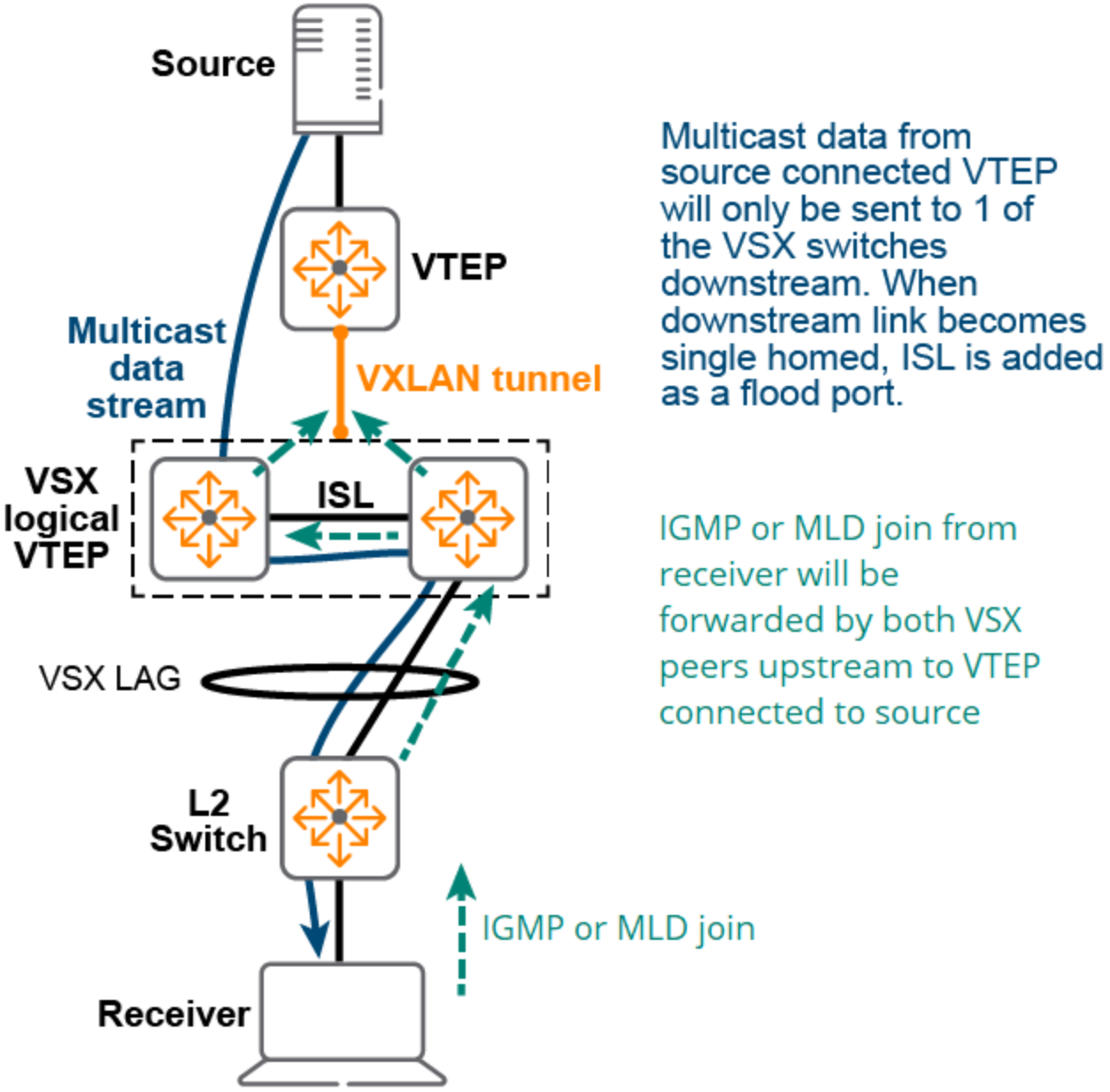


The following operation is done in no particular order:

- IGMP or MLD joins from receiver or an access switch are synced between the VSX switches over the ISL link, as a result both VSX switches will learn the join from the VSX LAG link.
- Data traffic from the multicast source through the VXLAN tunnel reaches one of the VSX switches.
- Whichever VSX VTEP receives the traffic forwards it downstream.
- When one of the VSX switches is the querier, the traffic is forwarded to the querier as well via Inter Switch Link (ISL); otherwise there is no traffic on the ISL link.
- Egress filtering rule prevents ingress data on an ISL port from going down the VSX LAG if it is multi-homed.

Single-homed VSX LAG with receivers

Figure 4 *Single-homed VSX LAG with receivers*



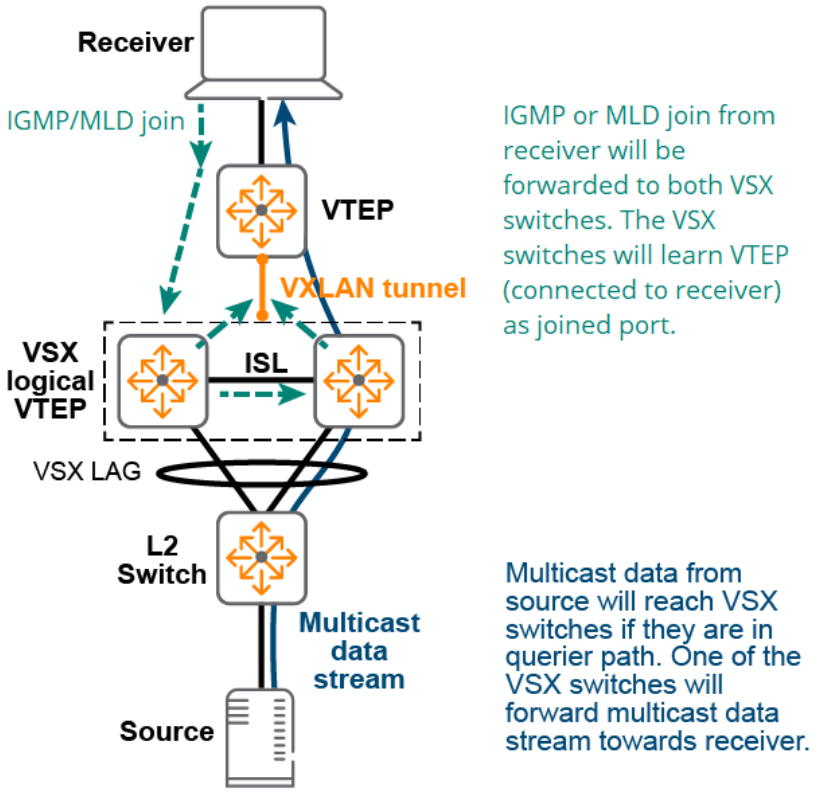
The following operation is done in no particular order:

- The IGMP or MLD joins from a receiver or an access switch are synced between the VSX switches over the ISL link, as a result both the VSX switches learn the join over the VSX LAG link.
- The moment the VSX LAG becomes single homed, the ISL port is added as a flood port. This ensures any data received by one of VSX VTEP is always forwarded to the peer
- Data traffic from the multicast source through the VXLAN tunnel reaches one of VSX switches and is forwarded via ISL to its peer.
- Whichever VSX VTEP has its link up forwards the data downstream, either received directly or via ISL.
- As the VSX LAG is single-homed, there is no egress filtering that prevents data going from ISL to VSX LAG.

Scenario 2: Source connected to VSX LAG and receivers on the VXLAN overlay network

As shown below, the source can be directly connected to the VSX VTEPs or it could be connected via an L2 switch. In both the cases, data reaches one of the VSX VTEPs because of VSX hash.

Figure 5 *Source connected to VSX LAG*



The following sequence can happen in no particular order:

- One of the switches in the L2 network is elected as querier and unknown multicast are always sent to the querier port. IGMP or MLD joins are always forwarded to VXLAN tunnels as well as to the querier port.
- Data traffic from the multicast source reaches the VSX switches either because they are in the querier path or because of the VSX LAG hash (in case directly connected),
- IGMP or MLD joins from receiver reaches one of the VSX switches. The joins are sent over ISL port to the peer switch. The peer VSX switch does a MAC lookup to figure out whether the join is to be learned on the ISL port or over the VXLAN tunnel.
- Once the join is learned on the VXLAN tunnel, multicast data is sent over the VXLAN tunnel when received from the VSX LAG. The path is the same for both a single-homed and a dual-homed VSX LAG.

Recommended configuration on the VSX VTEPs

As shown in Figure 5, Source connected to VSX LAG, the receiver-connected VTEP has a VXLAN tunnel to the VSX logical VTEP. The joins from receiver-connected VTEP are received by one of the VSX switches over the VXLAN tunnel and by the other switch via ISL. The VTEP that receives over ISL is a de-capsulated packet and does not have the VXLAN header. That switch needs to perform a MAC lookup and that MAC sometimes might not be available to the VSX VTEP.

To avoid this condition, the following two commands are recommended on L2 connected VSX VTEPs:

- `redistribute local-mac`

  This command is used to enable Type-2 route advertisement for local MAC address of all EVPN enabled VLANs.

- `redistribute local-svi`

  This command is used to enable Type-2 route advertisement for local IP address and MAC address of the SVI interfaces corresponding to the EVPN enabled VLANs (only required if SVI is configured).

IGMP or MLD querier positioning

An IGMP or MLD querier is one of the routers in the network whose responsibility is to send periodic IGMP or MLD queries. In regular IGMP or MLD operation, IGMP or MLD joins are forwarded to the IGMP or MLD querier. In addition, unknown multicast data is also sent to the querier. That is the way that the querier connects source and destination routers. Sending joins towards the querier is a must for the IGMP or MLD snooping operation; however in a VXLAN network, because of split-horizon rules, data packets are not sent across VTEPs. The querier does not need to be a centralized router in a VXLAN network as every IGMP or MLD join from the receiver connected VTEP is always forwarded to all remote VTEPs with the same VNI. In the AOS-CX implementation, there is no particular recommendation on where to place the querier in a VXLAN network.

L3 multicast over VXLAN

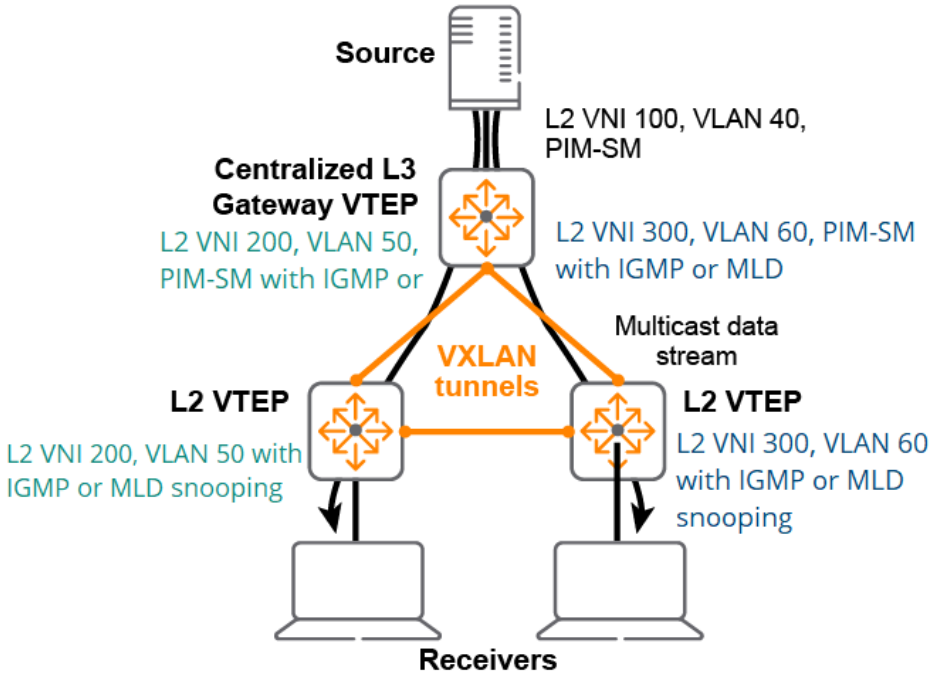
For L3 Multicast over VXLAN, both centralized L3 gateway and distributed L3 gateway use cases are supported.

Centralized L3 gateway

As shown in Figure 6, Centralized L3 gateway, PIM-SM is only enabled at the centralized L3 gateway VTEP which has VLAN mapped to VNIs. The remaining switches function as L2 VTEPs. The L2 VTEPs may or may not have IGMP or MLD snooping enabled.

- This use case is simple to implement as PIM-SM is enabled only at the centralized L3 gateway VTEP.
- Mroute entries are simple as routing is between Switch Virtual Interfaces (SVI)/Routed Only Ports (ROP) to L2 VNIs.
- The only difference is that the downstream VLANs are mapped to L2 VNIs; multicast data stream packets are tunneled via L2 VNI from the centralized L3 gateway VTEP towards the L2 VTEPs.

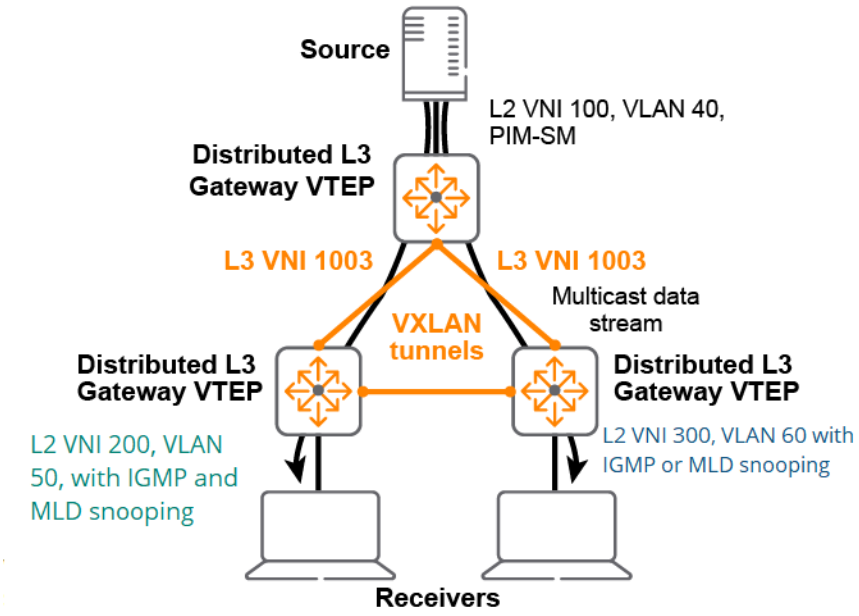
Figure 6 *Centralized L3 gateway*



Distributed L3 gateways

- For distributed L3 gateways (See Figure 7, Distributed L3 Gateways), AOS-CX only supports Symmetric IRB and multicast routing by extension of the PIM-SM protocol in the VXLAN tunnel. Only PIM-SM protocol is supported with L3 multicast over VXLAN tunnels.
- An L3 VNI is used to route traffic from one VLAN to another as the same VLAN/L2 VNI is not present across all VTEPs. PIM creates a logical interface on L3 VNI when `router pim` is enabled on the overlay VRF. This interface is created once the VXLAN EVPN tunnels are formed.
- All VTEPs create their per-tenant VRF L3 VNI interface and exchange PIM messages (e.g. hellos and joins) to other VTEPs through it. They form PIM neighbors via this interface; when the remote VTEP requests traffic via PIM joins on this interface on the source-connected VTEP, a multicast route entry is installed with the incoming interface as SVI interface (source-connected SVI) and Outgoing Interface List (OIL) with an L3 VNI<#> interface.
- On the receiver connected VTEP, a multicast route entry is created to route traffic coming from L3 VNI to the SVI where the receivers are present. Incoming interface is L3 VNI#, with OIL as the receiver SVI.

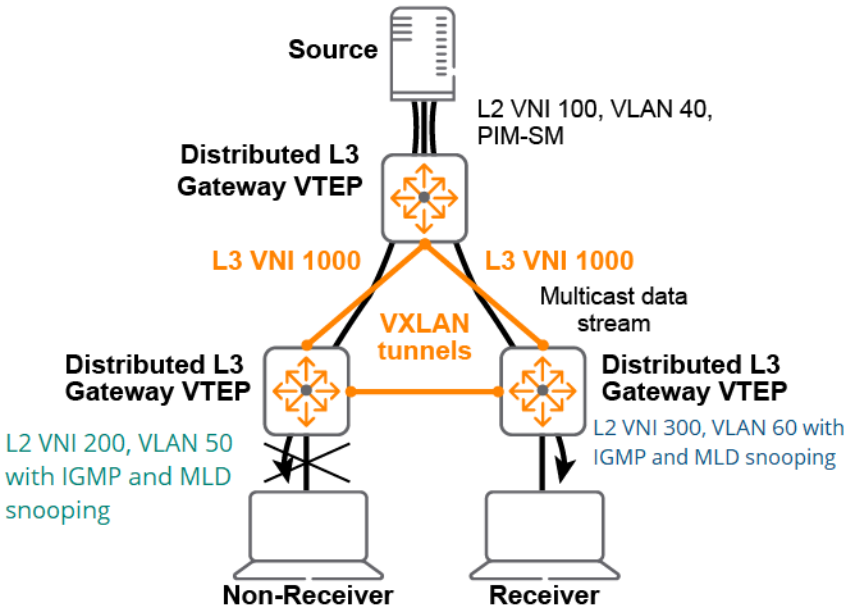
Figure 7 *Distributed L3 Gateways*



Additional details include the following:

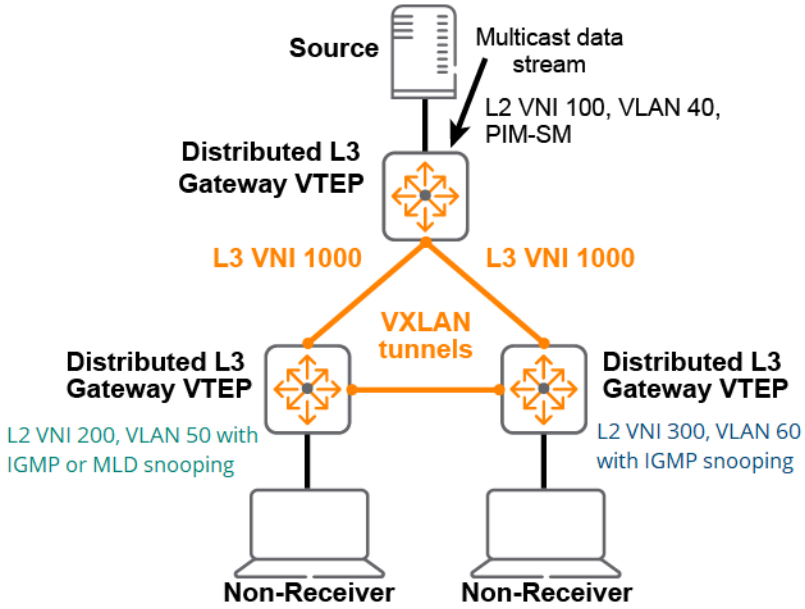
- Symmetric IRB with full meshed L3 VNIs.
- L2 VNIs can extended across switches.
- IGMP or MLD joins may be present in some/all the VTEPs for a particular flow.
- IGMP or MLD snooping will be enabled in VTEPs.
- PIM-SM is enabled on all the VRFs on the different VTEPs.
- PIM neighbors are formed across L3 VNIs.
- RPs can be present on any of the VTEPs.
- PIM control (join and prune) packets are sent on the other side of the L3 VNIs (where source is present) for every IGMP or MLD join.
- When the source connected VTEP sees a PIM join from an L3 VNI, it adds the L3 VNI as OIL.
- Data traffic from the multicast source is flooded across L3VNIs, split horizon rules will prevent data from flooding across VTEPs (see Figure 8, Distributed L3 Gateways with non-receiver, multicast data stream sent and pruned at remote VTEP).
- Non-interested VTEPs will drop/prune the multicast data (see Figure 8, Distributed L3 Gateways with non-receiver, multicast data stream sent and pruned at remote VTEP).
- In mixed mode there could be some L2VNIs that will be extended over VTEPS whereas L3 VNIs are enabled in all the VTEPs (per VRF).
- Mix of IGMP or MLD snooping and PIM-SM for intra VLAN and inter VLAN routing.

Figure 8 *Distributed L3 Gateways with non-receiver, multicast data stream sent and pruned at remote VTEP*



In case there are no interested receivers at remote VTEPs, L3 VNI are not added as an outgoing interface and data are pruned at the source-connected VTEP (See Figure 9, Distributed L3 Gateways with non-receivers, multicast data stream pruned at source VTEP).

Figure 9 *Distributed L3 Gateways with non-receivers, multicast data stream pruned at source VTEP*

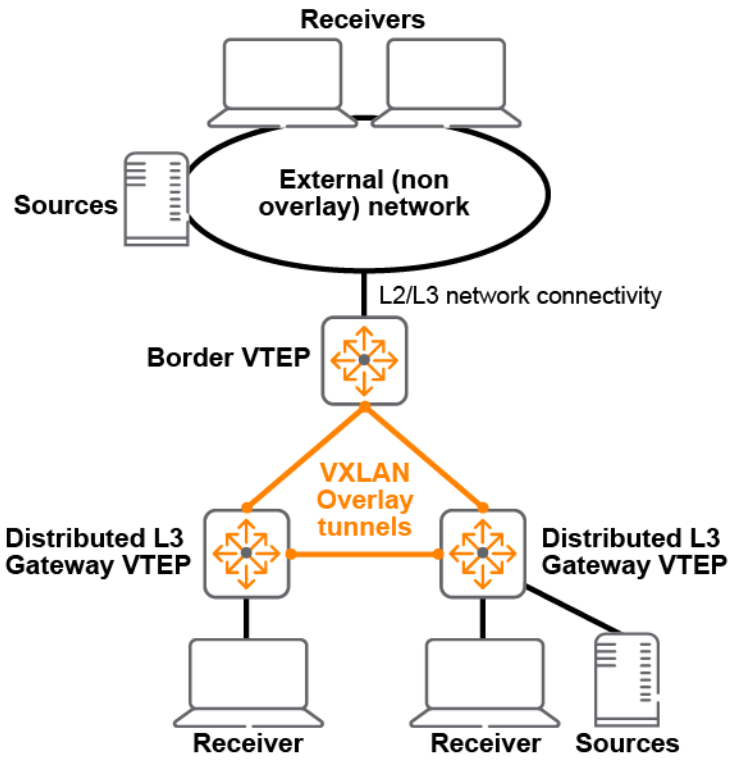


Border VTEP to external (non overlay) network

A border VTEP can be used to connect the VXLAN overlay network to external (non overlay) networks via either L2 or L3, sources and receivers in both networks are able to send and receive multicast streams.

L3 multicast routing using PIM-SM between the VXLAN and external (non overlay) network is recommended for most deployments as this provides clear demarcation between the two networks.

Figure 10 *Border VTEP to external (non overlay) network*



VSX and L3 Multicast

The following actions are done for all VSX VTEPs with PIM-SM and/or IGMP or MLD enabled:

- The control packets (PIM packets) are synced between the VSX switches
- Unknown multicast packets are also synced between the VSX switches
- One of the VSX switches forwards the packets to prevent duplicates

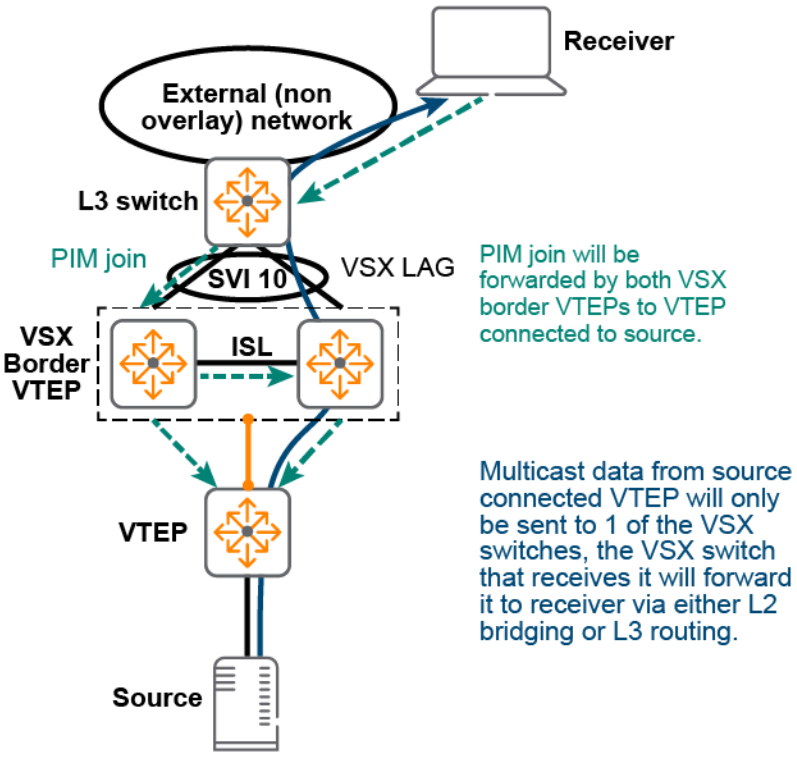
There are different combinations with VSX, with source inside the VXLAN overlay network and receivers on external (non overlay) network and vice versa. The different ways a receiver or a source is connected to a VSX border VTEP are:

- L2 VSX LAG
- L2 VSX LAG with SVIs
- ROP
- Point-to-Point (P2P) SVIs

VSX Border VTEP with L3 connectivity to external (non overlay) network

Figure 11, VSX Border VTEP with VSX LAG to receiver on external (non overlay) network shows a border VTEP with VSX LAG and SVI connected to an L3 switch with receivers on the external (non overlay) network.

Figure 11 *VSX Border VTEP with VSX LAG to receiver on external (non overlay) network*

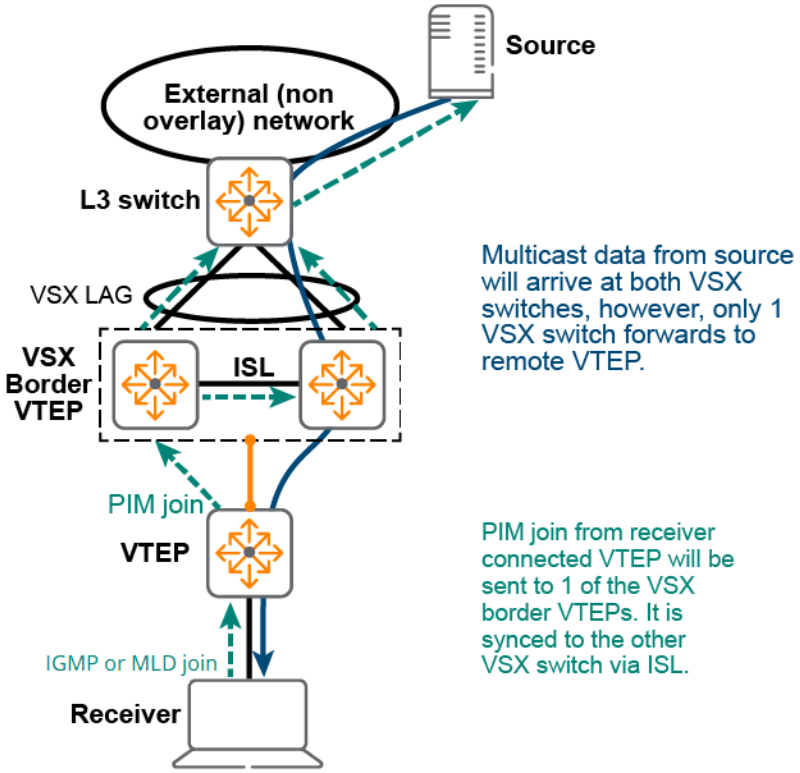


The following actions are taken:

1. PIM hello packets are synced between the VSX border VTEPs via L3 over ISL.
2. PIM joins are received by both VSX switches from the VSX LAG with SVI, both switches send PIM joins to the source-connected VTEP via L3 VNI.
3. The source-connected VTEP adds L3 VNI as the OIL even if it gets two PIM joins.
4. Data traffic from the multicast source is hashed from the source-connected VTEP to only one of the VSX switches as a unicast packet over the VXLAN tunnel.
5. The VSX switch that receives the multicast data stream forms the Mroute entry with the SVI connected to VSX LAG as egress.
6. The data stream packet goes to the other switch via ISL.
7. The egress filtering rule prevents duplicates as the second switch will have a bridge entry for the egress SVI.
8. The external L3 Switch routes to the receiver.
9. A similar action occurs for a single-homed border VTEP with VSX LAG.

VSX Border VTEP with VSX LAG to receiver on external (non overlay) network shows a border VTEP with VSX LAG and SVI connected to an L3 switch with source on the external (non overlay) network.

Figure 12 *VSX Border VTEP with VSX LAG to source on external (non overlay) network*

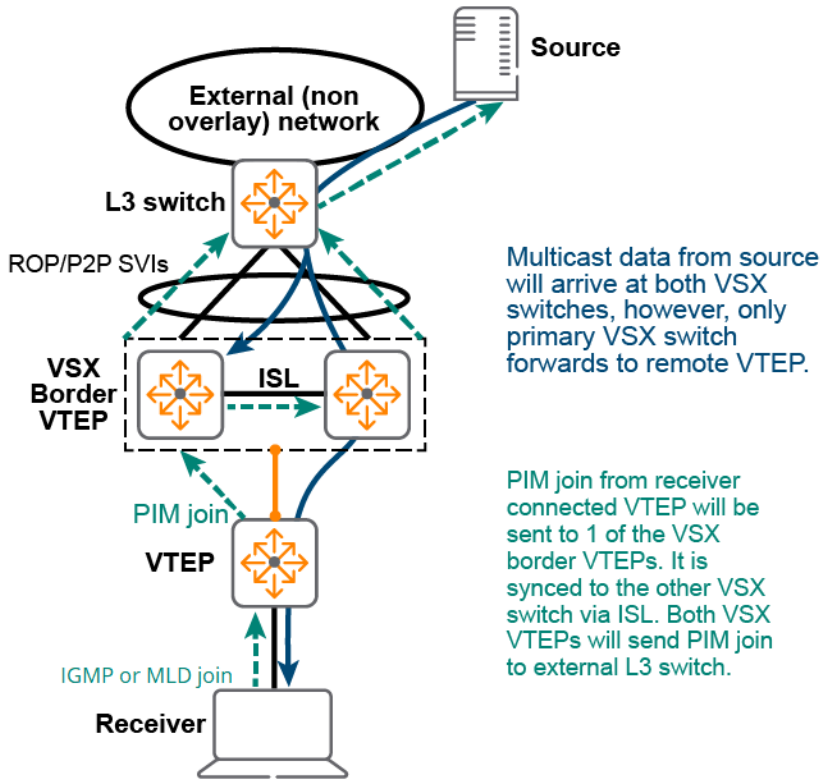


The following actions are taken:

1. PIM joins from the receiver-connected VTEP is only sent to one of the VSX border VTEP, this is synced to the other VSX peer.
2. PIM hello packets are synced between the VSX switches via L3 over ISL.
3. Both VSX border VTEPs that receive the PIM join adds L3 VNI as OIL.
4. Multicast data stream from the external network reaches both VSX border VTEPs via VSX LAG with SVI followed by ISL.
5. The primary VSX switch forwards the data to receiver-connected remote VTEP (applies to the Aruba 8325, 8400, 9300, and 10000 Switch Series).
6. When 1 of the VSX border VTEP gets data directly and not via ISL, it forwards to the receiver-connected remote VTEP (applies to the Aruba 6400, 8100, and 8360 Switch Series).

VSX Border VTEP with ROP/P2P SVIs to source on external (non overlay) network shows a border VTEP with ROP/P2P SVIs connected to an L3 switch with source on the external (non overlay) network.

Figure 13 *VSX Border VTEP with ROP/P2P SVIs to source on external (non overlay) network*



The following actions are taken:

1. PIM hello packets are synced between the VSX VTEPs via L3 over ISL.
2. Both VTEPs send PIM joins to the external L3 switch via ROPs; the assumption is that the source has Equal Cost Multi Pathing (ECMP) to both VTEPs.
3. The external L3 switch adds two ROPs/P2P SVIs as OIL in its Mroute entry.
4. Multicast data is sent to both border VTEPs.
5. 8325/8400—only VSX primary VTEP forwards.
6. 6400/8100/8360—only the VTEP that has pending joins forwards.
7. If the link from primary VTEP to the source goes down and primary becomes unreachable, then there can be traffic loss. In such a scenario, it is recommended to connect an additional L3 link per tenant VRF and enable PIM over them. This link is typically a P2P SVI between the VSX peers. Each tenant VRF requires its own P2P SVI. The **ip pim-sparse vsx virtual-neighbor** command should not be configured on this P2P SVI.

A. VSX Border VTEP with ROP/P2P SVIs to receivers on external (non-overlay) network and B. VSX Border VTEP with ROP/P2P SVIs to receivers on external (non-overlay) network show a border VTEP with ROP/P2P SVIs connected to an L3 switch with receivers on the external (non overlay) network. The example in Figure 16 shows multicast data and joins sent to different VSX switches, and the example in B. VSX Border VTEP with ROP/P2P SVIs to receivers on external (non-overlay) network shows multicast data and joins sent to the same VSX switch.

Figure 14 *A. VSX Border VTEP with ROP/P2P SVIs to receivers on external (non-overlay) network*

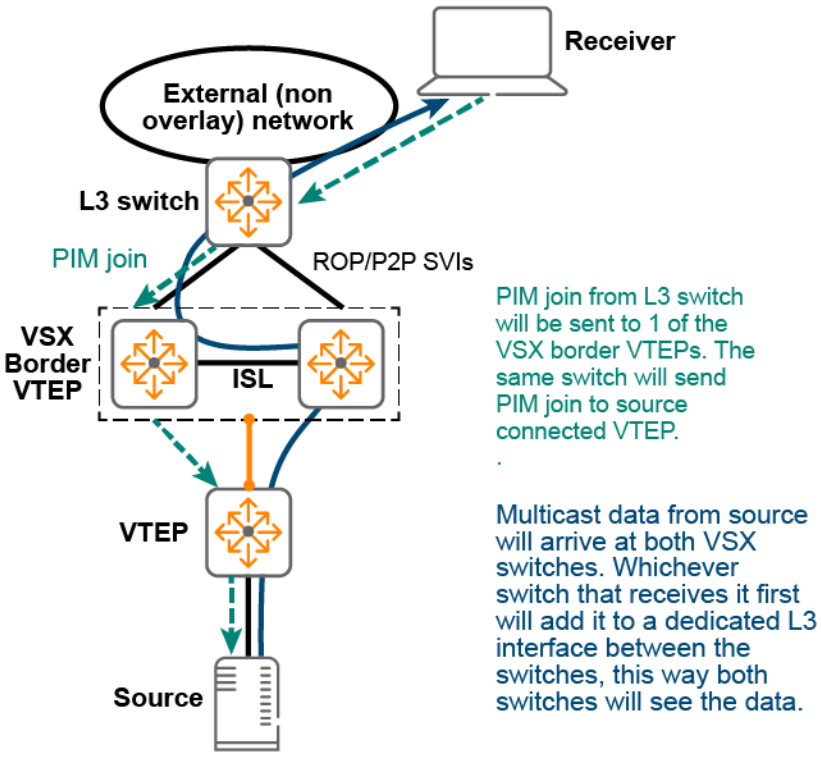
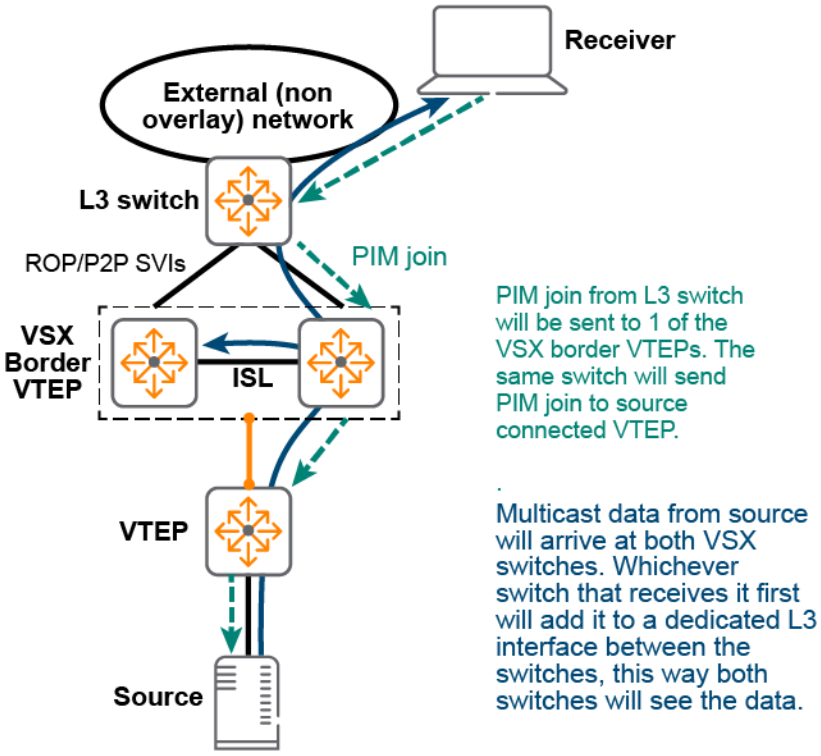


Figure 15 *B. VSX Border VTEP with ROP/P2P SVIs to receivers on external (non-overlay) network*



The following actions are taken:

1. PIM hello packets are synced between VSX switches via L3 over ISL.
2. PIM joins from ROP/P2P will reach one of the VSX switches.
3. Only one VSX switch sends the PIM join towards the source-connected VTEP.

4. The source-connected VTEP only adds the L3 VNI as an OIL and forward multicast data to the L3 VNI.
5. Any VSX switch that receives data from the L3 VNI adds the dedicated L3 Interface (as an OIL for all data coming from L3 VNI) and pending joined port as egress interface.
6. The other VSX switch receives data over the dedicated L3 Interface. That VSX switch adds any pending ROP/P2P joins as egress interface. No SVI is added as OIL as the VSX switch which received the data from the L3VNI would have already added the SVI to OIL.

Dedicated interface details for the default forwarder

- One interface is created per VRF, this functions as a default interface for forwarding packets if the incoming interface is L3 VNI.
- Note that packets are forwarded to this interface irrespective whether the OIL is ROP/P2P SVI or not.
- The receiver side VSX device also adds the OIL on every interface that has pending joins.
- Note that when the source is extended via ROP/P2P SVI, it is recommended to create an alternate L3 P2P interface between the VSX peers. This solution uses those interfaces only.

RP placement and election

Rendezvous Point (RP) placement is very important in a multicast network. The RP should to be located close to the multicast source.

The recommendations for RP are:

- If there is an existing multicast network with sources and receivers, the new VXLAN network VTEPs should learn about the existing RPs (on non VXLAN network) via bootstrap router (BSR) or point to the existing RPs statically.
- If the new VXLAN network does not require multicast connectivity with the external network, redundant VTEPs as new BSR/RPs should be deployed (this could be 2 x standalone VTEPs or 1 x VSX logical VTEP that utilizes unique loopback IPs as BSR/RP with the primary VSX switch typically set to preferred. If the primary VSX switch fails, all VTEPs utilize the secondary VSX switch unique loopback IP as the remaining BSR/RP (refer to Use case 1: Campus network with centralized L3 gateway sample configurations for a better understanding).
- Anycast RP is supported in single-fabric, multi-fabric, and shared border setups.

Anycast RP support for VXLANs

Anycast RP functionality is supported in the overlay and can be achieved with the help of MSDP. Anycast RP allows receivers and sources to connect with the closest RP, improving RP convergence. This benefits the overlay fabric by reducing the PIM control plane traffic in the tunnel, as the PIM registrations or joins do not need to traverse the tunnel if the anycast RP is configured in the local leaf. For an active source, the PIM registration occurs on the first hop leaf without entering the tunnel. Receivers requesting a join are served by the first hop RP and can switch directly to SPT, reducing the number of joins sent over the tunnel.

Another advantage is in the event of an RP failure, the next nearest RP is selected due to the anycast nature, avoiding single point of failures. This is particularly useful in the case of multi-fabric sites. Similar to traditional network, MSDP peering must be configured between all anycast RP routers in the overlay. It is important to note that MSDP rules in traditional networks apply to the overlay as well. For example, MSDP peering must be done across all anycast peers in a full mesh peering, and a unique MSDP mesh group name must be configured between them. The connect-source loopback used for peering must be configured with unicast ip address.

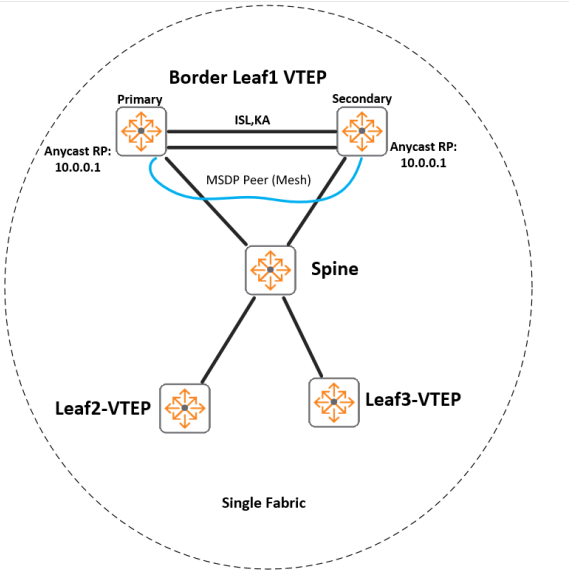
Refer to Anycast RP support sample configurations for a better understanding.

The PIM boundary feature is not supported in the overlay.

Example Topology

In the following example, the primary and secondary border routers are configured with anycast RP, and MSDP peering is enabled between them. The anycast IP **10.0.0.1** is configured on both the primary and secondary routers. A unique MSDP mesh-group name *AnyRpMesh* is configured between them.

Figure 16 *Example of Anycast RP*



MSDP configuration on Leaf1 VSX primary

```
!RP Interface Anycast IP
interface loopback 0
    vrf attach green
    ip address 10.0.0.1/24
    ip pim-sparse enable
!Connect source Interface Unicast IP
interface loopback 1
    vrf attach green
    ip address 10.1.1.1/24
    ip pim-sparse enable
!Enable PIM in overlay VRF
router pim vrf green
    enable
    rp-candidate source-ip-interface loopback0
    bsr-candidate source-ip-interface loopback1
router msdp vrf green
   enable
   ip msdp peer 10.1.1.2
      connect-source loopback1
      mesh-group AnyRpMesh
      enable
```

MSDP configuration on Leaf1 VSX secondary

```
!RP Interface Anycast IP
interface loopback 0
    vrf attach green
    ip address 10.0.0.1/24
    ip pim-sparse enable
!Connect source Interface Unicast IP
interface loopback 1
    vrf attach green
    ip address 10.1.1.2/24
    ip pim-sparse enable
!Enable PIM in overlay VRF
router pim vrf green
    enable
    rp-candidate source-ip-interface loopback0
    bsr-candidate source-ip-interface loopback1

router msdp vrf green
   enable
   ip msdp peer 10.1.1.1
      connect-source loopback1
      mesh-group AnyRpMesh
      enable
```

Refer to Use case 1: Campus network with centralized L3 gateway for a better understanding of anycast RP.

Important points to note

- There must be a peering session (full mesh peering) between all anycast RP routers in the network.
- For small fabrics (less VTEP scale), it is possible to configure all leafs as anycast RP and configure mesh group between all of them. However, note that with each peering session more router CPU resource will be utilized.
- It is possible to have anycast RP peering from an RP with in the fabric to an RP outside the fabric.
- For multi-fabric setups, it is recommended to configure the border router as the RP and enable mesh group between various border routers from different fabric. Peering between regular leaf across the sites/fabrics are not recommended.
- BSR can be used to advertise the RP to group mapping in the fabric, and the Candidate BSR must be configured with unicast IP.
- MSDP SA-Filter and MSDP SA-Limit features are supported in the overlay to filter SA messages.

EVPN VXLAN distributed anycast gateway

The distributed anycast gateway feature for EVPN VXLAN is a default gateway-addressing mechanism that enables the use of the same gateway IP addresses across all the VTEP switches that are part of a VXLAN network.

For PIMv6, both the IPv6 link-local and the active-gateway address of the anycast VLAN interface are configured with the anycast link-local address.

In the anycast scenario, all three address (primary, secondary, and active gateway) are the same.

Example of a VSX Primary Configuration for IPv4

```
interface vlan 10
description multicast_source_connected_anycast_vlan
vrf attach red
ip address 100.100.1.2/24
active-gateway ip mac 00:00:00:00:00:aa
active-gateway ip 100.100.1.2
ip pim-sparse enable
```

Example of a VSX Primary Configuration for IPv6

```
interface vlan 10
description multicast_source_connected_anycast_vlan
vrf attach red
ipv6 address link-local fe80::2/64
ipv6 address 100:100::2/64
active-gateway ipv6 mac 00:00:00:00:00:aa
active-gateway ipv6 fe80::2
active-gateway ipv6 100:100::2/64
ipv6 pim6-sparse enable
```

Example of a VSX Secondary Configuration for IPv4

```
interface vlan 10
description multicast_source_connected_anycast_vlan
vrf attach red
ip address 100.100.1.2/24
active-gateway ip mac 00:00:00:00:00:aa
active-gateway ip 100.100.1.2
ip pim-sparse enable
```

Example of a VSX Secondary Configuration for IPv6

```
interface vlan 10
description multicast_source_connected_anycast_vlan
vrf attach red
ipv6 address link-local fe80::2/64
ipv6 address 100:100::2/64
active-gateway ipv6 mac 00:00:00:00:00:aa
active-gateway ipv6 fe80::2
active-gateway ipv6 100:100::2/64
ipv6 pim6-sparse enable
```

Designated router priorities

In this anycast gateway solution, the VXLAN source IP address is used as the designated router (DR) priority and it overrides the default DR priority.

The `show ip pim interface <vlan-id>` command shows the operational DR priority and also the DR priority of the elected DR. When distributed anycast gateway is configured, all the PIM neighbors share the same anycast IP. The DR election is possible here by internally assigning a unique DR priority on the anycast interfaces and is managed by PIM. All neighbors in the anycast segment get a unique DR priority that can be viewed in the Operational DR Priority field. The Elected DR in the segment can be identified by the Elected DR Priority field.

The **show ip pim neighbor all-vrfs** command also displays whether an anycast neighbor is present.

Recommendations

- For seamless operation, it is recommended not to manually configure DR priorities when anycast gateway is configured.
- If the DR priorities are configured, they should be unique in each of the leaf nodes and need to have the same value on the VSX peers.

Limitation

Anycast VLANs cannot be configured as a candidate-RP or candidate-BSR. But they can learn the elected RP set through BSR.

Supported platforms and standards

IPv4 and IPv6 multicast VXLAN is supported by the Aruba 6300, 6400, 8100, 8325, 8360, 8400, and 9300, and 10000 Switch Series.

Scale

Table 1: *Scale for IPv4*

	6300	6400	8325	8360	8400	9300
VLANs/L2 VNIs (Multicast support)	128	128	128	128	128	128
L3 VNI/VRF (Each VRF requires 1 x L3 VNI)	16	16	32	32	32	32
PIM interfaces (SVIs)	64	64	64	64	64	64
IGMP groups	2000	2000	2000	2000	8000	2000
Mroutes	2000	2000	3500	3500	8000	3500
VTEPs	32	32	32	32	32	32

Supported RFCs and standards

The AOS-CX IPv4 multicast VXLAN implementation is currently proprietary and is not able to inter-operate with other vendors. However, the border VTEP that connects to the external non-VXLAN network uses standards-based protocols such as PIM-SM (RFC 4601) + IGMP (RFC 3376 and RFC 2236).

Configuration task list

Multicast VXLAN and EVPN

Table 1: *Configuration task list for Multicast VXLAN and EVPN*

Step	Command	Comments
1. Enter evpn	`evpn`	--
2. Enable redistribute local-mac and local-svi	`redistribute local-mac` `redistribute local-svi`	This should be enabled on all VTEPs at the evpn level

VSX VTEP

Table 2: *Configuration task list for IPv4 VSX VTEPs*

Step	Command	Comments
1. Enter desired SVI	`int vlan number`	
2. Enable PIM VSX virtual neighbor	`ip pim-sparse vsx-virtual-neighbor`	Only required on VSX VTEPs to allow the interface to be in the same multicast data path state on both VSX VTEPs. This allows a VTEP to process IGMP and PIM joins received on this interface regardless of its DR or prime neighbor role.

Table 3: *Configuration task list for IPv6 VSX VTEPs*

Step	Command	Comments
1. Enter desired SVI	`int vlan number`	
2. Enable PIM VSX virtual neighbor	`ipv6 pim6-sparse vsx-virtual-neighbor`	Only required on VSX VTEPs to allow the interface to be in the same multicast data path state on both VSX VTEPs. This allows a VTEP to process MLD and PIM joins received on this interface regardless of its DR or prime neighbor role.

IGMP/MLD snooping

Table 4: *Configuration task list for IPv4 IGMP snooping*

Step	Command	Comments
1. Enter desired VLAN	`vlan number`	--
2. Enable IGMP snooping	`ip igmp snooping enable`	This should be enabled on all VTEPs at the VLAN level

Table 5: *Configuration task list for IPv6 MLD snooping*

Step	Command	Comments
1. Enter desired VLAN	`vlan number`	--
2. Enable IGMP snooping	`ipv6 mld snooping enable`	This should be enabled on all VTEPs at the VLAN level

PIM/PIM6 and IGMP/MLD on SVI with source and receivers

Table 6: *Configuration task list for IPv4 PIM and IGMP to be enabled on an SVI with source and receivers attached to the VXLAN overlay network.*

Step	Command	Comments
1. Enter desired SVI	`int vlan number`	This should be enabled on all VTEPs at the SVI level
2. Attach VRF to loopback	`vrf attach name`	Loopback should be part of overlay VRF
3. Enable PIM on SVI	`ip pim-sparse enable`	Required if source or receivers are expected
4. Enable PIM VSX virtual neighbor	`ip pim-sparse vsx-virtual-neighbor`	Only required on VSX VTEPs
5. Enable IGMP on SVI	`ip igmp enable`	Only required if receivers are expected

6. Add desired IPs and Active Gateway info to SVIs	`ip address IP-address`
	`active-gateway ip mac MAC-address`
	`active-gateway ip IP-address`
		The SVI and Active Gateway IPs need to be different

Table 7: *Configuration task list for IPv6 PIM6 and MLD to be enabled on an SVI with source and receivers attached to the VXLAN overlay network.*

Step	Command	Comments
1. Enter desired SVI	`int vlan number`	This should be enabled on all VTEPs at the SVI level
2. Attach VRF to loopback	`vrf attach name`	Loopback should be part of overlay VRF
3. Enable PIM on SVI	`ipv6 pim6-sparse enable`	Required if source or receivers are expected
4. Enable PIM VSX virtual neighbor	`ipv6 pim6-sparse vsx-virtual-neighbor`	Only required on VSX VTEPs
5. Enable MLD on SVI	`ipv6 mld enable`	Only required if receivers are expected

6. Add desired IPs and Active Gateway info to SVIs	`ipv6 address IP-address`
	`active-gateway ipv6 mac MAC-address`
	`active-gateway ipv6 IP-address`
		The SVI and Active Gateway IPs need to be different

Static RP on VTEP

Table 8: *Configuration task list for PIM VTEPs that utilize remote static RPs*

Step	Command	Comments
1. Enter desired PIM VRF	`router pim vrf name`	--

Step	Command	Comments
2. Enable PIM at the VRF level	`enable`	This should be enabled on all VTEPs at the PIM VRF level
3. Point to remote static RP	`rp-address IP-address`	RPs could be in the VXLAN overlay or on the external non-VXLAN network

Table 9: *Configuration task list for PIM6 VTEPs that utilize remote static RPs*

Step	Command	Comments
1. Enter desired PIM6 VRF	`router pim6 vrf name`	--
2. Enable PIM6 at the VRF level	`enable`	This should be enabled on all VTEPs at the PIM6 VRF level
3. Point to remote static RP	`rp-address IPv6-address`	RPs could be in the VXLAN overlay or on the external non-VXLAN network

Overlay BSR/RP on VTEP

Table 10: *Configuration task list to enable redundant BSRs/RPs in the IPv4 VXLAN overlay (if static RPs are not used and BSR/RP is preferred)*

Step	Command	Comments
1. Enter desired SVI	`int lo number`	This should only be enabled on the 2 VTEPs identified as BSR/RP
2. Attach VRF to loopback	`vrf attach name`	Loopback should be part of overlay VRF
3. Enable PIM on Loopback	`ip pim-sparse enable`	--
4. Add desired IPs	`ip address IP-address`	The redundant BSRs/RPs should have different /32 IPs
5. Enter desired PIM VRF	`router pim vrf name`	This should only be enabled on the 2 VTEPs identified as BSR/RP
6. Enable RP functionality	`rp-candidate source-ip-interface loopback-number` `rp-candidate group-prefix 224.0.0.0/4`	Specify previously identified loopback as RP Specify prefix for RP
7. Enable BSR functionality	`bsr-candidate source-ip-interface loopback-number`	Specify previously identified loopback as BSR

Table 11: *Configuration task list to enable redundant BSRs/RPs in the IPv6 VXLAN overlay (if static RPs are not used and BSR/RP is preferred)*

Step	Command	Comments
1. Enter desired SVI	`int lo number`	This should only be enabled on the 2 VTEPs identified as BSR/RP
2. Attach VRF to loopback	`vrf attach name`	Loopback should be part of overlay VRF
3. Enable PIM on Loopback	`ipv6 pim6-sparse enable`	--
4. Add desired IPs	`ipv6 address IP-address`	The redundant BSRs/RPs should have different /128 IPs
5. Enter desired PIM VRF	`router pim6 vrf name`	This should only be enabled on the 2 VTEPs identified as BSR/RP
6. Enable RP functionality	`rp-candidate source-ip-interface loopback-number` `rp-candidate group-prefix ff00::/8`	Specify previously identified loopback as RP Specify prefix for RP
7. Enable BSR functionality	`bsr-candidate source-ip-interface loopback-number`	Specify previously identified loopback as BSR

EVPN VXLAN distributed anycast gateway configuration

Table 12: *Configuring the source interface to be used for IPv4 PIM registration in VXLAN anycast interfaces*

Step	Command	Comments

1. Specify the source interface and configure VRF, IP Address, and PIM	`interface <INTERFACE-NAME>`	Example:
		`interface loopback 101`
		`vrf attach vrf1`
		`ip address 140.100.100.100/32`
		`ip pim-sparse enable`
		
		NOTE: The IP address must be a non-anycast IP.

2. Configure `register-source`	`register-source <INTERFACE-NAME>`	Link to the previously created loopback in Step 1.
		
		Example:
		`router pim vrf vrf1`
		`register-source loopback101`

3. Verify that `register-source` is configured on the anycast device	`show running-config pim`	--
4. Verify the presence of anycast PIM neighbors in the fabric	`show ip pim interface <INTERFACE-NAME>`	Check for the following in the output: `Anycast Neighbors Present : True`

Step	Command	Comments

	`show ip pim neighbor <IP-ADDRESS>`	Examples:
		`show ip pim interface vlan101`
		`show ip pim neighbor <IP-ADDRESS>`

Table 13: *Configuring the source interface to be used for IPv6 PIM6 registration in VXLAN anycast interfaces*

Step	Command	Comments

1. Specify the source interface and configure VRF, IP Address, and PIM	`interface <INTERFACE-NAME>`	Example:
		`interface loopback 101`
		`vrf attach vrf1`
		`ipv6 address 140.100.100.100/128`
		`ip6 pim6-sparse enable`
		
		NOTE: The IP address must be a non-anycast IP.

2. Configure `register-source`	`register-source <INTERFACE-NAME>`	Link to the previously created loopback in Step 1.
		
		Example:
		`router pim vrf vrf1`
		`register-source loopback101`

3. Verify that `register-source` is configured on the anycast device	`show running-config pim6`	--

4. Verify the presence of anycast PIM neighbors in the fabric	`show ipv6 pim6 interface <INTERFACE-NAME>`
	
	`show ipv6 pim6 neighbor <IP-ADDRESS>`
		Check for the following in the output:
		`Anycast Neighbors Present : True`
		Examples:
		`show ipv6 pim6 interface vlan101`
		`show ipv6 pim6 neighbor <IP-ADDRESS>`

Considerations and best practices

The following considerations and best practices are recommended for Multicast VXLAN:

- IGMP or MLD snooping should be enabled on all VTEPs; multicast traffic flooding will happen without IGMP or MLD snooping.
- **redistribute local-svi** or **redistribute local-mac** are required on all VTEPs for proper querier information propagation.
- In a VSX VxLAN deployment, `ip pim-sparse vsx-virtual-neighbor` needs to be enabled on all PIM enabled SVI interfaces with VSX-LAGs and L2 VNI mapped SVI interfaces. This is needed for both L2 and L3 extensions.

- A unique virtual-mac should be configured on all VTEPs for a distributed L3 gateway use case; a VSX VTEP pair should be configured with the same virtual-mac.
- RP can be placed in the overlay network or in the external non-overlay network. Any existing RP in the external non-overlay network can also be used. It is recommended for RPs to be placed near multicast sources.
- Underlay links, which is used to establish overlay connectivity, should not be enabled with multicast (PIM/IGMP/MLD) configuration.
- Overlay RPs or BSRs on VSX VTEPs are only supported on the Aruba 6400, 8100, 8325, 8360, 9300 and 8400 Switch Series.
- It is not recommended to enable **ip pim-sparse vsx-virtual-neighbor** on P2P SVI or ROP extensions. Enabling the command can lead to traffic loss.
- Customers who need to route Multicast Traffic across VRF's, need to configure the VRF merging router as the RP/BSR in the overlay networks.

These are the supported VSX VTEP use cases:

- VSX switches (logical VTEPs) for IGMP or MLD snooping and PIM-SM
- VSX border VTEP with VSX LAG, L2 extension to sources/receivers in external/non overlay network
- VSX border VTEP with VSX LAG, SVI + PIM-SM L3 extension to sources/receivers in external/non overlay network
- VSX border VTEP with ROP/P2P SVIs + PIM-SM L3 extension to sources and receivers in external/non overlay network

Consider the following when deploying ROP and P2P SVI as uplinks on VSX border VTEPs to non-VXLAN networks:

- An additional L3 peering per tenant VRF between VSX primary and secondary on overlay is required to handle failover scenarios, this link will normally be P2P SVIs over ISL.
  - `ip pim-sparse datapath-auto-include` command is required to be configured on the L3 peering, when receivers are connected behind ROP or P2P SVI uplinks.



For example:

```
hostname BorderVTEP1A
interface vlan 1500
    description transit VLAN
    vrf attach VRF1
! IPv4
    ip address 1.1.2.1/30
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
    ip pim-sparse datapath-auto-include
```

- When using a P2P SVI L3 extension, do not allow upstream VLANs in ISL; it will make the link non P2P.
- `ip pim-sparse vsx-virtual-neighbor` command is not recommended to be enabled on the additional L3 peering or P2P SVI link per tenant VRF between VSX peers.

The following restrictions are applicable for IPv4 Multicast VXLAN:

- MSDP, mDNS, mtrace, Inter VRF Route Leaking (IVRL), and PIM-DM over VXLAN are not supported.
- GShut is not supported on VXLAN based overlay networks.

Use cases

The use cases provide examples of networks using multicast VXLAN configuration.

IPv6 is supported. The use case examples in this section show IPv4 configurations.

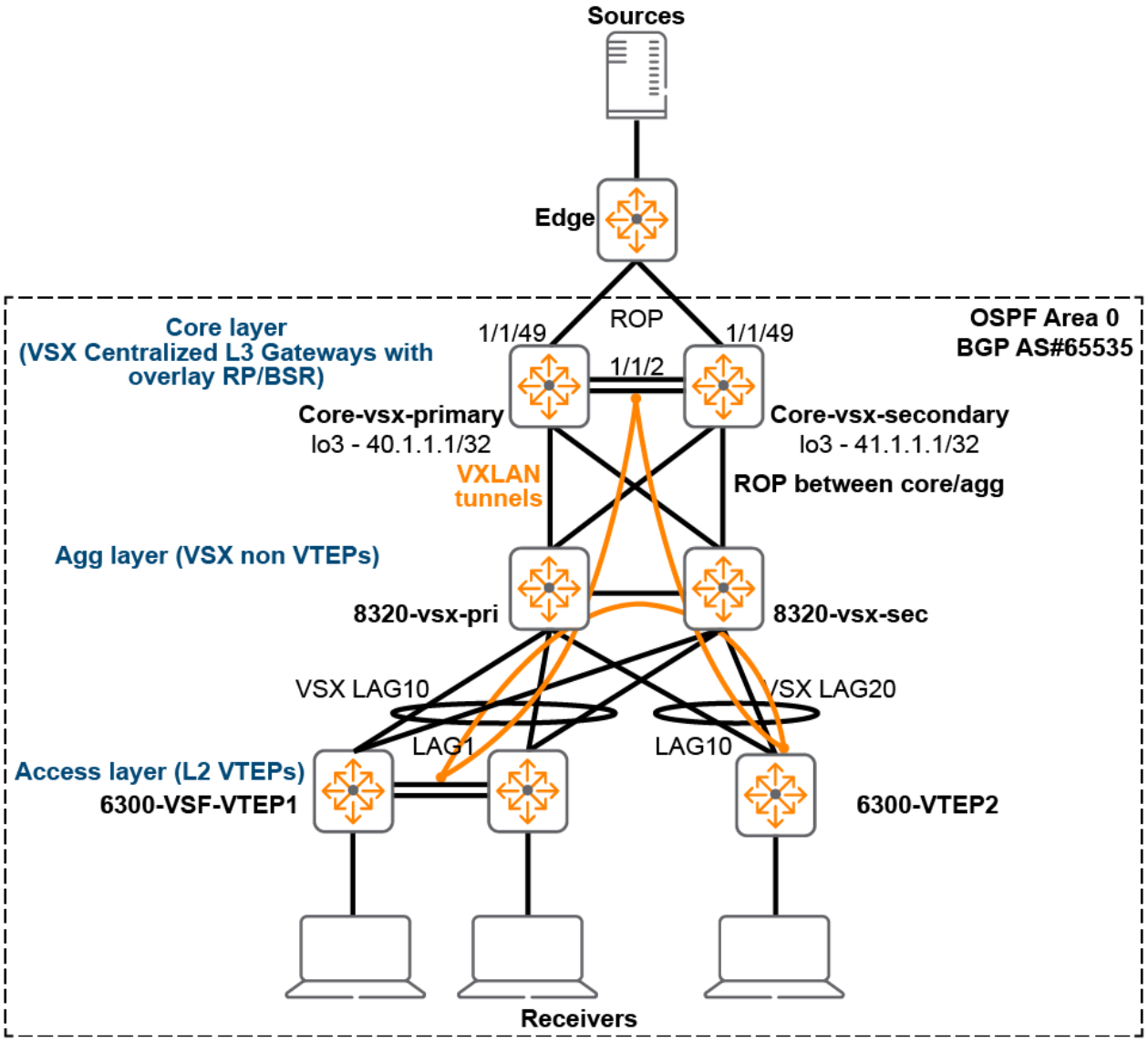
Use case 1: Campus network with centralized L3 gateway

This use case provides the following details:

- Sample configurations
- Relevant verification commands for a campus network with centralized L3 gateway
- Overlay BSRs/RPs on VSX switches
- Anycast RP configured between core VSX VTEPs
- Receivers in overlay
- Sources in external non-VXLAN network and external network that learn about overlay BSRs/RPs

On the Aruba 8360 VSX centralized L3 gateway, the additional 802.1Q link is required as ROP is used towards the non-VXLAN network (as mentioned in the Considerations and best practices section).

Figure 1 *Use case 1 – Campus network with centralized L3 gateway topology*



Configuration and verification details for the devices in this use case are provided in the following sections:

- Edge
- Core-vsx-primary
- Core-vsx-secondary
- 8320-vsx-pri
- 8320-vsx-sec
- 6300-VSF-VTEP1
- 6300-VTEP2
- Anycast RP configured between core VSX VTEPs

Edge

Configuration

```
!export-password: default
hostname Edge
profile Leaf
!
!
!
!
!
ssh server vrf mgmt
vlan 1
interface mgmt
    no shutdown
    ip dhcp
system interface-group 1 speed 10g
    !interface group 1 contains ports 1/1/1-1/1/12
system interface-group 2 speed 10g
    !interface group 2 contains ports 1/1/13-1/1/24
system interface-group 3 speed 10g
    !interface group 3 contains ports 1/1/25-1/1/36
interface 1/1/1
    no shutdown
interface 1/1/2
    no shutdown
interface 1/1/25
    no shutdown
    description Connnection to Ixia Sources
    ip address 60.1.1.1/24
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip pim-sparse enable
interface 1/1/26
    no shutdown
interface 1/1/53
    no shutdown
    description Conneciton to Core-vsx-primary
    ip address 80.2.1.2/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
    ip pim-sparse enable
interface 1/1/54
    no shutdown
    description Conneciton to Core-vsx-secondary
    ip address 80.3.1.2/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
    ip pim-sparse enable
interface loopback 0
    ip address 20.20.20.20/32
    ip ospf 1 area 0.0.0.0
interface loopback 1
    ip address 20.20.20.1/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
!
!
!
!
!
router ospf 1
    router-id 20.20.20.20
    area 0.0.0.0
router pim
```

```
    enable
https-server vrf mgmt
```

Verification

Verify OSPF neighbors

```
Edge# show ip ospf neighbors
VRF : default                              Process : 1
=================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
30.1.1.6         n/a       FULL              80.2.1.1           1/1/53

30.2.1.6         n/a       FULL              80.3.1.1           1/1/54
```

Verify PIM neighbors

```
Edge# show ip pim neighbor all-vrfs

PIM Neighbor


VRF                         : default
Total number of neighbors : 2

IP Address                  : 80.2.1.1
Interface                   : 1/1/53
Up Time (HH:MM:SS)          : 00:39:17
Expire Time (HH:MM:SS)      : 00:01:31
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:01:45

IP Address                  : 80.3.1.1
Interface                   : 1/1/54
Up Time (HH:MM:SS)          : 00:40:05
Expire Time (HH:MM:SS)      : 00:01:41
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:01:45
```

Verify PIM interfaces

```
Edge# show ip pim interface

PIM Interfaces

VRF: default
Total Number of interfaces : 4

Interface  : 1/1/53
Neighbor count : 1
IP Address : 80.2.1.2/30
Mode       : sparse
Designated Router : 80.2.1.2
```

```
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes
Propagation Delay (msec)  : 500               Configured DR Priority    : 1
Operational DR Priority   : 1
Neighbor Timeout          : 92

Interface  : 1/1/25
Neighbor count : 0
IP Address : 60.1.1.1/24
Mode       : sparse
Designated Router : 60.1.1.1
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes
Propagation Delay (msec)  : 500               Configured DR Priority    : 1
Operational DR Priority   : 1
Neighbor Timeout          : 0

Interface  : 1/1/54
Neighbor count : 1
IP Address : 80.3.1.2/30
Mode       : sparse
Designated Router : 80.3.1.2
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes
Propagation Delay (msec)  : 500               Configured DR Priority    : 1
Operational DR Priority   : 1
Neighbor Timeout          : 102

Interface  : loopback1
Neighbor count : 0
IP Address : 20.20.20.1/32
Mode       : sparse
```

Verify mroutes

```
Edge# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : default
Total number of entries : 10

Group Address           : 225.1.1.1
Source Address          : 60.1.1.10
Neighbor                :
Incoming interface      : 1/1/25
Outgoing Interface List :
Interface       State
-----------     ----------
1/1/53          forwarding
1/1/54          forwarding

Group Address           : 225.2.1.1
Source Address          : 60.1.1.10
Neighbor                :
```

```
Incoming interface      : 1/1/25
Outgoing Interface List :
Interface       State
-----------     ----------
1/1/54          forwarding
1/1/53          forwarding
!snip

Group Address           : 225.9.1.1
Source Address          : 60.1.1.10
Neighbor                :
Incoming interface      : 1/1/25
Outgoing Interface List :
Interface       State
-----------     ----------
1/1/54          forwarding
1/1/53          forwarding

Group Address           : 225.10.1.1
Source Address          : 60.1.1.10
Neighbor                :
Incoming interface      : 1/1/25
Outgoing Interface List :
Interface       State
-----------     ----------
1/1/53          forwarding
1/1/54          forwarding
```

Verify BSR information

```
Edge# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information

VRF                       : default
E-BSR Address             : 40.1.1.1
E-BSR Priority            : 100
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 1 hour 11 mins 18 secs
Next Bootstrap Message    : 1 mins 52 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP
```

Verify RP information

```
Edge# show ip pim rp-set all-vrfs

VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
---------------  ---------------  ---------------  ---------  -----------
224.0.0.0        240.0.0.0        40.1.1.1         150        119
224.0.0.0        240.0.0.0        41.1.1.1         150        119
```

Core-vsx-primary

Configuration

```
!export-password: default
hostname Core-vsx-primary
user admin group administrators password ciphertext
AQBapY6cG7OGjeUOSUjD8JmBYxBiqulUS3CpBAJhXwz2c6sgYgAAANSAd/CskaIkHsCsIYti0XwXMICwnx
bUdzxWRYTg9XM4uyZuVaRCX37T2FpbesioloyEeCYquFNcD82AWH3oGzm8oZVla8yEV52tqYYPJZAxpZRw
1giyp+7Yl9z3CSk/32Ct
clock timezone us/pacific
no ip icmp redirect
profile Aggregation-Leaf
!
!
!
!
!
ssh server vrf mgmt
vlan 1,10,101
vlan 1001
    ip igmp snooping enable
vlan 1002
    ip igmp snooping enable
vlan 1003
    ip igmp snooping enable
vlan 1004
    ip igmp snooping enable
vlan 1005
    ip igmp snooping enable
vlan 1006
    ip igmp snooping enable
vlan 1007
    ip igmp snooping enable
vlan 1008
    ip igmp snooping enable
vlan 1009
    ip igmp snooping enable
vlan 1010
    ip igmp snooping enable
evpn
    redistribute local-svi
    vlan 1001
        rd 172.1.1.5:1001
        route-target export 1001:1001
        route-target import 1001:1001
        redistribute host-route
    vlan 1002
        rd 172.1.1.5:1002
        route-target export 1002:1002
        route-target import 1002:1002
        redistribute host-route
    vlan 1003
        rd 172.1.1.5:1003
        route-target export 1003:1003
        route-target import 1003:1003
        redistribute host-route
    vlan 1004
        rd 172.1.1.5:1004
        route-target export 1004:1004
        route-target import 1004:1004
        redistribute host-route
    vlan 1005
        rd 172.1.1.5:1005
        route-target export 1005:1005
        route-target import 1005:1005
```

```
        redistribute host-route
    vlan 1006
        rd 172.1.1.5:1006
        route-target export 1006:1006
        route-target import 1006:1006
        redistribute host-route
    vlan 1007
        rd 172.1.1.5:1007
        route-target export 1007:1007
        route-target import 1007:1007
        redistribute host-route
    vlan 1008
        rd 172.1.1.5:1008
        route-target export 1008:1008
        route-target import 1008:1008
        redistribute host-route
    vlan 1009
        rd 172.1.1.5:1009
        route-target export 1009:1009
        route-target import 1009:1009
        redistribute host-route
    vlan 1010
        rd 172.1.1.5:1010
        route-target export 1010:1010
        route-target import 1010:1010
        redistribute host-route
interface mgmt
    no shutdown
    ip dhcp
interface lag 10 multi-chassis
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
    lacp mode active
interface lag 100
    no shutdown
    description ISL
    no routing
    vlan trunk native 1 tag
    vlan trunk allowed all
    lacp mode active
interface 1/1/1
    no shutdown
    lag 100
interface 1/1/2
    description additional L3 link
    no shutdown
    ip address 80.1.1.1/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
    ip pim-sparse enable
interface 1/1/3
    no shutdown
interface 1/1/4
    no shutdown
interface 1/1/5
    no shutdown
    description KA
    ip address 192.168.100.1/30
interface 1/1/7
    no shutdown
```

```
interface 1/1/28
    no shutdown
interface 1/1/47
    no shutdown
    description Orphan port to Ixia
    no routing
    vlan trunk native 1
    vlan trunk allowed 1001-1010
interface 1/1/49
    no shutdown
    description Connection to Edge
    ip address 80.2.1.1/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
    ip pim-sparse enable
interface 1/1/50
    no shutdown
interface 1/1/51
    no shutdown
    description Connection to Distro_primary
    ip address 30.1.1.2/30
    ip ospf 1 area 0.0.0.0
    ip ospf cost 10
interface 1/1/52
    no shutdown
    description Connection to Distro_secondary
    ip address 30.1.1.6/30
    ip ospf 1 area 0.0.0.0
    ip ospf cost 10
interface loopback 1
    ip address 172.16.1.5/32
    ip ospf 1 area 0.0.0.0
interface loopback 2
    ip address 172.1.1.5/32
    ip ospf 1 area 0.0.0.0
interface loopback 3
    ip address 40.1.1.1/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface loopback 12
interface vlan 1001
    vsx-sync active-gateways
    ip address 101.1.1.252/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.1.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1002
    vsx-sync active-gateways
    ip address 101.2.1.252/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.2.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1003
    vsx-sync active-gateways
    ip address 101.3.1.252/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.3.1.254
    ip igmp enable
```

```
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1004
    vsx-sync active-gateways
    ip address 101.4.1.252/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.4.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1005
    vsx-sync active-gateways
    ip address 101.5.1.252/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.5.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1006
    vsx-sync active-gateways
    ip address 101.6.1.252/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.6.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1007
    vsx-sync active-gateways
    ip address 101.7.1.252/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.7.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1008
    vsx-sync active-gateways
    ip address 101.8.1.252/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.8.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1009
    vsx-sync active-gateways
    ip address 101.9.1.252/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.9.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1010
    vsx-sync active-gateways
    ip address 101.10.1.252/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.10.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vxlan 1
    source ip 172.1.1.5
    vxlan-counters aggregate
    no shutdown
```

```
    vni 1001
        vlan 1001
    vni 1002
        vlan 1002
    vni 1003
        vlan 1003
    vni 1004
        vlan 1004
    vni 1005
        vlan 1005
    vni 1006
        vlan 1006
    vni 1007
        vlan 1007
    vni 1008
        vlan 1008
    vni 1009
        vlan 1009
    vni 1010
        vlan 1010
vsx
    inter-switch-link lag 100
    role primary
    keepalive peer 192.168.100.2 source 192.168.100.1
    no split-recovery
    vsx-sync evpn
!
!
!
!
!
router ospf 1
    router-id 30.1.1.6
    distance 210
    redistribute connected
    area 0.0.0.0
router bgp 65535
    bgp router-id 172.16.1.5
    no bgp fast-external-fallover
    neighbor 172.16.1.1 remote-as 65535
    neighbor 172.16.1.1 update-source loopback 1
    neighbor 172.16.1.2 remote-as 65535
    neighbor 172.16.1.2 update-source loopback 1
    address-family ipv4 unicast
        network 40.1.1.1/32
    exit-address-family
    address-family l2vpn evpn
        neighbor 172.16.1.1 activate
        neighbor 172.16.1.1 send-community extended
        neighbor 172.16.1.2 activate
        neighbor 172.16.1.2 send-community extended
    exit-address-family
!
router pim
    enable
    rp-candidate source-ip-interface loopback3 group-prefix 224.0.0.0/4
    rp-candidate priority 200
    bsr-candidate source-ip-interface loopback3
    bsr-candidate priority 100
https-server vrf mgmt
```

Verification

Verify OSPF neighbors

```
Core-vsx-primary(config)# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
=================================================

Total Number of Neighbors : 3

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
20.20.20.20      n/a       FULL              80.2.1.2           1/1/49

30.1.1.1         1         FULL/BDR          30.1.1.1           1/1/51

30.2.1.1         1         FULL/DR           30.1.1.5           1/1/52
```

Verify BGP neighbors

```
Core-vsx-primary(config)# show bgp all summary
VRF : default
BGP Summary
-----------
 Local AS               : 65535        BGP Router Identifier  : 172.16.1.5
 Peers                  : 2            Log Neighbor Changes   : No
 Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
 Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
 Neighbor        Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
 172.16.1.1      65535       217     180     02h:03m:15s  Established   Up
 172.16.1.2      65535       171     181     02h:03m:22s  Established   Up
```

Verify VXLAN tunnel, VTEP peers, and VNIs

```
Leaf01-primary# show interface vxlan
Core-vsx-primary(config)# show interface vxlan vteps
Source           Destination      Origin       Status               VNI       Routing   VLAN  VRF
---------------- ---------------- ------------ -------------------- --------- --------- ----- ---
172.1.1.5        172.1.1.1        evpn         operational          1001      disabled  1001   --
172.1.1.5        172.1.1.1        evpn         operational          1002      disabled  1002   --
172.1.1.5        172.1.1.1        evpn         operational          1003      disabled  1003   --
172.1.1.5        172.1.1.1        evpn         operational          1004      disabled  1004   --
172.1.1.5        172.1.1.1        evpn         operational          1005      disabled  1005   --
172.1.1.5        172.1.1.1        evpn         operational          1006      disabled  1006   --
172.1.1.5        172.1.1.1        evpn         operational          1007      disabled  1007   --
172.1.1.5        172.1.1.1        evpn         operational          1008      disabled  1008   --
172.1.1.5        172.1.1.1        evpn         operational          1009      disabled  1009   --
172.1.1.5        172.1.1.1        evpn         operational          1010      disabled  1010   --
172.1.1.5        172.1.1.2        evpn         operational          1001      disabled  1001   --
172.1.1.5        172.1.1.2        evpn         operational          1002      disabled  1002   --
172.1.1.5        172.1.1.2        evpn         operational          1003      disabled  1003   --
172.1.1.5        172.1.1.2        evpn         operational          1004      disabled  1004   --
172.1.1.5        172.1.1.2        evpn         operational          1005      disabled  1005   --
172.1.1.5        172.1.1.2        evpn         operational          1006      disabled  1006   --
```

```
172.1.1.5        172.1.1.2        evpn         operational           1007      disabled  1007   --
172.1.1.5        172.1.1.2        evpn         operational           1008      disabled  1008   --
172.1.1.5        172.1.1.2        evpn         operational           1009      disabled  1009   --
172.1.1.5        172.1.1.2        evpn         operational           1010      disabled  1010   --
```

Verify BGP EVPN table

```
Core-vsx-primary(config)# show bgp l2vpn evpn
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
              i internal, e external S Stale, R Removed, a additional-paths
Origin codes: i - IGP, e - EGP, ? - incomplete

EVPN Route-Type 2 prefix: [2]:[ESI]:[EthTag]:[MAC]:[OrigIP]
EVPN Route-Type 3 prefix: [3]:[EthTag]:[OrigIP]
EVPN Route-Type 5 prefix: [5]:[ESI]:[EthTag]:[IPAddrLen]:[IPAddr]
VRF : default
Local Router-ID 172.16.1.5

     Network                                          Nexthop         Metric     LocPrf    Weight   Path
-------------------------------------------------------------------------------------------------------------
Route Distinguisher: 172.1.1.1:1001       (L2VNI 1001)
*>i [2]:[0]:[0]:[00:11:01:00:00:01]:[]                172.1.1.1       0          100       0       ?
*>i [3]:[0]:[172.1.1.1]                               172.1.1.1       0          100       0       ?

Route Distinguisher: 172.1.1.2:1001       (L2VNI 1001)
*>i [2]:[0]:[0]:[00:13:01:00:00:01]:[]                172.1.1.2       0          100       0       ?
*>i [3]:[0]:[172.1.1.2]                               172.1.1.2       0          100       0       ?

Route Distinguisher: 172.1.1.5:1001       (L2VNI 1001)
*>  [2]:[0]:[0]:[00:00:20:00:10:01]:[101.1.1.254]    172.1.1.5       0          100       0       ?
*>  [2]:[0]:[0]:[b8:d4:e7:5d:8a:00]:[101.1.1.252]    172.1.1.5       0          100       0       ?
*>  [3]:[0]:[172.1.1.5]                               172.1.1.5       0          100       0       ?

Route Distinguisher: 172.1.1.1:1002       (L2VNI 1002)
*>i [2]:[0]:[0]:[00:11:01:00:00:02]:[]                172.1.1.1       0          100       0       ?
*>i [3]:[0]:[172.1.1.1]                               172.1.1.1       0          100       0       ?

Route Distinguisher: 172.1.1.2:1002       (L2VNI 1002)
*>i [2]:[0]:[0]:[00:13:01:00:00:02]:[]                172.1.1.2       0          100       0       ?
*>i [3]:[0]:[172.1.1.2]                               172.1.1.2       0          100       0       ?

Route Distinguisher: 172.1.1.5:1002       (L2VNI 1002)
*>  [2]:[0]:[0]:[00:00:20:00:10:01]:[101.2.1.254]    172.1.1.5       0          100       0       ?
*>  [2]:[0]:[0]:[b8:d4:e7:5d:8a:00]:[101.2.1.252]    172.1.1.5       0          100       0       ?
*>  [3]:[0]:[172.1.1.5]                               172.1.1.5       0          100       0       ?

Route Distinguisher: 172.1.1.1:1003       (L2VNI 1003)
*>i [2]:[0]:[0]:[00:11:01:00:00:03]:[]                172.1.1.1       0          100       0       ?
*>i [3]:[0]:[172.1.1.1]                               172.1.1.1       0          100       0       ?

Route Distinguisher: 172.1.1.2:1003       (L2VNI 1003)
*>i [2]:[0]:[0]:[00:13:01:00:00:03]:[]                172.1.1.2       0          100       0       ?
*>i [3]:[0]:[172.1.1.2]                               172.1.1.2       0          100       0       ?
!snip

Route Distinguisher: 172.1.1.2:1009       (L2VNI 1009)
*>i [2]:[0]:[0]:[00:13:01:00:00:09]:[]                172.1.1.2       0          100       0       ?
*>i [3]:[0]:[172.1.1.2]                               172.1.1.2       0          100       0       ?

Route Distinguisher: 172.1.1.5:1009       (L2VNI 1009)
*>  [2]:[0]:[0]:[00:00:20:00:10:01]:[101.9.1.254]    172.1.1.5       0          100       0       ?
```

```
*>  [2]:[0]:[0]:[b8:d4:e7:5d:8a:00]:[101.9.1.252]          172.1.1.5       0          100        0       ?
*>  [3]:[0]:[172.1.1.5]                                    172.1.1.5       0          100        0       ?

Route Distinguisher: 172.1.1.1:1010       (L2VNI 1010)
*>i [2]:[0]:[0]:[00:11:01:00:00:0a]:[]                     172.1.1.1       0          100        0       ?
*>i [3]:[0]:[172.1.1.1]                                    172.1.1.1       0          100        0       ?

Route Distinguisher: 172.1.1.2:1010       (L2VNI 1010)
*>i [2]:[0]:[0]:[00:13:01:00:00:0a]:[]                     172.1.1.2       0          100        0       ?
*>i [3]:[0]:[172.1.1.2]                                    172.1.1.2       0          100        0       ?

Route Distinguisher: 172.1.1.5:1010       (L2VNI 1010)
*>  [2]:[0]:[0]:[00:00:20:00:10:01]:[101.10.1.254]        172.1.1.5       0          100        0       ?
*>  [2]:[0]:[0]:[b8:d4:e7:5d:8a:00]:[101.10.1.252]        172.1.1.5       0          100        0       ?
*>  [3]:[0]:[172.1.1.5]                                    172.1.1.5       0          100        0       ?
Total number of entries 70
```

Verify PIM neighbors

```
Core-vsx-primary(config)# do show ip pim neighbor all-vrfs

PIM Neighbor


VRF                         : default
Total number of neighbors : 11

IP Address                  : 80.2.1.2
Interface                   : 1/1/49
Up Time (HH:MM:SS)          : 01:15:56
Expire Time (HH:MM:SS)      : 00:01:25
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:01:45

IP Address                  : 101.1.1.253
Interface                   : vlan1001
Up Time (HH:MM:SS)          : 02:03:48
Expire Time (HH:MM:SS)      : 00:01:33
DR Priority                 : 83952044
Hold Time (HH:MM:SS)        : 00:01:45

IP Address                  : 101.2.1.253
Interface                   : vlan1002
Up Time (HH:MM:SS)          : 02:03:48
Expire Time (HH:MM:SS)      : 00:01:32
DR Priority                 : 83952044
Hold Time (HH:MM:SS)        : 00:01:45

IP Address                  : 101.3.1.253
Interface                   : vlan1003
Up Time (HH:MM:SS)          : 02:03:47
Expire Time (HH:MM:SS)      : 00:01:32
DR Priority                 : 83952044
Hold Time (HH:MM:SS)        : 00:01:45
!snip

IP Address                  : 101.8.1.253
Interface                   : vlan1008
Up Time (HH:MM:SS)          : 02:03:47
Expire Time (HH:MM:SS)      : 00:01:30
DR Priority                 : 83952044
```

```
Hold Time (HH:MM:SS)      : 00:01:45

IP Address                : 101.9.1.253
Interface                 : vlan1009
Up Time (HH:MM:SS)        : 02:03:48
Expire Time (HH:MM:SS)    : 00:01:29
DR Priority               : 83952044
Hold Time (HH:MM:SS)      : 00:01:45

IP Address                : 101.10.1.253
Interface                 : vlan1010
Up Time (HH:MM:SS)        : 02:03:48
Expire Time (HH:MM:SS)    : 00:01:33
DR Priority               : 83952044
Hold Time (HH:MM:SS)      : 00:01:45
```

Verify PIM interfaces

```
Core-vsx-primary(config)# show ip pim interface

PIM Interfaces

VRF: default
Total Number of interfaces : 13

Interface  : vlan1003
Neighbor count : 1
IP Address : 101.3.1.252/24
Mode       : sparse
Designated Router : 101.3.1.252
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes
Propagation Delay (msec)  : 500               Configured DR Priority    : 1
Operational DR Priority   : 83952044
Neighbor Timeout          : 87

Interface  : loopback3
Neighbor count : 0
IP Address : 40.1.1.1/32
Mode       : sparse

Interface  : 1/1/2
Neighbor count : 0
IP Address : 80.1.1.1/30
Mode       : sparse
Designated Router : 80.1.1.1
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes
Propagation Delay (msec)  : 500               Configured DR Priority    : 1
Operational DR Priority   : 1
Neighbor Timeout          : 0

Interface  : vlan1001
Neighbor count : 1
IP Address : 101.1.1.252/24
Mode       : sparse
Designated Router : 101.1.1.252
```

```
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes
Propagation Delay (msec)  : 500               Configured DR Priority    : 1
Operational DR Priority   : 83952044
Neighbor Timeout          : 88
!snip

Interface  : vlan1002
Neighbor count : 1
IP Address : 101.2.1.252/24
Mode       : sparse
Designated Router : 101.2.1.252
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes
Propagation Delay (msec)  : 500               Configured DR Priority    : 1
Operational DR Priority   : 83952044
Neighbor Timeout          : 87
```

Verify mroutes

```
Core-vsx-primary(config)# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : default
Total number of entries : 10

Group Address           : 225.1.1.1
Source Address          : 60.1.1.10
Neighbor                : 80.2.1.2
Incoming interface      : 1/1/49
Outgoing Interface List :
Interface       State
-----------     ----------
vlan1001        forwarding

Group Address           : 225.2.1.1
Source Address          : 60.1.1.10
Neighbor                : 80.2.1.2
Incoming interface      : 1/1/49
Outgoing Interface List :
Interface       State
-----------     ----------
vlan1002        forwarding

Group Address           : 225.3.1.1
Source Address          : 60.1.1.10
Neighbor                : 80.2.1.2
Incoming interface      : 1/1/49
Outgoing Interface List :
Interface       State
-----------     ----------
vlan1003        forwarding

Group Address           : 225.4.1.1
Source Address          : 60.1.1.10
Neighbor                : 80.2.1.2
Incoming interface      : 1/1/49
```

```
Outgoing Interface List :
Interface       State
-----------     ----------
vlan1004        forwarding
!snip

Group Address           : 225.9.1.1
Source Address          : 60.1.1.10
Neighbor                : 80.2.1.2
Incoming interface      : 1/1/49
Outgoing Interface List :
Interface       State
-----------     ----------
vlan1009        forwarding

Group Address           : 225.10.1.1
Source Address          : 60.1.1.10
Neighbor                : 80.2.1.2
Incoming interface      : 1/1/49
Outgoing Interface List :
Interface       State
-----------     ----------
vlan1010        forwarding
```

Verify BSR information

```
Core-vsx-primary(config)# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information

VRF                       : default
E-BSR Address             : 40.1.1.1
E-BSR Priority            : 100
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 2 hour 7 mins 49 secs
Next Bootstrap Message    : 14 secs

C-BSR Admin Status        : This system is a Candidate-BSR
C-BSR Address             : 40.1.1.1
C-BSR Priority            : 100
C-BSR Hash Mask Length    : 30
C-BSR Message Interval    : 60
C-BSR Source IP Interface : loopback3

C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : 40.1.1.1
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 200
C-RP Source IP Interface  : loopback3

Group Address    Group Mask
---------------  ---------------
224.0.0.0        240.0.0.0
```

Verify RP information

```
Core-vsx-primary(config)# show ip pim rp-set all-vrfs

VRF: default
```

```
Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
---------------  ---------------  ---------------  ---------  -----------
224.0.0.0        240.0.0.0        40.1.1.1         150        97
224.0.0.0        240.0.0.0        41.1.1.1         150        97
```

Verify IGMP snooping

```
Core-vsx-primary(config)# show ip igmp snooping

IGMP Snooping Protocol Info

Total VLANs with IGMP enabled             : 10
Current count of multicast groups joined  : 10

IGMP Drop Unknown Multicast               : Global
VLAN ID : 1001
VLAN Name : VLAN1001
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address [this switch] : 101.1.1.252
Querier Port :
Querier UpTime :2h 9m
Querier Expiration Time :1m 37s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.1.1.1              Filter    2         1h 40m    3m 56s

VLAN ID : 1002
VLAN Name : VLAN1002
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address [this switch] : 101.2.1.252
Querier Port :
Querier UpTime :2h 9m
Querier Expiration Time :1m 37s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.2.1.1              Filter    2         1h 40m    4m 1s

VLAN ID : 1003
VLAN Name : VLAN1003
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address [this switch] : 101.3.1.252
Querier Port :
Querier UpTime :2h 9m
Querier Expiration Time :1m 37s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.3.1.1              Filter    2         1h 40m    4m 0s

VLAN ID : 1004
VLAN Name : VLAN1004
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address [this switch] : 101.4.1.252
```

```
Querier Port :
Querier UpTime :2h 9m
Querier Expiration Time :1m 37s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.4.1.1              Filter    2         1h 40m    4m 2s
!snip

VLAN ID : 1009
VLAN Name : VLAN1009
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address [this switch] : 101.9.1.252
Querier Port :
Querier UpTime :2h 9m
Querier Expiration Time :1m 37s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.9.1.1              Filter    2         1h 40m    3m 58s

VLAN ID : 1010
VLAN Name : VLAN1010
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address [this switch] : 101.10.1.252
Querier Port :
Querier UpTime :2h 9m
Querier Expiration Time :1m 37s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.10.1.1             Filter    2         1h 40m    4m 0s
```

Verify IGMP

```
Core-vsx-primary(config)# show ip igmp

VRF Name   : default
Interface  : vlan1001
IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Querier
Querier IP [this switch]   : 101.1.1.252
Querier Uptime             : 2h 9m
Querier Expiration Time    : 1m 30s
IGMP Snoop Enabled on VLAN : True

Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
225.1.1.1              2         1h 40m    3m 49s

VRF Name   : default
Interface  : vlan1002
IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Querier
Querier IP [this switch]   : 101.2.1.252
Querier Uptime             : 2h 9m
Querier Expiration Time    : 1m 30s
```

```
IGMP Snoop Enabled on VLAN : True

Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
225.2.1.1              2         1h 40m    3m 54s

VRF Name   : default
Interface  : vlan1003
IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Querier
Querier IP [this switch]   : 101.3.1.252
Querier Uptime             : 2h 9m
Querier Expiration Time    : 1m 30s
IGMP Snoop Enabled on VLAN : True

Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
225.3.1.1              2         1h 43m    3m 53s
!snip

VRF Name   : default
Interface  : vlan1010
IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Querier
Querier IP [this switch]   : 101.10.1.252
Querier Uptime             : 2h 9m
Querier Expiration Time    : 1m 30s
IGMP Snoop Enabled on VLAN : True

Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
225.10.1.1             2         1h 43m    3m 53s
```

Core-vsx-secondary

Configuration

```
!export-password: default
hostname Core-vsx-secondary
clock timezone us/pacific
no ip icmp redirect
profile Aggregation-Leaf
!
!
!
!
!
ssh server vrf mgmt
vlan 1,101
vlan 1001
    ip igmp snooping enable
vlan 1002
    ip igmp snooping enable
vlan 1003
    ip igmp snooping enable
vlan 1004
    ip igmp snooping enable
vlan 1005
    ip igmp snooping enable
```

```
vlan 1006
    ip igmp snooping enable
vlan 1007
    ip igmp snooping enable
vlan 1008
    ip igmp snooping enable
vlan 1009
    ip igmp snooping enable
vlan 1010
    ip igmp snooping enable
evpn
    redistribute local-svi
    vlan 1001
        rd 172.1.1.5:1001
        route-target export 1001:1001
        route-target import 1001:1001
        redistribute host-route
    vlan 1002
        rd 172.1.1.5:1002
        route-target export 1002:1002
        route-target import 1002:1002
        redistribute host-route
    vlan 1003
        rd 172.1.1.5:1003
        route-target export 1003:1003
        route-target import 1003:1003
        redistribute host-route
    vlan 1004
        rd 172.1.1.5:1004
        route-target export 1004:1004
        route-target import 1004:1004
        redistribute host-route
    vlan 1005
        rd 172.1.1.5:1005
        route-target export 1005:1005
        route-target import 1005:1005
        redistribute host-route
    vlan 1006
        rd 172.1.1.5:1006
        route-target export 1006:1006
        route-target import 1006:1006
        redistribute host-route
    vlan 1007
        rd 172.1.1.5:1007
        route-target export 1007:1007
        route-target import 1007:1007
        redistribute host-route
    vlan 1008
        rd 172.1.1.5:1008
        route-target export 1008:1008
        route-target import 1008:1008
        redistribute host-route
    vlan 1009
        rd 172.1.1.5:1009
        route-target export 1009:1009
        route-target import 1009:1009
        redistribute host-route
    vlan 1010
        rd 172.1.1.5:1010
        route-target export 1010:1010
        route-target import 1010:1010
        redistribute host-route
```

```
interface mgmt
    no shutdown
    ip dhcp
interface lag 100
    no shutdown
    description ISL
    no routing
    vlan trunk native 1 tag
    vlan trunk allowed all
    lacp mode active
interface 1/1/1
    no shutdown
    lag 100
interface 1/1/2
    no shutdown
    description Additional L3 link
    ip address 80.1.1.1/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/3
    no shutdown
interface 1/1/4
    no shutdown
interface 1/1/5
    no shutdown
    description KA
    ip address 192.168.100.2/30
interface 1/1/7
    no shutdown
interface 1/1/28
    no shutdown
interface 1/1/47
    no shutdown
    description Orphan port to Ixia
    no routing
    vlan trunk native 1
    vlan trunk allowed 1001-1010
interface 1/1/49
    no shutdown
    description Connection to Edge
    ip address 80.3.1.1/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
    ip pim-sparse enable
interface 1/1/50
    no shutdown
interface 1/1/51
    no shutdown
    description Connection to Distro_primary
    ip address 30.2.1.2/30
    ip ospf 1 area 0.0.0.0
    ip ospf cost 10
interface 1/1/52
    no shutdown
    description Connection to Distro_secondary
    ip address 30.2.1.6/30
    ip ospf 1 area 0.0.0.0
    ip ospf cost 10
interface loopback 1
    ip address 172.16.1.4/32
    ip ospf 1 area 0.0.0.0
interface loopback 2
```

```
    ip address 172.1.1.5/32
    ip ospf 1 area 0.0.0.0
interface loopback 3
    ip address 41.1.1.1/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface vlan 1001
    vsx-sync active-gateways
    ip address 101.1.1.253/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.1.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1002
    vsx-sync active-gateways
    ip address 101.2.1.253/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.2.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1003
    vsx-sync active-gateways
    ip address 101.3.1.253/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.3.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1004
    vsx-sync active-gateways
    ip address 101.4.1.253/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.4.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1005
    vsx-sync active-gateways
    ip address 101.5.1.253/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.5.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1006
    vsx-sync active-gateways
    ip address 101.6.1.253/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.6.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1007
    vsx-sync active-gateways
    ip address 101.7.1.253/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.7.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
```

```
interface vlan 1008
    vsx-sync active-gateways
    ip address 101.8.1.253/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.8.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1009
    vsx-sync active-gateways
    ip address 101.9.1.253/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.9.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 1010
    vsx-sync active-gateways
    ip address 101.10.1.253/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.10.1.254
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vxlan 1
    source ip 172.1.1.5
    vxlan-counters aggregate
    no shutdown
    vni 1001
        vlan 1001
    vni 1002
        vlan 1002
    vni 1003
        vlan 1003
    vni 1004
        vlan 1004
    vni 1005
        vlan 1005
    vni 1006
        vlan 1006
    vni 1007
        vlan 1007
    vni 1008
        vlan 1008
    vni 1009
        vlan 1009
    vni 1010
        vlan 1010
vsx
    inter-switch-link lag 100
    role secondary
    keepalive peer 192.168.100.1 source 192.168.100.2
    vsx-sync evpn
!
!
!
!
!
router ospf 1
    router-id 30.2.1.6
    distance 210
    redistribute connected
```

```
    area 0.0.0.0
router bgp 65535
    bgp router-id 172.16.1.4
    no bgp fast-external-fallover
    neighbor 172.16.1.1 remote-as 65535
    neighbor 172.16.1.1 update-source loopback 1
    neighbor 172.16.1.2 remote-as 65535
    neighbor 172.16.1.2 update-source loopback 1
    address-family ipv4 unicast
        network 41.1.1.1/32
    exit-address-family
    address-family l2vpn evpn
        neighbor 172.16.1.1 activate
        neighbor 172.16.1.1 send-community extended
        neighbor 172.16.1.2 activate
        neighbor 172.16.1.2 send-community extended
    exit-address-family
!
router pim
    enable
    rp-candidate source-ip-interface loopback3 group-prefix 224.0.0.0/4
    bsr-candidate source-ip-interface loopback3
https-server vrf mgmt
```

Verification

Verify OSPF neighbors

```
Core-vsx-secondary(config)# show ip ospf neighbors
VRF : default                              Process : 1
================================================

Total Number of Neighbors : 3

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
20.20.20.20      n/a       FULL              80.3.1.2           1/1/49

30.1.1.1         1         FULL/BDR          30.2.1.1           1/1/51

30.2.1.1         1         FULL/BDR          30.2.1.5           1/1/52
```

Verify BGP neighbors

```
Core-vsx-secondary(config)# show bgp all summary
VRF : default
BGP Summary
-----------
 Local AS               : 65535        BGP Router Identifier  : 172.16.1.4
 Peers                  : 2            Log Neighbor Changes   : No
 Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
 Confederation Id       : 0

Address-family : IPv4 Unicast
-----------------------------

Address-family : IPv6 Unicast
-----------------------------
```

```
Address-family : L2VPN EVPN
------------------------------
 Neighbor        Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
 172.16.1.1      65535       199     189     02h:12m:11s  Established   Up
 172.16.1.2      65535       182     187     02h:12m:12s  Established   Up
```

Verify VXLAN tunnel, VTEP peers, and VNIs

```
Core-vsx-secondary(config)# show interface vxlan vteps
Source           Destination      Origin       Status                VNI       Routing   VLAN  VRF
---------------- ---------------- ------------ --------------------- --------- --------- ----- ----
172.1.1.5        172.1.1.1        evpn         operational           1001      disabled  1001   --
172.1.1.5        172.1.1.1        evpn         operational           1002      disabled  1002   --
172.1.1.5        172.1.1.1        evpn         operational           1003      disabled  1003   --
172.1.1.5        172.1.1.1        evpn         operational           1004      disabled  1004   --
172.1.1.5        172.1.1.1        evpn         operational           1005      disabled  1005   --
172.1.1.5        172.1.1.1        evpn         operational           1006      disabled  1006   --
172.1.1.5        172.1.1.1        evpn         operational           1007      disabled  1007   --
172.1.1.5        172.1.1.1        evpn         operational           1008      disabled  1008   --
172.1.1.5        172.1.1.1        evpn         operational           1009      disabled  1009   --
172.1.1.5        172.1.1.1        evpn         operational           1010      disabled  1010   --
172.1.1.5        172.1.1.2        evpn         operational           1001      disabled  1001   --
172.1.1.5        172.1.1.2        evpn         operational           1002      disabled  1002   --
172.1.1.5        172.1.1.2        evpn         operational           1003      disabled  1003   --
172.1.1.5        172.1.1.2        evpn         operational           1004      disabled  1004   --
172.1.1.5        172.1.1.2        evpn         operational           1005      disabled  1005   --
172.1.1.5        172.1.1.2        evpn         operational           1006      disabled  1006   --
172.1.1.5        172.1.1.2        evpn         operational           1007      disabled  1007   --
172.1.1.5        172.1.1.2        evpn         operational           1008      disabled  1008   --
172.1.1.5        172.1.1.2        evpn         operational           1009      disabled  1009   --
172.1.1.5        172.1.1.2        evpn         operational           1010      disabled  1010   --
```

Verify BGP EVPN table

```
Core-vsx-secondary(config)# show bgp l2vpn evpn
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
              i internal, e external S Stale, R Removed, a additional-paths
Origin codes: i - IGP, e - EGP, ? - incomplete

EVPN Route-Type 2 prefix: [2]:[ESI]:[EthTag]:[MAC]:[OrigIP]
EVPN Route-Type 3 prefix: [3]:[EthTag]:[OrigIP]
EVPN Route-Type 5 prefix: [5]:[ESI]:[EthTag]:[IPAddrLen]:[IPAddr]
VRF : default
Local Router-ID 172.16.1.4

     Network                                          Nexthop         Metric     LocPrf    Weight   Path
-------------------------------------------------------------------------------------------------------
Route Distinguisher: 172.1.1.1:1001       (L2VNI 1001)
*>i [2]:[0]:[0]:[00:11:01:00:00:01]:[]                172.1.1.1       0          100        0      ?
*>i [3]:[0]:[172.1.1.1]                               172.1.1.1       0          100        0      ?

Route Distinguisher: 172.1.1.2:1001       (L2VNI 1001)
*>i [2]:[0]:[0]:[00:13:01:00:00:01]:[]                172.1.1.2       0          100        0      ?
*>i [3]:[0]:[172.1.1.2]                               172.1.1.2       0          100        0      ?

Route Distinguisher: 172.1.1.5:1001       (L2VNI 1001)
*>  [2]:[0]:[0]:[00:00:20:00:10:01]:[101.1.1.254]    172.1.1.5       0          100        0      ?
*>  [2]:[0]:[0]:[b8:d4:e7:5b:2c:00]:[101.1.1.253]    172.1.1.5       0          100        0      ?
*>  [3]:[0]:[172.1.1.5]                               172.1.1.5       0          100        0      ?
```

```
Route Distinguisher: 172.1.1.1:1002      (L2VNI 1002)
*>i [2]:[0]:[0]:[00:11:01:00:00:02]:[]                    172.1.1.1      0          100        0       ?
*>i [3]:[0]:[172.1.1.1]                                   172.1.1.1      0          100        0       ?

Route Distinguisher: 172.1.1.2:1002      (L2VNI 1002)
*>i [2]:[0]:[0]:[00:13:01:00:00:02]:[]                    172.1.1.2      0          100        0       ?
*>i [3]:[0]:[172.1.1.2]                                   172.1.1.2      0          100        0       ?

Route Distinguisher: 172.1.1.5:1002      (L2VNI 1002)
*>  [2]:[0]:[0]:[00:00:20:00:10:01]:[101.2.1.254]         172.1.1.5      0          100        0       ?
*>  [2]:[0]:[0]:[b8:d4:e7:5b:2c:00]:[101.2.1.253]         172.1.1.5      0          100        0       ?
*>  [3]:[0]:[172.1.1.5]                                   172.1.1.5      0          100        0       ?
!snip

Route Distinguisher: 172.1.1.1:1010      (L2VNI 1010)
*>i [2]:[0]:[0]:[00:11:01:00:00:0a]:[]                    172.1.1.1      0          100        0       ?
*>i [3]:[0]:[172.1.1.1]                                   172.1.1.1      0          100        0       ?

Route Distinguisher: 172.1.1.2:1010      (L2VNI 1010)
*>i [2]:[0]:[0]:[00:13:01:00:00:0a]:[]                    172.1.1.2      0          100        0       ?
*>i [3]:[0]:[172.1.1.2]                                   172.1.1.2      0          100        0       ?

Route Distinguisher: 172.1.1.5:1010      (L2VNI 1010)
*>  [2]:[0]:[0]:[00:00:20:00:10:01]:[101.10.1.254]        172.1.1.5      0          100        0       ?
*>  [2]:[0]:[0]:[b8:d4:e7:5b:2c:00]:[101.10.1.253]        172.1.1.5      0          100        0       ?
*>  [3]:[0]:[172.1.1.5]                                   172.1.1.5      0          100        0       ?
Total number of entries 70
```

Verify PIM neighbors

```
Core-vsx-secondary(config)# show ip pim neighbor

PIM Neighbor

VRF                         : default
Total number of neighbors : 11

IP Address                  : 80.3.1.2
Interface                   : 1/1/49
Up Time (HH:MM:SS)          : 01:27:10
Expire Time (HH:MM:SS)      : 00:01:37
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:01:45

IP Address                  : 101.1.1.252
Interface                   : vlan1001
Up Time (HH:MM:SS)          : 02:14:14
Expire Time (HH:MM:SS)      : 00:01:36
DR Priority                 : 83952044
Hold Time (HH:MM:SS)        : 00:01:45
Secondary IP Addresses :
 101.1.1.254
!snip

IP Address                  : 101.9.1.252
Interface                   : vlan1009
Up Time (HH:MM:SS)          : 02:14:14
Expire Time (HH:MM:SS)      : 00:01:35
DR Priority                 : 83952044
Hold Time (HH:MM:SS)        : 00:01:45
```

```
Secondary IP Addresses :
 101.9.1.254

IP Address                : 101.10.1.252
Interface                 : vlan1010
Up Time (HH:MM:SS)        : 02:14:14
Expire Time (HH:MM:SS)    : 00:01:35
DR Priority               : 83952044
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses :
 101.10.1.254
```

Verify mroutes

```
Core-vsx-secondary(config)# show ip mroute
IP Multicast Route Entries

VRF : default
Total number of entries : 20

Group Address           : 225.1.1.1
Source Address          : 60.1.1.10
Neighbor                : 80.3.1.2
Incoming interface      : 1/1/49
Outgoing Interface List :
Interface       State
-----------     ----------
vlan1001        forwarding

Group Address           : 225.1.1.1
Source Address          : 60.1.1.10
Neighbor                :
Incoming interface      : vlan1001

Group Address           : 225.2.1.1
Source Address          : 60.1.1.10
Neighbor                :
Incoming interface      : vlan1002

Group Address           : 225.2.1.1
Source Address          : 60.1.1.10
Neighbor                : 80.3.1.2
Incoming interface      : 1/1/49
Outgoing Interface List :
Interface       State
-----------     ----------
vlan1002        forwarding
!snip

Group Address           : 225.9.1.1
Source Address          : 60.1.1.10
Neighbor                : 80.3.1.2
Incoming interface      : 1/1/49
Outgoing Interface List :
Interface       State
-----------     ----------
vlan1009        forwarding

Group Address           : 225.10.1.1
Source Address          : 60.1.1.10
Neighbor                : 80.3.1.2
```

```
Incoming interface      : 1/1/49
Outgoing Interface List :
Interface       State
-----------     ----------
vlan1010        forwarding

Group Address           : 225.10.1.1
Source Address          : 60.1.1.10
Neighbor                :
Incoming interface      : vlan1010
```

Verify PIM interfaces

```
Core-vsx-secondary(config)# show ip pim interface

PIM Interfaces

VRF: default
Total Number of interfaces : 12

Interface  : vlan1001
Neighbor count : 1
IP Address : 101.1.1.253/24
Mode       : sparse
Designated Router : 101.1.1.253
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes
Propagation Delay (msec)  : 500               Configured DR Priority    : 1
Operational DR Priority   : 83952044
Neighbor Timeout          : 84

Interface  : vlan1005
Neighbor count : 1
IP Address : 101.5.1.253/24
Mode       : sparse
Designated Router : 101.5.1.253
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes
Propagation Delay (msec)  : 500               Configured DR Priority    : 1
Operational DR Priority   : 83952044
Neighbor Timeout          : 83
!snip

Interface  : loopback3
Neighbor count : 0
IP Address : 41.1.1.1/32
Mode       : sparse

Interface  : vlan1002
Neighbor count : 1
IP Address : 101.2.1.253/24
Mode       : sparse
Designated Router : 101.2.1.253
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes
```

```
Propagation Delay (msec)  : 500               Configured DR Priority    : 1
Operational DR Priority   : 83952044
Neighbor Timeout          : 81

Interface  : 1/1/49
Neighbor count : 1
IP Address : 80.3.1.1/30
Mode       : sparse
Designated Router : 80.3.1.2
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes
Propagation Delay (msec)  : 500               Configured DR Priority    : 1
Operational DR Priority   : 1
Neighbor Timeout          : 85
```

Verify BSR information

```
Core-vsx-secondary(config)# show ip pim bsr
Status and Counters- PIM-SM Bootstrap Router Information

VRF                       : default
E-BSR Address             : 40.1.1.1
E-BSR Priority            : 100
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 2 hour 13 mins 17 secs
Next Bootstrap Message    : 2 mins 4 secs

C-BSR Admin Status        : This system is a Candidate-BSR
C-BSR Address             : 41.1.1.1
C-BSR Priority            : 0
C-BSR Hash Mask Length    : 30
C-BSR Message Interval    : 60
C-BSR Source IP Interface : loopback3

C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : 41.1.1.1
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 192
C-RP Source IP Interface  : loopback3

Group Address    Group Mask
---------------  ---------------
224.0.0.0        240.0.0.0
```

Verify RP information

```
Core-vsx-secondary(config)# show ip pim rp-set

VRF: default

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
---------------  ---------------  ---------------  ---------  -----------
224.0.0.0        240.0.0.0        40.1.1.1         150        132
224.0.0.0        240.0.0.0        41.1.1.1         150        132
```

```
Verify IGMP snooping
Core-vsx-secondary(config)# show ip igmp snooping

IGMP Snooping Protocol Info

Total VLANs with IGMP enabled             : 10
Current count of multicast groups joined  : 10

IGMP Drop Unknown Multicast               : Global
VLAN ID : 1001
VLAN Name : VLAN1001
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.1.1.252
Querier Port : lag100
Querier UpTime :2h 16m
Querier Expiration Time :2m 14s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.1.1.1              Filter    2         1h 50m    2m 28s

VLAN ID : 1002
VLAN Name : VLAN1002
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.2.1.252
Querier Port : lag100
Querier UpTime :2h 16m
Querier Expiration Time :2m 14s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.2.1.1              Filter    2         1h 50m    2m 30s
!snip

VLAN ID : 1009
VLAN Name : VLAN1009
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.9.1.252
Querier Port : lag100
Querier UpTime :2h 17m
Querier Expiration Time :2m 14s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.9.1.1              Filter    2         1h 50m    2m 27s

VLAN ID : 1010
VLAN Name : VLAN1010
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.10.1.252
Querier Port : lag100
Querier UpTime :2h 17m
Querier Expiration Time :2m 14s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.10.1.1             Filter    2         1h 50m    2m 28s
```

8320-vsx-pri

Configuration

```
!export-password: default
hostname 8320-vsx-pri
no ip icmp redirect
profile L3-core
ntp server 16.110.135.123 minpoll 4 maxpoll 4 iburst
cli-session
    timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1,10-11,20,22
interface mgmt
    no shutdown
    ip dhcp
interface lag 2 multi-chassis
    no routing
    vlan access 1
    lacp mode active
interface lag 10 multi-chassis
    no shutdown
    description MC_LAG to VTEP1
    no routing
    vlan trunk native 1
    vlan trunk allowed 11
    lacp mode active
interface lag 20 multi-chassis
    no shutdown
    description MC_LAG to VTEP2
    no routing
    vlan trunk native 1
    vlan trunk allowed 20
    lacp mode active
interface lag 100
    no shutdown
    description ISL
    no routing
    vlan trunk native 1 tag
    vlan trunk allowed all
interface 1/1/1
    no shutdown
interface 1/1/9
    no shutdown
interface 1/1/15
    no shutdown
    lag 20
interface 1/1/17
    no shutdown
interface 1/1/18
    no shutdown
interface 1/1/19
    no shutdown
interface 1/1/20
    no shutdown
interface 1/1/33
    no shutdown
    lag 10
interface 1/1/34
    no shutdown
```

```
    lag 10
interface 1/1/39
    no shutdown
interface 1/1/40
    no shutdown
interface 1/1/41
    no shutdown
interface 1/1/42
    no shutdown
interface 1/1/46
    no shutdown
    lag 100
interface 1/1/47
    no shutdown
    lag 100
interface 1/1/48
    no shutdown
    description KA
    ip address 2.1.1.1/30
interface 1/1/51
    no shutdown
    description ROP to Core-VSX-primary
    ip address 30.1.1.1/30
    ip ospf 1 area 0.0.0.0
interface 1/1/52
    no shutdown
    description ROP to Core-VSX-secondary
    ip address 30.2.1.1/30
    ip ospf 1 area 0.0.0.0
interface vlan 11
    vsx active-forwarding
    ip address 11.10.1.3/29
    ip ospf 1 area 0.0.0.1
interface vlan 20
    vsx active-forwarding
    ip address 11.20.2.3/29
    ip ospf 1 area 0.0.0.2
vsx
    inter-switch-link lag 100
    role primary
    keepalive peer 2.1.1.2 source 2.1.1.1
!
!
!
!
!
router ospf 1
    router-id 30.1.1.1
    area 0.0.0.0
    area 0.0.0.1
    area 0.0.0.2
https-server vrf mgmt
```

8320-vsx-sec

Configuration

```
!export-password: default
hostname 8320-vsx-sec
no ip icmp redirect
profile L3-core
```

```
cli-session
    timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1,10-11,20-21
interface mgmt
    no shutdown
    ip dhcp
interface lag 1
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 21
    lacp mode active
interface lag 10 multi-chassis
    no shutdown
    description MC-LAG to VTEP1
    no routing
    vlan trunk native 1
    vlan trunk allowed 11
    lacp mode active
interface lag 20 multi-chassis
    no shutdown
    description MC-LAG to VTEP2
    no routing
    vlan trunk native 1
    vlan trunk allowed 20
    lacp mode active
interface lag 100
    no shutdown
    description ISL
    no routing
    vlan trunk native 1 tag
    vlan trunk allowed all
interface 1/1/1
    no shutdown
interface 1/1/7
    no shutdown
    ip address 30.2.1.1/30
    ip ospf 1 area 0.0.0.0
interface 1/1/9
    no shutdown
interface 1/1/15
    no shutdown
    lag 20
interface 1/1/33
    no shutdown
    lag 10
interface 1/1/34
    no shutdown
    lag 10
interface 1/1/46
    no shutdown
    lag 100
interface 1/1/47
    no shutdown
    lag 100
interface 1/1/48
```

```
    no shutdown
    description KA
    ip address 2.1.1.2/30
interface 1/1/49
    no shutdown
interface 1/1/50
    no shutdown
interface 1/1/51
    no shutdown
    description ROP to Core-VSX-primary
    ip address 30.1.1.5/30
    ip ospf 1 area 0.0.0.0
interface 1/1/52
    no shutdown
    description ROP to Core-VSX-secondary
    ip address 30.2.1.5/30
    ip ospf 1 area 0.0.0.0
interface vlan 11
    vsx active-forwarding
    ip address 11.10.1.2/29
    ip ospf 1 area 0.0.0.1
interface vlan 20
    vsx active-forwarding
    ip address 11.20.2.2/29
    ip ospf 1 area 0.0.0.2
interface vlan 21
    ip address 11.20.1.2/30
    ip ospf 1 area 0.0.0.1
    ip ospf network point-to-point
vsx
    inter-switch-link lag 100
    role secondary
    keepalive peer 2.1.1.1 source 2.1.1.2
mirror session 1
    destination cpu
    source interface 1/1/51 rx
!
!
!
!
!
router ospf 1
    router-id 30.2.1.1
    area 0.0.0.0
    area 0.0.0.1
    area 0.0.0.2
https-server vrf mgmt
```

6300-VSF-VTEP1

```
!export-password: default
hostname 6300-VSF-VTEP1
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vsf secondary-member 2
```

```
vsf member 1
    type jl668a
    link 1 1/1/28
    link 2 1/1/26
vsf member 2
    type jl668a
    link 1 2/1/28
    link 2 2/1/27
vsf member 3
    type jl668a
    link 1 3/1/27
    link 2 3/1/26
vlan 1,11,21
vlan 1001
    ip igmp snooping enable
vlan 1002
    ip igmp snooping enable
vlan 1003
    ip igmp snooping enable
vlan 1004
    ip igmp snooping enable
vlan 1005
    ip igmp snooping enable
vlan 1006
    ip igmp snooping enable
vlan 1007
    ip igmp snooping enable
vlan 1008
    ip igmp snooping enable
vlan 1009
    ip igmp snooping enable
vlan 1010
    ip igmp snooping enable
evpn
    vlan 1001
        rd 172.1.1.1:1001
        route-target export 1001:1001
        route-target import 1001:1001
        redistribute host-route
    vlan 1002
        rd 172.1.1.1:1002
        route-target export 1002:1002
        route-target import 1002:1002
        redistribute host-route
    vlan 1003
        rd 172.1.1.1:1003
        route-target export 1003:1003
        route-target import 1003:1003
        redistribute host-route
    vlan 1004
        rd 172.1.1.1:1004
        route-target export 1004:1004
        route-target import 1004:1004
        redistribute host-route
    vlan 1005
        rd 172.1.1.1:1005
        route-target export 1005:1005
        route-target import 1005:1005
        redistribute host-route
    vlan 1006
        rd 172.1.1.1:1006
        route-target export 1006:1006
```

```
        route-target import 1006:1006
        redistribute host-route
    vlan 1007
        rd 172.1.1.1:1007
        route-target export 1007:1007
        route-target import 1007:1007
        redistribute host-route
    vlan 1008
        rd 172.1.1.1:1008
        route-target export 1008:1008
        route-target import 1008:1008
        redistribute host-route
    vlan 1009
        rd 172.1.1.1:1009
        route-target export 1009:1009
        route-target import 1009:1009
        redistribute host-route
    vlan 1010
        rd 172.1.1.1:1010
        route-target export 1010:1010
        route-target import 1010:1010
        redistribute host-route
spanning-tree
interface mgmt
    no shutdown
    ip dhcp
interface lag 1
    no shutdown
    description MC-LAG to Distro-VSX
    no routing
    vlan trunk native 1
    vlan trunk allowed 11
    lacp mode active
interface 1/1/1
    no shutdown
    no routing
    vlan access 1
interface 1/1/2
    no shutdown
    no routing
    vlan access 1
interface 1/1/3
    no shutdown
    no routing
    vlan access 1
interface 1/1/4
    no shutdown
    no routing
    vlan access 1
interface 1/1/5
    no shutdown
    no routing
    vlan access 1
interface 1/1/6
    no shutdown
    no routing
    vlan access 1
interface 1/1/7
    no shutdown
    no routing
    vlan access 1
interface 1/1/8
```

```
    no shutdown
    no routing
    vlan access 1
interface 1/1/9
    no shutdown
    no routing
    vlan access 1
interface 1/1/10
    no shutdown
    no routing
    vlan access 1
interface 1/1/11
    no shutdown
    no routing
    vlan access 1
interface 1/1/12
    no shutdown
    no routing
    vlan access 1
interface 1/1/13
    no shutdown
    no routing
    vlan access 1
interface 1/1/14
    no shutdown
    no routing
    vlan access 1
interface 1/1/15
    no shutdown
    no routing
    vlan access 1
interface 1/1/16
    no shutdown
    no routing
    vlan access 1
interface 1/1/17
    no shutdown
    no routing
    vlan access 1
interface 1/1/18
    no shutdown
    no routing
    vlan access 1
interface 1/1/19
    no shutdown
    no routing
    vlan access 1
interface 1/1/20
    no shutdown
    no routing
    vlan access 1
interface 1/1/21
    no shutdown
    no routing
    vlan access 1
interface 1/1/22
    no shutdown
    no routing
    vlan access 1
interface 1/1/23
    no shutdown
    no routing
```

```
    vlan access 1
interface 1/1/24
    no shutdown
    no routing
    vlan access 1
interface 1/1/25
    no shutdown
    lag 1
interface 1/1/26
    no shutdown
interface 1/1/27
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 1001-1010
interface 1/1/28
    no shutdown
interface 2/1/1
    no shutdown
    no routing
    vlan access 1
interface 2/1/2
    no shutdown
    no routing
    vlan access 1
interface 2/1/3
    no shutdown
    no routing
    vlan access 1
interface 2/1/4
    no shutdown
    no routing
    vlan access 1
interface 2/1/5
    no shutdown
    no routing
    vlan access 1
interface 2/1/6
    no shutdown
    no routing
    vlan access 1
interface 2/1/7
    no shutdown
    no routing
    vlan access 1
interface 2/1/8
    no shutdown
    no routing
    vlan access 1
interface 2/1/9
    no shutdown
    no routing
    vlan access 1
interface 2/1/10
    no shutdown
    no routing
    vlan access 1
interface 2/1/11
    no shutdown
    no routing
    vlan access 1
interface 2/1/12
```

```
    no shutdown
    no routing
    vlan access 1
interface 2/1/13
    no shutdown
    no routing
    vlan access 1
interface 2/1/14
    no shutdown
    no routing
    vlan access 1
interface 2/1/15
    no shutdown
    no routing
    vlan access 1
interface 2/1/16
    no shutdown
    no routing
    vlan access 1
interface 2/1/17
    no shutdown
    no routing
    vlan access 1
interface 2/1/18
    no shutdown
    no routing
    vlan access 1
interface 2/1/19
    no shutdown
    no routing
    vlan access 1
interface 2/1/20
    no shutdown
    no routing
    vlan access 1
interface 2/1/21
    no shutdown
    no routing
    vlan access 1
interface 2/1/22
    no shutdown
    no routing
    vlan access 1
interface 2/1/23
    no shutdown
    no routing
    vlan access 1
interface 2/1/24
    no shutdown
    no routing
    vlan access 1
interface 2/1/25
    no shutdown
    lag 1
interface 2/1/26
    no shutdown
    lag 1
interface 2/1/27
    no shutdown
interface 2/1/28
    no shutdown
interface 3/1/1
```

```
    no shutdown
    no routing
    vlan access 1
interface 3/1/2
    no shutdown
    no routing
    vlan access 1
interface 3/1/3
    no shutdown
    no routing
    vlan access 1
interface 3/1/4
    no shutdown
    no routing
    vlan access 1
interface 3/1/5
    no shutdown
    no routing
    vlan access 1
interface 3/1/6
    no shutdown
    no routing
    vlan access 1
interface 3/1/7
    no shutdown
    no routing
    vlan access 1
interface 3/1/8
    no shutdown
    no routing
    vlan access 1
interface 3/1/9
    no shutdown
    no routing
    vlan access 1
interface 3/1/10
    no shutdown
    no routing
    vlan access 1
interface 3/1/11
    no shutdown
    no routing
    vlan access 1
interface 3/1/12
    no shutdown
    no routing
    vlan access 1
interface 3/1/13
    no shutdown
    no routing
    vlan access 1
interface 3/1/14
    no shutdown
    no routing
    vlan access 1
interface 3/1/15
    no shutdown
    no routing
    vlan access 1
interface 3/1/16
    no shutdown
    no routing
```

```
    vlan access 1
interface 3/1/17
    no shutdown
    no routing
    vlan access 1
interface 3/1/18
    no shutdown
    no routing
    vlan access 1
interface 3/1/19
    no shutdown
    no routing
    vlan access 1
interface 3/1/20
    no shutdown
    no routing
    vlan access 1
interface 3/1/21
    no shutdown
    no routing
    vlan access 1
interface 3/1/22
    no shutdown
    no routing
    vlan access 1
interface 3/1/23
    no shutdown
    no routing
    vlan access 1
interface 3/1/24
    no shutdown
    no routing
    vlan access 1
interface 3/1/25
    no shutdown
    lag 1
interface 3/1/26
    no shutdown
interface 3/1/27
    no shutdown
interface 3/1/28
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 1001-1010
interface loopback 1
    ip address 172.16.1.1/32
    ip ospf 1 area 0.0.0.1
interface loopback 2
    ip address 172.1.1.1/32
    ip ospf 1 area 0.0.0.1
interface vlan 1
    ip dhcp
interface vlan 11
    ip address 11.10.1.1/29
    ip ospf 1 area 0.0.0.1
interface vlan 21
    ip address 11.20.1.1/30
    ip ospf 1 area 0.0.0.1
    ip ospf network point-to-point
interface vxlan 1
    source ip 172.1.1.1
```

```
    no shutdown
    vni 1001
        vlan 1001
    vni 1002
        vlan 1002
    vni 1003
        vlan 1003
    vni 1004
        vlan 1004
    vni 1005
        vlan 1005
    vni 1006
        vlan 1006
    vni 1007
        vlan 1007
    vni 1008
        vlan 1008
    vni 1009
        vlan 1009
    vni 1010
        vlan 1010
!
!
!
!
!
router ospf 1
    router-id 11.20.1.1
    area 0.0.0.1
router bgp 65535
    bgp router-id 172.16.1.1
    no bgp fast-external-fallover
    neighbor 172.16.1.2 remote-as 65535
    neighbor 172.16.1.2 update-source 172.16.1.1
    neighbor 172.16.1.4 remote-as 65535
    neighbor 172.16.1.4 update-source 172.16.1.1
    neighbor 172.16.1.5 remote-as 65535
    neighbor 172.16.1.5 update-source 172.16.1.1
    address-family l2vpn evpn
        neighbor 172.16.1.2 activate
        neighbor 172.16.1.2 send-community extended
        neighbor 172.16.1.4 activate
        neighbor 172.16.1.4 send-community extended
        neighbor 172.16.1.5 activate
        neighbor 172.16.1.5 send-community extended
    exit-address-family
!
https-server vrf default
https-server vrf mgmt
```

Verification

Verify OSPF neighbors

```
6300-VSF-VTEP1(config)# show ip ospf neighbors
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
```

```
--------------------------------------------------------------------------------
30.1.1.1         1         FULL/DR           11.10.1.3          vlan11

30.2.1.1         1         FULL/BDR          11.10.1.2          vlan11
```

Verify BGP neighbors

```
6300-VSF-VTEP1(config)# show bgp all summary
VRF : default
BGP Summary
-----------
 Local AS               : 65535        BGP Router Identifier  : 172.16.1.1
 Peers                  : 3            Log Neighbor Changes   : No
 Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
 Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
 Neighbor        Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
 172.16.1.2      65535       15521   13377   01d:08h:25m  Established   Up
 172.16.1.4      65535       30068   13611   23h:52m:29s  Established   Up
 172.16.1.5      65535       27204   14966   02h:28m:51s  Established   Up
```

Verify BGP EVPN able

```
6300-VSF-VTEP1(config)# show bgp l2vpn evpn
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
              i internal, e external S Stale, R Removed, a additional-paths
Origin codes: i - IGP, e - EGP, ? - incomplete

EVPN Route-Type 2 prefix: [2]:[ESI]:[EthTag]:[MAC]:[OrigIP]
EVPN Route-Type 3 prefix: [3]:[EthTag]:[OrigIP]
EVPN Route-Type 5 prefix: [5]:[ESI]:[EthTag]:[IPAddrLen]:[IPAddr]
VRF : default
Local Router-ID 172.16.1.1

     Network                                          Nexthop         Metric     LocPrf    Weight   Path
-----------------------------------------------------------------------------------------------------------
Route Distinguisher: 172.1.1.1:1001       (L2VNI 1001)
*>  [2]:[0]:[0]:[00:11:01:00:00:01]:[]                172.1.1.1       0          100        0      ?
*>  [3]:[0]:[172.1.1.1]                               172.1.1.1       0          100        0      ?

Route Distinguisher: 172.1.1.2:1001       (L2VNI 1001)
*>i [2]:[0]:[0]:[00:13:01:00:00:01]:[]                172.1.1.2       0          100        0      ?
*>i [3]:[0]:[172.1.1.2]                               172.1.1.2       0          100        0      ?

Route Distinguisher: 172.1.1.5:1001       (L2VNI 1001)
*>i [2]:[0]:[0]:[00:00:20:00:10:01]:[101.1.1.254]     172.1.1.5       0          100        0      ?
* i [2]:[0]:[0]:[00:00:20:00:10:01]:[101.1.1.254]     172.1.1.5       0          100        0      ?
*>i [2]:[0]:[0]:[b8:d4:e7:5b:2c:00]:[101.1.1.253]     172.1.1.5       0          100        0      ?
*>i [2]:[0]:[0]:[b8:d4:e7:5d:8a:00]:[101.1.1.252]     172.1.1.5       0          100        0      ?
*>i [3]:[0]:[172.1.1.5]                               172.1.1.5       0          100        0      ?
* i [3]:[0]:[172.1.1.5]                               172.1.1.5       0          100        0      ?
```

```
Route Distinguisher: 172.1.1.1:1002       (L2VNI 1002)
*>  [2]:[0]:[0]:[00:11:01:00:00:02]:[]                    172.1.1.1       0          100        0       ?
*>  [3]:[0]:[172.1.1.1]                                   172.1.1.1       0          100        0       ?

Route Distinguisher: 172.1.1.2:1002       (L2VNI 1002)
*>i [2]:[0]:[0]:[00:13:01:00:00:02]:[]                    172.1.1.2       0          100        0       ?
*>i [3]:[0]:[172.1.1.2]                                   172.1.1.2       0          100        0       ?

Route Distinguisher: 172.1.1.5:1002       (L2VNI 1002)
*>i [2]:[0]:[0]:[00:00:20:00:10:01]:[101.2.1.254]         172.1.1.5       0          100        0       ?
* i [2]:[0]:[0]:[00:00:20:00:10:01]:[101.2.1.254]         172.1.1.5       0          100        0       ?
*>i [2]:[0]:[0]:[b8:d4:e7:5b:2c:00]:[101.2.1.253]         172.1.1.5       0          100        0       ?
*>i [2]:[0]:[0]:[b8:d4:e7:5d:8a:00]:[101.2.1.252]         172.1.1.5       0          100        0       ?
*>i [3]:[0]:[172.1.1.5]                                   172.1.1.5       0          100        0       ?
* i [3]:[0]:[172.1.1.5]                                   172.1.1.5       0          100        0       ?
!snip

Route Distinguisher: 172.1.1.1:1009       (L2VNI 1009)
*>  [2]:[0]:[0]:[00:11:01:00:00:09]:[]                    172.1.1.1       0          100        0       ?
*>  [3]:[0]:[172.1.1.1]                                   172.1.1.1       0          100        0       ?

Route Distinguisher: 172.1.1.2:1009       (L2VNI 1009)
*>i [2]:[0]:[0]:[00:13:01:00:00:09]:[]                    172.1.1.2       0          100        0       ?
*>i [3]:[0]:[172.1.1.2]                                   172.1.1.2       0          100        0       ?

Route Distinguisher: 172.1.1.5:1009       (L2VNI 1009)
*>i [2]:[0]:[0]:[00:00:20:00:10:01]:[101.9.1.254]         172.1.1.5       0          100        0       ?
* i [2]:[0]:[0]:[00:00:20:00:10:01]:[101.9.1.254]         172.1.1.5       0          100        0       ?
*>i [2]:[0]:[0]:[b8:d4:e7:5b:2c:00]:[101.9.1.253]         172.1.1.5       0          100        0       ?
*>i [2]:[0]:[0]:[b8:d4:e7:5d:8a:00]:[101.9.1.252]         172.1.1.5       0          100        0       ?
*>i [3]:[0]:[172.1.1.5]                                   172.1.1.5       0          100        0       ?
* i [3]:[0]:[172.1.1.5]                                   172.1.1.5       0          100        0       ?

Route Distinguisher: 172.1.1.1:1010       (L2VNI 1010)
*>  [2]:[0]:[0]:[00:11:01:00:00:0a]:[]                    172.1.1.1       0          100        0       ?
*>  [3]:[0]:[172.1.1.1]                                   172.1.1.1       0          100        0       ?

Route Distinguisher: 172.1.1.2:1010       (L2VNI 1010)
*>i [2]:[0]:[0]:[00:13:01:00:00:0a]:[]                    172.1.1.2       0          100        0       ?
*>i [3]:[0]:[172.1.1.2]                                   172.1.1.2       0          100        0       ?

Route Distinguisher: 172.1.1.5:1010       (L2VNI 1010)
*>i [2]:[0]:[0]:[00:00:20:00:10:01]:[101.10.1.254]        172.1.1.5       0          100        0       ?
* i [2]:[0]:[0]:[00:00:20:00:10:01]:[101.10.1.254]        172.1.1.5       0          100        0       ?
*>i [2]:[0]:[0]:[b8:d4:e7:5b:2c:00]:[101.10.1.253]        172.1.1.5       0          100        0       ?
*>i [2]:[0]:[0]:[b8:d4:e7:5d:8a:00]:[101.10.1.252]        172.1.1.5       0          100        0       ?
*>i [3]:[0]:[172.1.1.5]                                   172.1.1.5       0          100        0       ?
* i [3]:[0]:[172.1.1.5]                                   172.1.1.5       0          100        0       ?
Total number of entries 100
```

Verify VXLAN tunnel, VTEP peers, and VNIs

```
6300-VSF-VTEP1(config)# show interface vxlan vteps
Source           Destination      Origin       Status                VNI       Routing
VLAN  VRF
---------------- ---------------- ------------ --------------------- --------- --------- ---
-- ----
172.1.1.1        172.1.1.2        evpn         operational           1001      disabled
1001   --
172.1.1.1        172.1.1.2        evpn         operational           1002      disabled
```

```
1002   --
172.1.1.1       172.1.1.2       evpn        operational          1003     disabled
1003   --
172.1.1.1       172.1.1.2       evpn        operational          1004     disabled
1004   --
172.1.1.1       172.1.1.2       evpn        operational          1005     disabled
1005   --
172.1.1.1       172.1.1.2       evpn        operational          1006     disabled
1006   --
172.1.1.1       172.1.1.2       evpn        operational          1007     disabled
1007   --
172.1.1.1       172.1.1.2       evpn        operational          1008     disabled
1008   --
172.1.1.1       172.1.1.2       evpn        operational          1009     disabled
1009   --
172.1.1.1       172.1.1.2       evpn        operational          1010     disabled
1010   --
172.1.1.1       172.1.1.5       evpn        operational          1001     disabled
1001   --
172.1.1.1       172.1.1.5       evpn        operational          1002     disabled
1002   --
172.1.1.1       172.1.1.5       evpn        operational          1003     disabled
1003   --
172.1.1.1       172.1.1.5       evpn        operational          1004     disabled
1004   --
172.1.1.1       172.1.1.5       evpn        operational          1005     disabled
1005   --
172.1.1.1       172.1.1.5       evpn        operational          1006     disabled
1006   --
172.1.1.1       172.1.1.5       evpn        operational          1007     disabled
1007   --
172.1.1.1       172.1.1.5       evpn        operational          1008     disabled
1008   --
172.1.1.1       172.1.1.5       evpn        operational          1009     disabled
1009   --
172.1.1.1       172.1.1.5       evpn        operational          1010     disabled
1010   --
```

Verify IGMP snooping

```
6300-VSF-VTEP1(config)# show ip igmp snooping

IGMP Snooping Protocol Info

Total VLANs with IGMP enabled             : 10
Current count of multicast groups joined  : 11

IGMP Drop Unknown Multicast               : Global
VLAN ID : 1001
VLAN Name : VLAN1001
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.1.1.252
Querier Port : vxlan1(172.1.1.5)
Querier UpTime :2h 30m
Querier Expiration Time :2m 23s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.1.1.1              Filter    2         5m 57s    2m 40s
```

```
VLAN ID : 1002
VLAN Name : VLAN1002
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.2.1.252
Querier Port : vxlan1(172.1.1.5)
Querier UpTime :2h 30m
Querier Expiration Time :2m 23s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.2.1.1              Filter    2         5m 55s    2m 35s
!snip

VLAN ID : 1009
VLAN Name : VLAN1009
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.9.1.252
Querier Port : vxlan1(172.1.1.5)
Querier UpTime :2h 30m
Querier Expiration Time :2m 18s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.9.1.1              Filter    2         6m 0s     2m 24s

VLAN ID : 1010
VLAN Name : VLAN1010
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.10.1.252
Querier Port : vxlan1(172.1.1.5)
Querier UpTime :2h 30m
Querier Expiration Time :2m 18s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.10.1.1             Filter    2         5m 55s    2m 21s
```

6300-VTEP2

Configuration

```
!export-password: default
hostname 6300-VTEP2
user admin group administrators password ciphertext
AQBapSlnp7JaPOWttid6/sPULR9294P5Y1I4pcw7Uwm5cXc5YgAAADUrPl5vyqQcFNfTJPou6XByU9MNfY
yHenV88cNMkqrOJ68oAmFuxr5STGHWu409uXdKOkXQACuJTpnYsdNeIvjOT0eRHAonCFHKLlgGVdd72RIk
73gtlO8ED0qCrosc2Nqn
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vsf member 1
    type jl668a
vlan 1,10,20-21
```

```
vlan 1001
    ip igmp snooping enable
vlan 1002
    ip igmp snooping enable
vlan 1003
    ip igmp snooping enable
vlan 1004
    ip igmp snooping enable
vlan 1005
    ip igmp snooping enable
vlan 1006
    ip igmp snooping enable
vlan 1007
    ip igmp snooping enable
vlan 1008
    ip igmp snooping enable
vlan 1009
    ip igmp snooping enable
vlan 1010
    ip igmp snooping enable
evpn
    redistribute local-mac
    vlan 1001
        rd 172.1.1.2:1001
        route-target export 1001:1001
        route-target import 1001:1001
        redistribute host-route
    vlan 1002
        rd 172.1.1.2:1002
        route-target export 1002:1002
        route-target import 1002:1002
        redistribute host-route
    vlan 1003
        rd 172.1.1.2:1003
        route-target export 1003:1003
        route-target import 1003:1003
        redistribute host-route
    vlan 1004
        rd 172.1.1.2:1004
        route-target export 1004:1004
        route-target import 1004:1004
        redistribute host-route
    vlan 1005
        rd 172.1.1.2:1005
        route-target export 1005:1005
        route-target import 1005:1005
        redistribute host-route
    vlan 1006
        rd 172.1.1.2:1006
        route-target export 1006:1006
        route-target import 1006:1006
        redistribute host-route
    vlan 1007
        rd 172.1.1.2:1007
        route-target export 1007:1007
        route-target import 1007:1007
        redistribute host-route
    vlan 1008
        rd 172.1.1.2:1008
        route-target export 1008:1008
        route-target import 1008:1008
        redistribute host-route
```

```
    vlan 1009
        rd 172.1.1.2:1009
        route-target export 1009:1009
        route-target import 1009:1009
        redistribute host-route
    vlan 1010
        rd 172.1.1.2:1010
        route-target export 1010:1010
        route-target import 1010:1010
        redistribute host-route
spanning-tree
interface mgmt
    no shutdown
    ip dhcp
interface lag 10
    no shutdown
    description MC-LAG to Distro VSX
    no routing
    vlan trunk native 1
    vlan trunk allowed 20
    lacp mode active
interface 1/1/1
    no shutdown
    no routing
    vlan access 1
interface 1/1/2
    no shutdown
    no routing
    vlan access 1
interface 1/1/3
    no shutdown
    no routing
    vlan access 1
interface 1/1/4
    no shutdown
    no routing
    vlan access 1
interface 1/1/5
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 1001-1010
interface 1/1/6
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 1001-1010
interface 1/1/7
    no shutdown
    no routing
    vlan access 1
interface 1/1/8
    no shutdown
    no routing
    vlan access 1
interface 1/1/9
    no shutdown
    no routing
    vlan access 1
interface 1/1/10
    no shutdown
    no routing
```

```
    vlan access 1
interface 1/1/11
    no shutdown
    no routing
    vlan access 1
interface 1/1/12
    no shutdown
    no routing
    vlan access 1
interface 1/1/13
    no shutdown
    no routing
    vlan access 1
interface 1/1/14
    no shutdown
    no routing
    vlan access 1
interface 1/1/15
    no shutdown
    no routing
    vlan access 1
interface 1/1/16
    no shutdown
    no routing
    vlan access 1
interface 1/1/17
    no shutdown
    no routing
    vlan access 1
interface 1/1/18
    no shutdown
    no routing
    vlan access 1
interface 1/1/19
    no shutdown
    no routing
    vlan access 1
interface 1/1/20
    no shutdown
    no routing
    vlan access 1
interface 1/1/21
    no shutdown
    no routing
    vlan access 1
interface 1/1/22
    no shutdown
    no routing
    vlan access 1
interface 1/1/23
    no shutdown
    no routing
    vlan access 1
interface 1/1/24
    no shutdown
    no routing
    vlan access 1
interface 1/1/25
    shutdown
    no routing
    vlan access 1
interface 1/1/26
```

```
    shutdown
    no routing
    vlan access 1
interface 1/1/27
    no shutdown
    lag 10
interface 1/1/28
    no shutdown
    lag 10
interface loopback 1
    ip address 172.16.1.2/32
    ip ospf 1 area 0.0.0.2
interface loopback 2
    ip address 172.1.1.2/32
    ip ospf 1 area 0.0.0.2
interface vlan 1
    ip dhcp
interface vlan 20
    ip address 11.20.2.1/29
    ip ospf 1 area 0.0.0.2
interface vxlan 1
    source ip 172.1.1.2
    no shutdown
    vni 1001
        vlan 1001
    vni 1002
        vlan 1002
    vni 1003
        vlan 1003
    vni 1004
        vlan 1004
    vni 1005
        vlan 1005
    vni 1006
        vlan 1006
    vni 1007
        vlan 1007
    vni 1008
        vlan 1008
    vni 1009
        vlan 1009
    vni 1010
        vlan 1010
!
!
!
!
!
router ospf 1
    router-id 11.20.2.1
    area 0.0.0.2
router bgp 65535
    bgp router-id 172.16.1.2
    no bgp fast-external-fallover
    neighbor 172.16.1.1 remote-as 65535
    neighbor 172.16.1.1 update-source 172.16.1.2
    neighbor 172.16.1.4 remote-as 65535
    neighbor 172.16.1.4 update-source 172.16.1.2
    neighbor 172.16.1.5 remote-as 65535
    neighbor 172.16.1.5 update-source 172.16.1.2
    address-family l2vpn evpn
        neighbor 172.16.1.1 activate
```

```
        neighbor 172.16.1.1 send-community extended
        neighbor 172.16.1.4 activate
        neighbor 172.16.1.4 send-community extended
        neighbor 172.16.1.5 activate
        neighbor 172.16.1.5 send-community extended
    exit-address-family
!
https-server vrf default
https-server vrf mgmt
```

Verify OSPF neighbors

```
6300-VTEP2(config)# show ip ospf neighbors
VRF : default                           Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
30.1.1.1         1         FULL/DR           11.20.2.3          vlan20

30.2.1.1         1         FULL/BDR          11.20.2.2          vlan20
```

Verify BGP neighbors

```
6300-VTEP2(config)# show bgp all summary
VRF : default
BGP Summary
-----------
 Local AS               : 65535        BGP Router Identifier  : 172.16.1.2
 Peers                  : 3            Log Neighbor Changes   : No
 Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
 Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
 Neighbor        Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
 172.16.1.1      65535       13423   15570   01d:08h:30m  Established   Up
 172.16.1.4      65535       30063   15780   23h:56m:42s  Established   Up
 172.16.1.5      65535       27210   17141   02h:33m:21s  Established   Up
```

Verify VXLAN tunnel, VTEP peers, and VNIs

```
6300-VTEP2(config)# show interface vxlan vteps
Source           Destination      Origin       Status               VNI       Routing   VLAN  VRF
---------------- ---------------- ------------ -------------------- --------- --------- ----- ----
172.1.1.2        172.1.1.1        evpn         operational          1001      disabled  1001   --
172.1.1.2        172.1.1.1        evpn         operational          1002      disabled  1002   --
172.1.1.2        172.1.1.1        evpn         operational          1003      disabled  1003   --
172.1.1.2        172.1.1.1        evpn         operational          1004      disabled  1004   --
```

```
172.1.1.2        172.1.1.1        evpn         operational           1005      disabled  1005   --
172.1.1.2        172.1.1.1        evpn         operational           1006      disabled  1006   --
172.1.1.2        172.1.1.1        evpn         operational           1007      disabled  1007   --
172.1.1.2        172.1.1.1        evpn         operational           1008      disabled  1008   --
172.1.1.2        172.1.1.1        evpn         operational           1009      disabled  1009   --
172.1.1.2        172.1.1.1        evpn         operational           1010      disabled  1010   --
172.1.1.2        172.1.1.5        evpn         operational           1001      disabled  1001   --
172.1.1.2        172.1.1.5        evpn         operational           1002      disabled  1002   --
172.1.1.2        172.1.1.5        evpn         operational           1003      disabled  1003   --
172.1.1.2        172.1.1.5        evpn         operational           1004      disabled  1004   --
172.1.1.2        172.1.1.5        evpn         operational           1005      disabled  1005   --
172.1.1.2        172.1.1.5        evpn         operational           1006      disabled  1006   --
172.1.1.2        172.1.1.5        evpn         operational           1007      disabled  1007   --
172.1.1.2        172.1.1.5        evpn         operational           1008      disabled  1008   --
172.1.1.2        172.1.1.5        evpn         operational           1009      disabled  1009   --
172.1.1.2        172.1.1.5        evpn         operational           1010      disabled  1010   --
```

Verify BGP EVPN table

```
6300-VTEP2(config)# show bgp l2vpn evpn
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
              i internal, e external S Stale, R Removed, a additional-paths
Origin codes: i - IGP, e - EGP, ? - incomplete

EVPN Route-Type 2 prefix: [2]:[ESI]:[EthTag]:[MAC]:[OrigIP]
EVPN Route-Type 3 prefix: [3]:[EthTag]:[OrigIP]
EVPN Route-Type 5 prefix: [5]:[ESI]:[EthTag]:[IPAddrLen]:[IPAddr]
VRF : default
Local Router-ID 172.16.1.2

     Network                                          Nexthop         Metric     LocPrf    Weight   Path
-------------------------------------------------------------------------------------------------------------
Route Distinguisher: 172.1.1.1:1001       (L2VNI 1001)
*>i [2]:[0]:[0]:[00:11:01:00:00:01]:[]                172.1.1.1       0          100       0       ?
*>i [3]:[0]:[172.1.1.1]                               172.1.1.1       0          100       0       ?

Route Distinguisher: 172.1.1.2:1001       (L2VNI 1001)
*>  [2]:[0]:[0]:[00:13:01:00:00:01]:[]                172.1.1.2       0          100       0       ?
*>  [3]:[0]:[172.1.1.2]                               172.1.1.2       0          100       0       ?

Route Distinguisher: 172.1.1.5:1001       (L2VNI 1001)
*>i [2]:[0]:[0]:[00:00:20:00:10:01]:[101.1.1.254]     172.1.1.5       0          100       0       ?
* i [2]:[0]:[0]:[00:00:20:00:10:01]:[101.1.1.254]     172.1.1.5       0          100       0       ?
*>i [2]:[0]:[0]:[b8:d4:e7:5b:2c:00]:[101.1.1.253]     172.1.1.5       0          100       0       ?
*>i [2]:[0]:[0]:[b8:d4:e7:5d:8a:00]:[101.1.1.252]     172.1.1.5       0          100       0       ?
*>i [3]:[0]:[172.1.1.5]                               172.1.1.5       0          100       0       ?
* i [3]:[0]:[172.1.1.5]                               172.1.1.5       0          100       0       ?

Route Distinguisher: 172.1.1.1:1002       (L2VNI 1002)
*>i [2]:[0]:[0]:[00:11:01:00:00:02]:[]                172.1.1.1       0          100       0       ?
*>i [3]:[0]:[172.1.1.1]                               172.1.1.1       0          100       0       ?

Route Distinguisher: 172.1.1.2:1002       (L2VNI 1002)
*>  [2]:[0]:[0]:[00:13:01:00:00:02]:[]                172.1.1.2       0          100       0       ?
*>  [3]:[0]:[172.1.1.2]                               172.1.1.2       0          100       0       ?

Route Distinguisher: 172.1.1.5:1002       (L2VNI 1002)
*>i [2]:[0]:[0]:[00:00:20:00:10:01]:[101.2.1.254]     172.1.1.5       0          100       0       ?
* i [2]:[0]:[0]:[00:00:20:00:10:01]:[101.2.1.254]     172.1.1.5       0          100       0       ?
*>i [2]:[0]:[0]:[b8:d4:e7:5b:2c:00]:[101.2.1.253]     172.1.1.5       0          100       0       ?
*>i [2]:[0]:[0]:[b8:d4:e7:5d:8a:00]:[101.2.1.252]     172.1.1.5       0          100       0       ?
```

```
*>i [3]:[0]:[172.1.1.5]                                 172.1.1.5       0          100        0       ?
* i [3]:[0]:[172.1.1.5]                                 172.1.1.5       0          100        0       ?

!snip

Route Distinguisher: 172.1.1.2:1010       (L2VNI 1010)
*>  [2]:[0]:[0]:[00:13:01:00:00:0a]:[]                  172.1.1.2       0          100        0       ?
*>  [3]:[0]:[172.1.1.2]                                 172.1.1.2       0          100        0       ?

Route Distinguisher: 172.1.1.5:1010       (L2VNI 1010)
*>i [2]:[0]:[0]:[00:00:20:00:10:01]:[101.10.1.254]      172.1.1.5       0          100        0       ?
* i [2]:[0]:[0]:[00:00:20:00:10:01]:[101.10.1.254]      172.1.1.5       0          100        0       ?
*>i [2]:[0]:[0]:[b8:d4:e7:5b:2c:00]:[101.10.1.253]      172.1.1.5       0          100        0       ?
*>i [2]:[0]:[0]:[b8:d4:e7:5d:8a:00]:[101.10.1.252]      172.1.1.5       0          100        0       ?
*>i [3]:[0]:[172.1.1.5]                                 172.1.1.5       0          100        0       ?
* i [3]:[0]:[172.1.1.5]                                 172.1.1.5       0          100        0       ?
Total number of entries 100
```

Verify IGMP snooping

```
6300-VTEP2(config)# show ip igmp snooping

IGMP Snooping Protocol Info

Total VLANs with IGMP enabled             : 10
Current count of multicast groups joined  : 10

IGMP Drop Unknown Multicast               : Global
VLAN ID : 1001
VLAN Name : VLAN1001
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.1.1.252
Querier Port : vxlan1(172.1.1.5)
Querier UpTime :10m 19s
Querier Expiration Time :2m 20s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.1.1.1              Filter    2         10m 10s   2m 29s

VLAN ID : 1002
VLAN Name : VLAN1002
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.2.1.252
Querier Port : vxlan1(172.1.1.5)
Querier UpTime :10m 19s
Querier Expiration Time :2m 20s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.2.1.1              Filter    2         10m 14s   2m 34s

VLAN ID : 1003
VLAN Name : VLAN1003
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.3.1.252
Querier Port : vxlan1(172.1.1.5)
Querier UpTime :10m 19s
```

```
Querier Expiration Time :2m 15s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.3.1.1              Filter    2         10m 15s   2m 19s

VLAN ID : 1004
VLAN Name : VLAN1004
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.4.1.252
Querier Port : vxlan1(172.1.1.5)
Querier UpTime :10m 19s
Querier Expiration Time :2m 15s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.4.1.1              Filter    2         10m 11s   2m 19s

VLAN ID : 1005
VLAN Name : VLAN1005
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.5.1.252
Querier Port : vxlan1(172.1.1.5)
Querier UpTime :10m 19s
Querier Expiration Time :2m 15s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.5.1.1              Filter    2         10m 16s   2m 24s

VLAN ID : 1006
VLAN Name : VLAN1006
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.6.1.252
Querier Port : vxlan1(172.1.1.5)
Querier UpTime :10m 19s
Querier Expiration Time :2m 15s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.6.1.1              Filter    2         10m 13s   2m 18s

VLAN ID : 1007
VLAN Name : VLAN1007
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.7.1.252
Querier Port : vxlan1(172.1.1.5)
Querier UpTime :10m 19s
Querier Expiration Time :2m 15s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.7.1.1              Filter    2         10m 12s   2m 25s

VLAN ID : 1008
VLAN Name : VLAN1008
IGMP Configured Version : 3
IGMP Operating Version : 3
```

```
Querier Address : 101.8.1.252
Querier Port : vxlan1(172.1.1.5)
Querier UpTime :10m 19s
Querier Expiration Time :2m 15s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.8.1.1              Filter    2         10m 17s   2m 24s

VLAN ID : 1009
VLAN Name : VLAN1009
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.9.1.252
Querier Port : vxlan1(172.1.1.5)
Querier UpTime :10m 19s
Querier Expiration Time :2m 15s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.9.1.1              Filter    2         10m 12s   2m 19s

VLAN ID : 1010
VLAN Name : VLAN1010
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 101.10.1.252
Querier Port : vxlan1(172.1.1.5)
Querier UpTime :10m 19s
Querier Expiration Time :2m 15s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.10.1.1             Filter    2         10m 11s   2m 22s
```

Anycast RP support

To configure anycast RP between core VSX VTEPs, use the following configurations:



MSDP peering must be enabled in the tenant VRF, and in this use case, it is the default VRF.

Configuration

Core-vsx-primary

```
  interface loopback 10
    ip address 11.0.0.1/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface loopback 11
    ip address 11.0.0.12/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable

router pim
    enable
    rp-candidate source-ip-interface loopback10 group-prefix 224.0.0.0/4
    bsr-candidate source-ip-interface loopback11
```

```
router msdp
    enable
    ip msdp peer 11.0.0.13
        connect-source loopback11
        enable
        mesh-group mesh1
```

Core-vsx-secondary

```
    interface loopback 10
    ip address 11.0.0.1/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface loopback 11
    ip address 11.0.0.13/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable

router pim
    enable
    rp-candidate source-ip-interface loopback10 group-prefix 224.0.0.0/4
    bsr-candidate source-ip-interface loopback11
router msdp
    enable
    ip msdp peer 11.0.0.12
        connect-source loopback11
        enable
        mesh-group mesh1
```

Verify MSDP peer information

Verify whether the peer state is up. For that the peer must be enabled and there must be a unicast path to peer IP.

```
core-vsx-primary# show ip msdp peer all-vrfs

VRF: default

MSDP Peer: 11.0.0.13
Connection status
State: up  Resets: 0  Connection Source: loopback11(11.0.0.12)
Uptime(Downtime): 32m 54s   SA Messages sent: 19
SA's learned from this peer: 1
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1
```

Verify MSDP peer summary

The show command can be used to verify MSDP peer summary on the core VSX secondary.

```
core-vsx-primary# show ip msdp summary all-vrfs
VRF: default

MSDP Peer Status Summary
Peer address    State    Uptime(Downtime)    Reset Count    SA Count
```

```
11.0.0.13       up       32m 59s             0              1
```

Verify MSDP peer count

This show command can be used to verify MSDP peer count on the core VSX secondary.

```
core-vsx-primary# show ip msdp count all-vrfs

VRF: default
SA state per Peer counters
<Peer>:<#SA learned>

11.0.0.13: 2

Total entries: 2
```

Verify MSDP peer SA-Cache information

This show command is used to verify sa-cache to check if the flow is listed. With the exception of the RP near to the multicast source, all other RP learn the source information via SA message exchange and stored in the SA-Cache.

```
Core-vsx-primary# show ip msdp sa-cache all-vrfs

VRF: default
Total entries: 2

(60.1.1.2, 227.1.1.1)  RP: 11.0.0.1  Peer: 11.0.0.13
(60.1.1.2, 228.1.1.1)  RP: 11.0.0.1  Peer: 11.0.0.13
```

Verify the active multicast flows that are registered by source DR to this RP. The anycast RP that is near to the multicast source will have this entry updated and the remaining RP will have the SA-Cache updated.

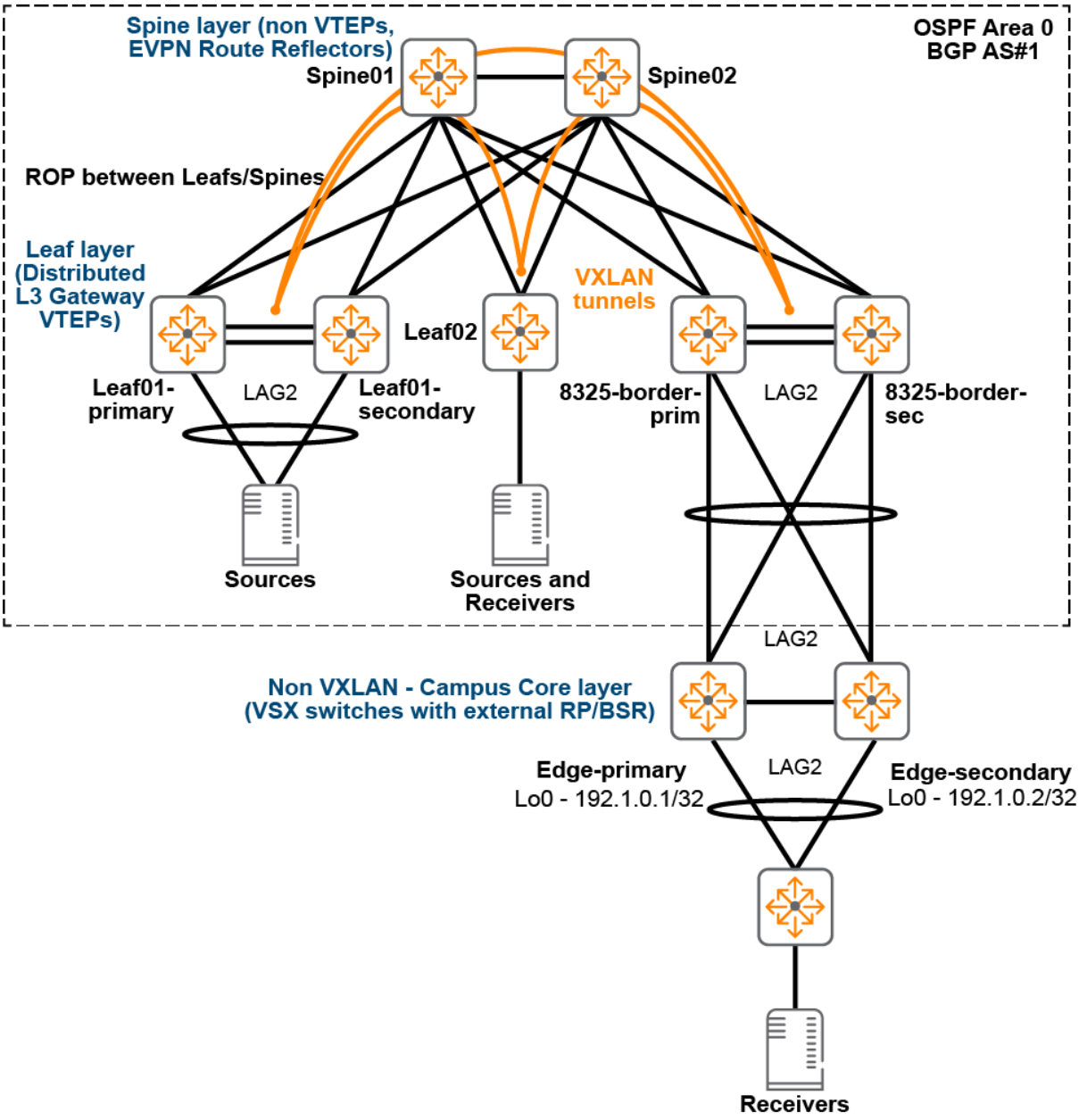
```
switch# show ip pim rp-registered-sources all-vrfs

Multicast flows registered with this RP
VRF : default
Total number of entries : 2
Source Address           Group Address           RP Address
--------------------     --------------------    --------------------
60.1.1.2                 227.1.1.1               11.0.0.1
60.1.1.2                 228.1.1.1               11.0.0.1
```

Use case 2: DC network with distributed L3 gateway

This use case shows sample configurations and relevant verification commands for a DC network with distributed L3 gateway, external BSR/RPs on a non-VXLAN network, sources in DC VXLAN network, and receivers in a non-VXLAN network.

Figure 1 *DC network with distributed L3 gateway topology*



Configuration and verification details for the devices in this use case are provided in the following sections:

- Spine01
- Spine02
- Leaf01-primary
- Leaf01-secondary
- Leaf02
- 8325-border-prim
- 8325-border-sec
- Edge-primary
- Edge-secondary

Spine01

Configuration

```
!export-password: default
hostname Spine01
module 1/1 product-number jl363a
cli-session
    timeout 0
!
!
!
ssh server vrf mgmt
vlan 1
interface mgmt
    no shutdown
    ip dhcp
interface 1/1/4
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 20.0.0.2/30
    ip ospf 1 area 0.0.0.0
interface 1/1/5
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 21.0.0.2/30
    ip ospf 1 area 0.0.0.0
interface 1/1/6
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 22.0.0.2/30
    ip ospf 1 area 0.0.0.0
interface 1/1/28
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 24.0.0.2/30
    ip ospf 1 area 0.0.0.0
interface 1/1/29
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 25.0.0.2/30
    ip ospf 1 area 0.0.0.0
interface loopback 0
    ip address 4.4.4.4/32
    ip ospf 1 area 0.0.0.0
!
!
!
!
!
router ospf 1
    router-id 44.44.44.44
    area 0.0.0.0
router bgp 1
    bgp router-id 4.4.4.4
    neighbor 1.1.1.1 remote-as 1
    neighbor 1.1.1.1 update-source loopback 0
    neighbor 1.1.2.1 remote-as 1
    neighbor 1.1.2.1 update-source loopback 0
    neighbor 6.6.6.6 remote-as 1
```

```
    neighbor 6.6.6.6 update-source loopback 0
    neighbor 109.0.0.1 remote-as 1
    neighbor 109.0.0.1 update-source loopback 0
    neighbor 110.0.0.1 remote-as 1
    neighbor 110.0.0.1 update-source loopback 0
    address-family ipv4 unicast
        redistribute connected
    exit-address-family
    address-family l2vpn evpn
        neighbor 1.1.1.1 activate
        neighbor 1.1.1.1 route-reflector-client
        neighbor 1.1.1.1 send-community extended
        neighbor 1.1.2.1 activate
        neighbor 1.1.2.1 route-reflector-client
        neighbor 1.1.2.1 send-community extended
        neighbor 6.6.6.6 activate
        neighbor 6.6.6.6 route-reflector-client
        neighbor 6.6.6.6 send-community extended
        neighbor 109.0.0.1 activate
        neighbor 109.0.0.1 route-reflector-client
        neighbor 109.0.0.1 send-community extended
        neighbor 110.0.0.1 activate
        neighbor 110.0.0.1 route-reflector-client
        neighbor 110.0.0.1 send-community extended
    exit-address-family
!
https-server vrf mgmt
```

Spine02

Configuration

```
!export-password: default
hostname Spine02
profile Spine
cli-session
    timeout 0
!
!
!
ssh server vrf mgmt
vlan 1
interface mgmt
    no shutdown
    ip dhcp
system interface-group 1 speed 10g
    !interface group 1 contains ports 1/1/1-1/1/12
system interface-group 3 speed 10g
    !interface group 3 contains ports 1/1/25-1/1/36
system interface-group 4 speed 10g
    !interface group 4 contains ports 1/1/37-1/1/48
interface 1/1/1
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 20.0.0.6/30
    ip ospf 1 area 0.0.0.0
interface 1/1/2
    no shutdown
    mtu 9198
    ip mtu 9198
```

```
    ip address 21.0.0.6/30
    ip ospf 1 area 0.0.0.0
interface 1/1/5
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 22.0.0.6/30
    ip ospf 1 area 0.0.0.0
interface 1/1/41
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 24.0.0.6/30
    ip ospf 1 area 0.0.0.0
interface 1/1/42
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 25.0.0.6/30
    ip ospf 1 area 0.0.0.0
interface loopback 0
    ip address 5.5.5.5/32
    ip ospf 1 area 0.0.0.0
!
!
!
!
!
router ospf 1
    router-id 45.45.45.45
    area 0.0.0.0
router bgp 1
    bgp router-id 5.5.5.5
    neighbor 1.1.1.1 remote-as 1
    neighbor 1.1.1.1 update-source loopback 0
    neighbor 1.1.2.1 remote-as 1
    neighbor 1.1.2.1 update-source loopback 0
    neighbor 6.6.6.6 remote-as 1
    neighbor 6.6.6.6 update-source loopback 0
    neighbor 109.0.0.1 remote-as 1
    neighbor 109.0.0.1 update-source loopback 0
    neighbor 110.0.0.1 remote-as 1
    neighbor 110.0.0.1 update-source loopback 0
    address-family ipv4 unicast
        redistribute connected
    exit-address-family
    address-family l2vpn evpn
        neighbor 1.1.1.1 activate
        neighbor 1.1.1.1 route-reflector-client
        neighbor 1.1.1.1 send-community extended
        neighbor 1.1.2.1 activate
        neighbor 1.1.2.1 route-reflector-client
        neighbor 1.1.2.1 send-community extended
        neighbor 6.6.6.6 activate
        neighbor 6.6.6.6 route-reflector-client
        neighbor 6.6.6.6 send-community extended
        neighbor 109.0.0.1 activate
        neighbor 109.0.0.1 route-reflector-client
        neighbor 109.0.0.1 send-community extended
        neighbor 110.0.0.1 activate
        neighbor 110.0.0.1 route-reflector-client
        neighbor 110.0.0.1 send-community extended
```

```
    exit-address-family
!
https-server vrf mgmt
```

Leaf01-primary

Configuration

```
!export-password: default
hostname Leaf01-primary
profile Leaf
vrf DC
    rd 192.1.0.10:1
    route-target export 65501:1 evpn
    route-target import 65501:1 evpn
cli-session
    timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 101
    ip igmp snooping enable
vlan 102
    ip igmp snooping enable
vlan 103
    ip igmp snooping enable
vlan 104
    ip igmp snooping enable
vlan 105
    ip igmp snooping enable
vlan 106
    ip igmp snooping enable
vlan 107
    ip igmp snooping enable
vlan 108
    ip igmp snooping enable
vlan 109
    ip igmp snooping enable
vlan 110
    ip igmp snooping enable
vlan 111
    ip igmp snooping enable
vlan 900
    description DC_Leaf_L3
vlan 1111
virtual-mac 00:00:00:0a:0a:0a
evpn
    redistribute local-svi
    vlan 101
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 102
        rd auto
        route-target export auto
        route-target import auto
```

```
        redistribute host-route
    vlan 103
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 104
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 105
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 106
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 107
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 108
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 109
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 110
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 111
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
interface mgmt
    no shutdown
    ip dhcp
system interface-group 1 speed 10g
    !interface group 1 contains ports 1/1/1-1/1/12
system interface-group 2 speed 10g
    !interface group 2 contains ports 1/1/13-1/1/24
system interface-group 3 speed 10g
    !interface group 3 contains ports 1/1/25-1/1/36
system interface-group 4 speed 10g
    !interface group 4 contains ports 1/1/37-1/1/48
interface lag 1
    no shutdown
    no routing
    vlan trunk native 1 tag
    vlan trunk allowed all
```

```
    lacp mode active
interface lag 2 multi-chassis
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 101-111
    lacp mode active
interface 1/1/5
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 20.0.0.1/30
    ip ospf 1 area 0.0.0.0
interface 1/1/6
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 20.0.0.5/30
    ip ospf 1 area 0.0.0.0
interface 1/1/7
    no shutdown
    mtu 9198
    lag 2
interface 1/1/32
    no shutdown
    mtu 9198
    lag 1
interface 1/1/33
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 192.168.1.1/30
interface loopback 0
    ip address 1.1.1.1/32
    ip ospf 1 area 0.0.0.0
interface loopback 1
    ip address 192.1.0.10/32
    ip ospf 1 area 0.0.0.0
interface vlan 101
    vrf attach DC
    ip address 192.1.1.2/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.1.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 102
    vrf attach DC
    ip address 192.1.2.2/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.2.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 103
    vrf attach DC
    ip address 192.1.3.2/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.3.1
    ip igmp enable
```

```
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 104
    vrf attach DC
    ip address 192.1.4.2/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.4.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 105
    vrf attach DC
    ip address 192.1.5.2/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.5.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 106
    vrf attach DC
    ip address 192.1.6.2/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.6.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 107
    vrf attach DC
    ip address 192.1.7.2/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.7.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 108
    vrf attach DC
    ip address 192.1.8.2/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.8.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 109
    vrf attach DC
    ip address 192.1.9.2/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.9.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 110
    vrf attach DC
    ip address 192.1.10.2/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.10.1
```

```
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 111
    vrf attach DC
    ip address 192.1.11.2/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.11.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 900
    description DC_Leaf_L3
    ip mtu 9198
    ip address 192.1.240.2/31
    ip ospf 1 area 0.0.0.0
    ip ospf cost 50
    ip ospf network point-to-point
interface vxlan 1
    source ip 192.1.0.10
    no shutdown
    vni 100
    vni 101
        vlan 101
    vni 102
        vlan 102
    vni 103
        vlan 103
    vni 104
        vlan 104
    vni 105
        vlan 105
    vni 106
        vlan 106
    vni 107
        vlan 107
    vni 108
        vlan 108
    vni 109
        vlan 109
    vni 110
        vlan 110
    vni 111
        vlan 111
    vni 100001
        vrf DC
        routing
vsx
    system-mac 00:00:00:0a:0a:0a
    inter-switch-link lag 1
    role primary
    keepalive peer 192.168.1.2 source 192.168.1.1
    no split-recovery
    vsx-sync evpn
!
!
!
!
!
router ospf 1
```

```
    router-id 11.11.11.11
    area 0.0.0.0
router bgp 1
    bgp router-id 1.1.1.1
    no bgp fast-external-fallover
    neighbor 4.4.4.4 remote-as 1
    neighbor 4.4.4.4 update-source loopback 0
    neighbor 5.5.5.5 remote-as 1
    neighbor 5.5.5.5 update-source loopback 0
    address-family ipv4 unicast
        redistribute connected
    exit-address-family
    address-family l2vpn evpn
        neighbor 4.4.4.4 activate
        neighbor 4.4.4.4 send-community extended
        neighbor 5.5.5.5 activate
        neighbor 5.5.5.5 send-community extended
    exit-address-family
!
    vrf DC
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
            redistribute static
        exit-address-family
!
router pim vrf DC
    enable
https-server vrf mgmt
```

Verification

Verify OSPF neighbors

```
Leaf01-primary# show ip ospf neighbors all-vrfs
VRF : default                              Process : 1
================================================
Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
44.44.44.44      1         FULL/DR           20.0.0.2           1/1/5
45.45.45.45      1         FULL/DR           20.0.0.6           1/1/6
```

Verify BGP EVPN neighbors

```
Leaf01-primary# show bgp l2vpn evpn summary
VRF : default
BGP Summary
-----------
Local AS               : 1            BGP Router Identifier  : 1.1.1.1
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Neighbor        Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
4.4.4.4         1           167     93      00h:11m:41s  Established   Up
5.5.5.5         1           168     93      00h:11m:41s  Established   Up
```

Verify VXLAN tunnel, VTEP peers, and VNIs

```
Leaf01-primary# show interface vxlan vteps
Source           Destination      Origin       Status                VNI       Routing
VLAN  VRF
---------------- ---------------- ------------ --------------------- --------- --------- ---
-- ----
192.1.0.10       192.1.0.7        evpn         operational           101       disabled  101
   --
192.1.0.10       192.1.0.7        evpn         operational           102       disabled  102
   --
192.1.0.10       192.1.0.7        evpn         operational           103       disabled  103
   --
192.1.0.10       192.1.0.7        evpn         operational           104       disabled  104
   --
192.1.0.10       192.1.0.7        evpn         operational           105       disabled  105
   --
192.1.0.10       192.1.0.7        evpn         operational           106       disabled  106
   --
192.1.0.10       192.1.0.7        evpn         operational           107       disabled  107
   --
192.1.0.10       192.1.0.7        evpn         operational           108       disabled  108
   --
192.1.0.10       192.1.0.7        evpn         operational           109       disabled  109
   --
192.1.0.10       192.1.0.7        evpn         operational           110       disabled  110
   --
192.1.0.10       192.1.0.7        evpn         operational           100001    enabled   --
   DC
192.1.0.10       192.1.0.17       evpn         operational           101       disabled  101
   --
192.1.0.10       192.1.0.17       evpn         operational           102       disabled  102
   --
192.1.0.10       192.1.0.17       evpn         operational           103       disabled  103
   --
192.1.0.10       192.1.0.17       evpn         operational           104       disabled  104
   --
192.1.0.10       192.1.0.17       evpn         operational           105       disabled  105
   --
192.1.0.10       192.1.0.17       evpn         operational           106       disabled  106
   --
192.1.0.10       192.1.0.17       evpn         operational           107       disabled  107
   --
192.1.0.10       192.1.0.17       evpn         operational           108       disabled  108
   --
192.1.0.10       192.1.0.17       evpn         operational           109       disabled  109
   --
192.1.0.10       192.1.0.17       evpn         operational           110       disabled  110
   --
192.1.0.10       192.1.0.17       evpn         operational           100001    enabled   --
   DC
```

Verify PIM neighbors

```
Leaf01-primary# show ip pim neighbor all-vrfs

PIM Neighbor


VRF                         : DC
Total number of neighbors : 43

IP Address                  : 192.1.0.7
```

```
Interface                 : vni100001
Up Time (HH:MM:SS)        : 00:12:01
Expire Time (HH:MM:SS)    : 00:03:05
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:03:30

IP Address                : 192.1.0.17
Interface                 : vni100001
Up Time (HH:MM:SS)        : 00:11:25
Expire Time (HH:MM:SS)    : 00:03:05
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:03:30

IP Address                : 192.1.1.3
Interface                 : vlan101
Up Time (HH:MM:SS)        : 00:12:53
Expire Time (HH:MM:SS)    : 00:01:23
DR Priority               : 167772608
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses :
 192.1.1.1

! snip
IP Address                : 192.1.11.3
Interface                 : vlan111
Up Time (HH:MM:SS)        : 00:12:58
Expire Time (HH:MM:SS)    : 00:01:17
DR Priority               : 167772608
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses :
 192.1.11.1
```

Verify RP information

```
Leaf01-primary# show ip pim rp-set all-vrfs

VRF: DC

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
---------------  ---------------  ---------------  ---------  -----------
224.0.0.0        240.0.0.0        192.1.0.1        150        124
224.0.0.0        240.0.0.0        192.1.0.2        150        124
```

Verify BSR information

```
Leaf01-primary# show ip pim bsr elected all-vrfs

Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                       : DC
E-BSR Address             : 192.1.0.2
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 10 mins 30 secs
Next Bootstrap Message    : 1 mins 40 secs
```

Verify mroutes

```
Leaf01-primary# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : DC
Total number of entries : 39

Group Address           : 225.1.1.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101

Group Address           : 225.1.2.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101

Group Address           : 225.1.2.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan102

Group Address           : 225.1.3.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan103
! snip

Group Address           : 230.1.1.1
Source Address          : 192.1.11.12
Neighbor                :
Incoming interface      : vlan111
Outgoing Interface List :
Interface       State
-----------     ----------
vni100001       forwarding

Group Address           : 230.1.2.1
Source Address          : 192.1.11.12
Neighbor                :
Incoming interface      : vlan111
Outgoing Interface List :
Interface       State
-----------     ----------
vni100001       forwarding

Group Address           : 230.1.3.1
Source Address          : 192.1.11.12
Neighbor                :
Incoming interface      : vlan111
Outgoing Interface List :
Interface       State
-----------     ----------
vni100001       forwarding

Group Address           : 230.1.4.1
Source Address          : 192.1.11.12
Neighbor                :
Incoming interface      : vlan111
Outgoing Interface List :
Interface       State
-----------     ----------
vni100001       forwarding
```

Verify PIM interfaces

```
Leaf01-primary# show ip pim interface vlan 101

PIM Interfaces

VRF: DC

Interface  : vlan101
Neighbor count : 4
IP Address : 192.1.1.2/24
Mode       : sparse
Designated Router : 192.1.1.4
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 167772608
Neighbor Timeout          : 91


Leaf01-primary# show ip pim interface vlan 110

PIM Interfaces

VRF: DC

Interface  : vlan110
Neighbor count : 4
IP Address : 192.1.10.2/24
Mode       : sparse
Designated Router : 192.1.10.4
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 167772608
Neighbor Timeout          : 93


Leaf01-primary# show ip pim interface vlan 111

PIM Interfaces

VRF: DC

Interface  : vlan111
Neighbor count : 1
IP Address : 192.1.11.2/24
Mode       : sparse
Designated Router : 192.1.11.2
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1
```

```
Operational DR Priority   : 167772608
Neighbor Timeout          : 83
```

Verify BGP EVPN table

```
Leaf01-primary# show bgp l2vpn evpn
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
              i internal, e external S Stale, R Removed, a additional-paths
Origin codes: i - IGP, e - EGP, ? - incomplete

EVPN Route-Type 2 prefix: [2]:[ESI]:[EthTag]:[MAC]:[OrigIP]
EVPN Route-Type 3 prefix: [3]:[EthTag]:[OrigIP]
EVPN Route-Type 5 prefix: [5]:[ESI]:[EthTag]:[IPAddrLen]:[IPAddr]
VRF : default
Local Router-ID 1.1.1.1

     Network                                          Nexthop         Metric     LocPrf    Weight   Path
-------------------------------------------------------------------------------------------------------------
Route Distinguisher: 192.1.0.10:101       (L2VNI 101)
*>  [2]:[0]:[0]:[00:11:01:00:00:01]:[192.1.1.11]           192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:11:01:00:00:01]:[]                     192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:12:01:00:00:01]:[192.1.1.12]           192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:12:01:00:00:01]:[]                     192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]            192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.1.3]           192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.1.3]           192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.1.2]           192.1.0.10      0          100        0       ?
*>  [3]:[0]:[192.1.0.10]                                  192.1.0.10      0          100        0       ?

Route Distinguisher: 192.1.0.17:101       (L2VNI 101)
*>i [2]:[0]:[0]:[00:13:01:00:00:01]:[192.1.1.13]          192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:13:01:00:00:01]:[192.1.1.13]          192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[00:13:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:13:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[00:14:01:00:00:01]:[192.1.1.23]          192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:14:01:00:00:01]:[192.1.1.23]          192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[00:14:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:14:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[54:80:28:3c:00:00]:[192.1.1.4]           192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[54:80:28:3c:00:00]:[192.1.1.4]           192.1.0.17      0          100        0       ?
*>i [3]:[0]:[192.1.0.17]                                  192.1.0.17      0          100        0       ?
* i [3]:[0]:[192.1.0.17]                                  192.1.0.17      0          100        0       ?

Route Distinguisher: 192.1.0.7:101        (L2VNI 101)
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.1.6]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.1.6]          192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.1.7]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.1.7]          192.1.0.7       0          100        0       ?
*>i [3]:[0]:[192.1.0.7]                                  192.1.0.7       0          100        0       ?
* i [3]:[0]:[192.1.0.7]                                  192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.10:102       (L2VNI 102)
*>  [2]:[0]:[0]:[00:11:01:00:00:02]:[192.1.2.11]           192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:11:01:00:00:02]:[]                     192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:12:01:00:00:02]:[192.1.2.12]           192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:12:01:00:00:02]:[]                     192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.2.1]            192.1.0.10      0          100        0       ?
```

```
* i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.2.3]            192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.2.3]            192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.2.2]            192.1.0.10      0          100        0       ?
*>  [3]:[0]:[192.1.0.10]                                   192.1.0.10      0          100        0       ?

!snip

Route Distinguisher: 192.1.0.10:1         (L3VNI 100001)
*>  [5]:[0]:[0]:[24]:[192.1.1.0]                           192.1.0.10      0          100        0       ?
*>  [5]:[0]:[0]:[24]:[192.1.10.0]                          192.1.0.10      0          100        0       ?
*>  [5]:[0]:[0]:[24]:[192.1.11.0]                          192.1.0.10      0          100        0       ?
*>  [5]:[0]:[0]:[24]:[192.1.2.0]                           192.1.0.10      0          100        0       ?
*>  [5]:[0]:[0]:[24]:[192.1.3.0]                           192.1.0.10      0          100        0       ?
*>  [5]:[0]:[0]:[24]:[192.1.4.0]                           192.1.0.10      0          100        0       ?
*>  [5]:[0]:[0]:[24]:[192.1.5.0]                           192.1.0.10      0          100        0       ?
*>  [5]:[0]:[0]:[24]:[192.1.6.0]                           192.1.0.10      0          100        0       ?
*>  [5]:[0]:[0]:[24]:[192.1.7.0]                           192.1.0.10      0          100        0       ?
*>  [5]:[0]:[0]:[24]:[192.1.8.0]                           192.1.0.10      0          100        0       ?
*>  [5]:[0]:[0]:[24]:[192.1.9.0]                           192.1.0.10      0          100        0       ?

Route Distinguisher: 192.1.0.10:101       (L3VNI 100001)
*>  [2]:[0]:[0]:[00:11:01:00:00:01]:[192.1.1.11]           192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:11:01:00:00:01]:[]                     192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:12:01:00:00:01]:[192.1.1.12]           192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:12:01:00:00:01]:[]                     192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]            192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.1.3]           192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.1.3]           192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.1.2]           192.1.0.10      0          100        0       ?

Route Distinguisher: 192.1.0.10:102       (L3VNI 100001)
*>  [2]:[0]:[0]:[00:11:01:00:00:02]:[192.1.2.11]           192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:11:01:00:00:02]:[]                     192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:12:01:00:00:02]:[192.1.2.12]           192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:12:01:00:00:02]:[]                     192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.2.1]            192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.2.3]           192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.2.3]           192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.2.2]           192.1.0.10      0          100        0       ?
Total number of entries 844
```

Leaf01-secondary

Configuration

```
hostname Leaf01-secondary
profile Leaf
vrf DC
    rd 192.1.0.10:1
    route-target export 65501:1 evpn
    route-target import 65501:1 evpn
ntp server 10.100.0.12 minpoll 4 maxpoll 4 iburst
cli-session
    timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1
```

```
vlan 101
    ip igmp snooping enable
vlan 102
    ip igmp snooping enable
vlan 103
    ip igmp snooping enable
vlan 104
    ip igmp snooping enable
vlan 105
    ip igmp snooping enable
vlan 106
    ip igmp snooping enable
vlan 107
    ip igmp snooping enable
vlan 108
    ip igmp snooping enable
vlan 109
    ip igmp snooping enable
vlan 110
    ip igmp snooping enable
vlan 111
    ip igmp snooping enable
vlan 900
virtual-mac 00:00:00:0a:0a:0a
evpn
    redistribute local-svi
    vlan 101
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 102
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 103
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 104
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 105
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 106
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 107
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 108
```

```
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 109
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 110
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 111
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
interface mgmt
    no shutdown
    ip dhcp
system interface-group 1 speed 10g
    !interface group 1 contains ports 1/1/1-1/1/12
system interface-group 2 speed 10g
    !interface group 2 contains ports 1/1/13-1/1/24
system interface-group 3 speed 10g
    !interface group 3 contains ports 1/1/25-1/1/36
system interface-group 4 speed 10g
    !interface group 4 contains ports 1/1/37-1/1/48
interface lag 1
    no shutdown
    no routing
    vlan trunk native 1 tag
    vlan trunk allowed all
    lacp mode active
interface lag 2 multi-chassis
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 101-111
    lacp mode active
interface 1/1/5
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 21.0.0.1/30
    ip ospf 1 area 0.0.0.0
interface 1/1/6
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 21.0.0.5/30
    ip ospf 1 area 0.0.0.0
interface 1/1/7
    no shutdown
    mtu 9198
    lag 2
interface 1/1/32
    no shutdown
    mtu 9198
    lag 1
```

```
interface 1/1/33
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 192.168.1.2/30
interface loopback 0
    ip address 1.1.2.1/32
    ip ospf 1 area 0.0.0.0
interface loopback 1
    ip address 192.1.0.10/32
    ip ospf 1 area 0.0.0.0
interface vlan 101
    vrf attach DC
    ip address 192.1.1.3/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.1.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 102
    vrf attach DC
    ip address 192.1.2.3/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.2.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 103
    vrf attach DC
    ip address 192.1.3.3/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.3.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 104
    vrf attach DC
    ip address 192.1.4.3/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.4.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 105
    vrf attach DC
    ip address 192.1.5.3/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.5.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 106
    vrf attach DC
    ip address 192.1.6.3/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.6.1
    ip igmp enable
```

```
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 107
    vrf attach DC
    ip address 192.1.7.3/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.7.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 108
    vrf attach DC
    ip address 192.1.8.3/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.8.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 109
    vrf attach DC
    ip address 192.1.9.3/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.9.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 110
    vrf attach DC
    ip address 192.1.10.3/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.10.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 111
    vrf attach DC
    ip address 192.1.11.3/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.11.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vxlan 1
    source ip 192.1.0.10
    no shutdown
    vni 100
    vni 101
        vlan 101
    vni 102
        vlan 102
    vni 103
        vlan 103
    vni 104
        vlan 104
    vni 105
        vlan 105
```

```
    vni 106
        vlan 106
    vni 107
        vlan 107
    vni 108
        vlan 108
    vni 109
        vlan 109
    vni 110
        vlan 110
    vni 111
        vlan 111
    vni 100001
        vrf DC
        routing
vsx
    system-mac 00:00:00:0a:0a:0a
    inter-switch-link lag 1
    role secondary
    keepalive peer 192.168.1.1 source 192.168.1.2
    no split-recovery
    vsx-sync evpn
!
!
!
!
!
router ospf 1
    router-id 1.1.2.1
    area 0.0.0.0
router bgp 1
    bgp router-id 1.1.2.1
    neighbor 4.4.4.4 remote-as 1
    neighbor 4.4.4.4 update-source loopback 0
    neighbor 5.5.5.5 remote-as 1
    neighbor 5.5.5.5 update-source loopback 0
    address-family ipv4 unicast
        redistribute connected
    exit-address-family
    address-family l2vpn evpn
        neighbor 4.4.4.4 activate
        neighbor 4.4.4.4 send-community extended
        neighbor 5.5.5.5 activate
        neighbor 5.5.5.5 send-community extended
    exit-address-family
!
    vrf DC
        address-family ipv4 unicast
            redistribute connected
            redistribute static
        exit-address-family
!
router pim vrf DC
    enable
https-server vrf mgmt
```

Verification

Verify OSPF neighbors

```
Leaf01-secondary# show ip ospf neighbors all-vrfs
VRF : default                           Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
44.44.44.44      1         FULL/DR           21.0.0.2           1/1/5

45.45.45.45      1         FULL/DR           21.0.0.6           1/1/6
```

Verify BGP EVPN neighbors

```
Leaf01-secondary# show bgp l2vpn evpn summary
VRF : default
BGP Summary
-----------
 Local AS               : 1           BGP Router Identifier  : 1.1.2.1
 Peers                  : 2           Log Neighbor Changes   : No
 Cfg. Hold Time         : 180         Cfg. Keep Alive        : 60
 Confederation Id       : 0

 Neighbor        Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
 4.4.4.4         1           258     93      00h:12m:51s  Established   Up
 5.5.5.5         1           259     93      00h:12m:51s  Established   Up
```

Verify VXLAN tunnel, VTEP peers, and VNIs

```
Leaf01-secondary# show interface vxlan vteps
Source           Destination      Origin       Status               VNI       Routing   VLAN  VRF
---------------- ---------------- ------------ -------------------- --------- --------- ----- ----
192.1.0.10       192.1.0.7        evpn         operational          101       disabled  101    --
192.1.0.10       192.1.0.7        evpn         operational          102       disabled  102    --
192.1.0.10       192.1.0.7        evpn         operational          103       disabled  103    --
192.1.0.10       192.1.0.7        evpn         operational          104       disabled  104    --
192.1.0.10       192.1.0.7        evpn         operational          105       disabled  105    --
192.1.0.10       192.1.0.7        evpn         operational          106       disabled  106    --
192.1.0.10       192.1.0.7        evpn         operational          107       disabled  107    --
192.1.0.10       192.1.0.7        evpn         operational          108       disabled  108    --
192.1.0.10       192.1.0.7        evpn         operational          109       disabled  109    --
192.1.0.10       192.1.0.7        evpn         operational          110       disabled  110    --
192.1.0.10       192.1.0.7        evpn         operational          100001    enabled   --     DC
192.1.0.10       192.1.0.17       evpn         operational          101       disabled  101    --
192.1.0.10       192.1.0.17       evpn         operational          102       disabled  102    --
192.1.0.10       192.1.0.17       evpn         operational          103       disabled  103    --
192.1.0.10       192.1.0.17       evpn         operational          104       disabled  104    --
192.1.0.10       192.1.0.17       evpn         operational          105       disabled  105    --
192.1.0.10       192.1.0.17       evpn         operational          106       disabled  106    --
192.1.0.10       192.1.0.17       evpn         operational          107       disabled  107    --
192.1.0.10       192.1.0.17       evpn         operational          108       disabled  108    --
192.1.0.10       192.1.0.17       evpn         operational          109       disabled  109    --
192.1.0.10       192.1.0.17       evpn         operational          110       disabled  110    --
192.1.0.10       192.1.0.17       evpn         operational          100001    enabled   --     DC
```

Verify PIM neighbors

```
Leaf01-secondary# show ip pim neighbor all-vrfs

PIM Neighbor


VRF                         : DC
Total number of neighbors : 43

IP Address                  : 192.1.0.7
Interface                   : vni100001
Up Time (HH:MM:SS)          : 00:12:52
Expire Time (HH:MM:SS)      : 00:03:15
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:03:30

IP Address                  : 192.1.0.17
Interface                   : vni100001
Up Time (HH:MM:SS)          : 00:12:15
Expire Time (HH:MM:SS)      : 00:03:15
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:03:30

IP Address                  : 192.1.1.2
Interface                   : vlan101
Up Time (HH:MM:SS)          : 00:13:42
Expire Time (HH:MM:SS)      : 00:01:32
DR Priority                 : 167772608
Hold Time (HH:MM:SS)        : 00:01:45
Secondary IP Addresses :
 192.1.1.1

! snip
IP Address                  : 192.1.11.2
Interface                   : vlan111
Up Time (HH:MM:SS)          : 00:13:49
Expire Time (HH:MM:SS)      : 00:01:29
DR Priority                 : 167772608
Hold Time (HH:MM:SS)        : 00:01:45
Secondary IP Addresses :
 192.1.11.1
```

Verify PIM interfaces

```
Leaf01-secondary# show ip pim interface vlan 101

PIM Interfaces

VRF: DC

Interface  : vlan101
Neighbor count : 4
IP Address : 192.1.1.3/24
Mode       : sparse
Designated Router : 192.1.1.4
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1
```

```
Operational DR Priority   : 167772608
Neighbor Timeout          : 81


Leaf01-secondary# show ip pim interface vlan 101

PIM Interfaces

VRF: DC

Interface  : vlan101
Neighbor count : 4
IP Address : 192.1.1.3/24
Mode       : sparse
Designated Router : 192.1.1.4
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 167772608
Neighbor Timeout          : 79


Leaf01-secondary# show ip pim interface vlan 110

PIM Interfaces

VRF: DC

Interface  : vlan110
Neighbor count : 4
IP Address : 192.1.10.3/24
Mode       : sparse
Designated Router : 192.1.10.4
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 167772608
Neighbor Timeout          : 76


Leaf01-secondary# show ip pim interface vlan 111

PIM Interfaces

VRF: DC

Interface  : vlan111
Neighbor count : 1
IP Address : 192.1.11.3/24
Mode       : sparse
Designated Router : 192.1.11.3
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
```

```
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 167772608
Neighbor Timeout          : 104
```

Verify mroutes

```
Leaf01-secondary# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : DC
Total number of entries : 39

Group Address           : 225.1.1.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101

Group Address           : 225.1.2.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan102

Group Address           : 225.1.2.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101

Group Address           : 225.1.3.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101

Group Address           : 225.1.3.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan103
! snip

Group Address           : 239.1.1.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan101

Group Address           : 239.1.2.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan102

Group Address           : 239.1.3.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan103

Group Address           : 239.1.4.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan104
```

```
Group Address           : 239.1.5.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan105

Group Address           : 239.1.6.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan106

Group Address           : 239.1.7.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan107

Group Address           : 239.1.8.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan108

Group Address           : 239.1.9.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan109

Group Address           : 239.1.10.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan110
```

Verify BGP EVPN table

```
Leaf01-secondary# show bgp l2vpn evpn
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
              i internal, e external S Stale, R Removed, a additional-paths
Origin codes: i - IGP, e - EGP, ? - incomplete

EVPN Route-Type 2 prefix: [2]:[ESI]:[EthTag]:[MAC]:[OrigIP]
EVPN Route-Type 3 prefix: [3]:[EthTag]:[OrigIP]
EVPN Route-Type 5 prefix: [5]:[ESI]:[EthTag]:[IPAddrLen]:[IPAddr]
VRF : default
Local Router-ID 1.1.2.1

     Network                                          Nexthop         Metric     LocPrf    Weight   Path
-------------------------------------------------------------------------------------------------------------
Route Distinguisher: 192.1.0.10:101       (L2VNI 101)
*>  [2]:[0]:[0]:[00:11:01:00:00:01]:[192.1.1.11]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:01]:[192.1.1.11]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:01]:[192.1.1.11]          192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:11:01:00:00:01]:[]                    192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:01]:[]                    192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:01]:[]                    192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:12:01:00:00:01]:[192.1.1.12]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:01]:[192.1.1.12]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:01]:[192.1.1.12]          192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:12:01:00:00:01]:[]                    192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:01]:[]                    192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:01]:[]                    192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]          192.1.0.10      0          100        0       ?
```

```
*>  [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.1.3]            192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.1.2]            192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.1.2]            192.1.0.10      0          100        0       ?
*>  [3]:[0]:[192.1.0.10]                                   192.1.0.10      0          100        0       ?
* i [3]:[0]:[192.1.0.10]                                   192.1.0.10      0          100        0       ?
* i [3]:[0]:[192.1.0.10]                                   192.1.0.10      0          100        0       ?

Route Distinguisher: 192.1.0.17:101       (L2VNI 101)
*>i [2]:[0]:[0]:[00:13:01:00:00:01]:[192.1.1.13]          192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:13:01:00:00:01]:[192.1.1.13]          192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[00:13:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:13:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[00:14:01:00:00:01]:[192.1.1.23]          192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:14:01:00:00:01]:[192.1.1.23]          192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[00:14:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:14:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[54:80:28:3c:00:00]:[192.1.1.4]           192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[54:80:28:3c:00:00]:[192.1.1.4]           192.1.0.17      0          100        0       ?
*>i [3]:[0]:[192.1.0.17]                                  192.1.0.17      0          100        0       ?
* i [3]:[0]:[192.1.0.17]                                  192.1.0.17      0          100        0       ?

Route Distinguisher: 192.1.0.7:101        (L2VNI 101)
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.1.6]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.1.6]          192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.1.7]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.1.7]          192.1.0.7       0          100        0       ?
*>i [3]:[0]:[192.1.0.7]                                   192.1.0.7       0          100        0       ?
* i [3]:[0]:[192.1.0.7]                                   192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.10:102       (L2VNI 102)
*>  [2]:[0]:[0]:[00:11:01:00:00:02]:[192.1.2.11]         192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:02]:[192.1.2.11]         192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:02]:[192.1.2.11]         192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:11:01:00:00:02]:[]                   192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:02]:[]                   192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:02]:[]                   192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:12:01:00:00:02]:[192.1.2.12]         192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:02]:[192.1.2.12]         192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:02]:[192.1.2.12]         192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[00:12:01:00:00:02]:[]                   192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:02]:[]                   192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:02]:[]                   192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.2.1]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.2.1]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.2.1]          192.1.0.10      0          100        0       ?
*>  [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.2.3]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.2.2]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.2.2]          192.1.0.10      0          100        0       ?
*>  [3]:[0]:[192.1.0.10]                                  192.1.0.10      0          100        0       ?
* i [3]:[0]:[192.1.0.10]                                  192.1.0.10      0          100        0       ?
* i [3]:[0]:[192.1.0.10]                                  192.1.0.10      0          100        0       ?

!snip

Route Distinguisher: 192.1.0.7:109        (L3VNI 100001)
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.9.1]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.9.1]          192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.9.6]          192.1.0.7       0          100        0       ?
```

```
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.9.6]           192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.9.7]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.9.7]           192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.7:110        (L3VNI 100001)
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.10.1]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.10.1]          192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.10.6]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.10.6]          192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.10.7]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.10.7]          192.1.0.7       0          100        0       ?
Total number of entries 1084
```

Leaf02

Configuration

```
hostname Leaf02
profile Leaf
vrf DC
    rd 192.1.0.17:1
    route-target export 65501:1 evpn
    route-target import 65501:1 evpn
cli-session
    timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 101
    ip igmp snooping enable
vlan 102
    ip igmp snooping enable
vlan 103
    ip igmp snooping enable
vlan 104
    ip igmp snooping enable
vlan 105
    ip igmp snooping enable
vlan 106
    ip igmp snooping enable
vlan 107
    ip igmp snooping enable
vlan 108
    ip igmp snooping enable
vlan 109
    ip igmp snooping enable
vlan 110
    ip igmp snooping enable
virtual-mac 00:00:00:0b:0b:0b
evpn
    redistribute local-svi
    vlan 101
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 102
```

```
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 103
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 104
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 105
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 106
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 107
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 108
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 109
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 110
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
interface mgmt
    no shutdown
    ip dhcp
system interface-group 1 speed 10g
    !interface group 1 contains ports 1/1/1-1/1/12
system interface-group 2 speed 10g
    !interface group 2 contains ports 1/1/13-1/1/24
system interface-group 3 speed 10g
    !interface group 3 contains ports 1/1/25-1/1/36
system interface-group 4 speed 10g
    !interface group 4 contains ports 1/1/37-1/1/48
interface lag 1
    no shutdown
    no routing
    vlan access 1
    lacp mode active
interface 1/1/1
    no shutdown
```

```
    mtu 9198
    ip mtu 9198
    ip address 22.0.0.1/30
    ip ospf 1 area 0.0.0.0
interface 1/1/2
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 22.0.0.5/30
    ip ospf 1 area 0.0.0.0
interface 1/1/7
    no shutdown
    mtu 9198
    no routing
    vlan trunk native 1
    vlan trunk allowed 101-110
interface 1/1/9
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 101-110
interface loopback 0
    ip address 6.6.6.6/32
    ip ospf 1 area 0.0.0.0
interface loopback 1
    ip address 192.1.0.17/32
    ip ospf 1 area 0.0.0.0
interface vlan 101
    vrf attach DC
    ip address 192.1.1.4/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.1.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 102
    vrf attach DC
    ip address 192.1.2.4/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.2.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 103
    vrf attach DC
    ip address 192.1.3.4/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.3.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 104
    vrf attach DC
    ip address 192.1.4.4/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.4.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
```

```
    ip pim-sparse vsx-virtual-neighbor
interface vlan 105
    vrf attach DC
    ip address 192.1.5.4/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.5.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 106
    vrf attach DC
    ip address 192.1.6.4/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.6.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 107
    vrf attach DC
    ip address 192.1.7.4/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.7.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 108
    vrf attach DC
    ip address 192.1.8.4/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.8.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 109
    vrf attach DC
    ip address 192.1.9.4/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.9.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 110
    vrf attach DC
    ip address 192.1.10.4/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.10.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vxlan 1
    source ip 192.1.0.17
    no shutdown
    vni 101
        vlan 101
    vni 102
        vlan 102
```

```
    vni 103
        vlan 103
    vni 104
        vlan 104
    vni 105
        vlan 105
    vni 106
        vlan 106
    vni 107
        vlan 107
    vni 108
        vlan 108
    vni 109
        vlan 109
    vni 110
        vlan 110
    vni 100001
        vrf DC
        routing
!
!
!
!
!
router ospf 1
    router-id 6.6.6.6
    area 0.0.0.0
router bgp 1
    bgp router-id 6.6.6.6
    neighbor 4.4.4.4 remote-as 1
    neighbor 4.4.4.4 update-source loopback 0
    neighbor 5.5.5.5 remote-as 1
    neighbor 5.5.5.5 update-source loopback 0
    address-family l2vpn evpn
        neighbor 4.4.4.4 activate
        neighbor 4.4.4.4 send-community extended
        neighbor 5.5.5.5 activate
        neighbor 5.5.5.5 send-community extended
    exit-address-family
!
    vrf DC
        address-family ipv4 unicast
            redistribute connected
            redistribute static
        exit-address-family
!
router pim vrf DC
    enable
https-server vrf mgmt
```

Verification

Verify OSPF neighbors

```
Leaf02# show ip ospf neighbors all-vrfs
VRF : default                              Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
```

```
------------------------------------------------------------------------
44.44.44.44      1         FULL/DR           22.0.0.2          1/1/1

45.45.45.45      1         FULL/DR           22.0.0.6          1/1/2
```

Verify BGP EVPN neighbors

```
Leaf02# show bgp l2vpn evpn summary
VRF : default
BGP Summary
-----------
 Local AS               : 1           BGP Router Identifier  : 6.6.6.6
 Peers                  : 2           Log Neighbor Changes   : No
 Cfg. Hold Time         : 180         Cfg. Keep Alive        : 60
 Confederation Id       : 0

 Neighbor        Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
 4.4.4.4         1           196     73      00h:13m:44s  Established   Up
 5.5.5.5         1           190     71      00h:13m:37s  Established   Up
```

Verify VXLAN tunnel, VTEP peers, and VNIs

```
Leaf02# show interface vxlan vteps
Source           Destination      Origin       Status               VNI       Routing
VLAN  VRF
---------------- ---------------- ------------ -------------------- --------- --------- ---
-- -----
192.1.0.17       192.1.0.7        evpn         operational          101       disabled  101
   --
192.1.0.17       192.1.0.7        evpn         operational          102       disabled  102
   --
192.1.0.17       192.1.0.7        evpn         operational          103       disabled  103
   --
192.1.0.17       192.1.0.7        evpn         operational          104       disabled  104
   --
192.1.0.17       192.1.0.7        evpn         operational          105       disabled  105
   --
192.1.0.17       192.1.0.7        evpn         operational          106       disabled  106
   --
192.1.0.17       192.1.0.7        evpn         operational          107       disabled  107
   --
192.1.0.17       192.1.0.7        evpn         operational          108       disabled  108
   --
192.1.0.17       192.1.0.7        evpn         operational          109       disabled  109
   --
192.1.0.17       192.1.0.7        evpn         operational          110       disabled  110
   --
192.1.0.17       192.1.0.7        evpn         operational          100001    enabled   --
   DC
192.1.0.17       192.1.0.10       evpn         operational          101       disabled  101
   --
192.1.0.17       192.1.0.10       evpn         operational          102       disabled  102
   --
192.1.0.17       192.1.0.10       evpn         operational          103       disabled  103
   --
192.1.0.17       192.1.0.10       evpn         operational          104       disabled  104
   --
192.1.0.17       192.1.0.10       evpn         operational          105       disabled  105
   --
```

```
192.1.0.17      192.1.0.10      evpn        operational          106      disabled  106
   --
192.1.0.17      192.1.0.10      evpn        operational          107      disabled  107
   --
192.1.0.17      192.1.0.10      evpn        operational          108      disabled  108
   --
192.1.0.17      192.1.0.10      evpn        operational          109      disabled  109
   --
192.1.0.17      192.1.0.10      evpn        operational          110      disabled  110
   --
192.1.0.17      192.1.0.10      evpn        operational          100001   enabled   --
   DC
```

Verify mroutes

```
Leaf02# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : DC
Total number of entries : 20

Group Address           : 225.1.1.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101

Group Address           : 225.1.2.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101
Outgoing Interface List :
Interface       State
-----------     ----------
vlan102         forwarding

Group Address           : 225.1.3.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101
Outgoing Interface List :
Interface       State
-----------     ----------
vlan103         forwarding

Group Address           : 225.1.4.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101
Outgoing Interface List :
Interface       State
-----------     ----------
vlan104         forwarding

Group Address           : 225.1.5.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101
Outgoing Interface List :
Interface       State
-----------     ----------
vlan105         forwarding
```

```
!snip

Group Address           : 239.1.8.1
Source Address          : 192.1.151.101
Neighbor                : 192.1.0.7
Incoming interface      : vni100001
Outgoing Interface List :
Interface       State
-----------     ----------
vlan108         forwarding

Group Address           : 239.1.9.1
Source Address          : 192.1.151.101
Neighbor                : 192.1.0.7
Incoming interface      : vni100001
Outgoing Interface List :
Interface       State
-----------     ----------
vlan109         forwarding

Group Address           : 239.1.10.1
Source Address          : 192.1.151.101
Neighbor                : 192.1.0.7
Incoming interface      : vni100001
Outgoing Interface List :
Interface       State
-----------     ----------
vlan110         forwarding
```

Verify PIM interfaces

```
Leaf02# show ip pim interface vlan 101

PIM Interfaces

VRF: DC

Interface  : vlan101
Neighbor count : 4
IP Address : 192.1.1.4/24
Mode       : sparse
Designated Router : 192.1.1.4
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 285213120
Neighbor Timeout          : 102



Leaf02# show ip pim interface vlan 102

PIM Interfaces

VRF: DC

Interface  : vlan102
```

```
Neighbor count : 4
IP Address : 192.1.2.4/24
Mode       : sparse
Designated Router : 192.1.2.4
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 285213120
Neighbor Timeout          : 102



Leaf02# show ip pim interface vlan 110

PIM Interfaces

VRF: DC

Interface  : vlan110
Neighbor count : 4
IP Address : 192.1.10.4/24
Mode       : sparse
Designated Router : 192.1.10.4
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 285213120
Neighbor Timeout          : 97
```

Verify BGP EVPN table

```
Leaf02# show bgp l2vpn evpn
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
              i internal, e external S Stale, R Removed, a additional-paths
Origin codes: i - IGP, e - EGP, ? - incomplete

EVPN Route-Type 2 prefix: [2]:[ESI]:[EthTag]:[MAC]:[OrigIP]
EVPN Route-Type 3 prefix: [3]:[EthTag]:[OrigIP]
EVPN Route-Type 5 prefix: [5]:[ESI]:[EthTag]:[IPAddrLen]:[IPAddr]
VRF : default
Local Router-ID 6.6.6.6

     Network                                          Nexthop         Metric     LocPrf    Weight   Path
-------------------------------------------------------------------------------------------------------------
Route Distinguisher: 192.1.0.10:101       (L2VNI 101)
*>i [2]:[0]:[0]:[00:11:01:00:00:01]:[192.1.1.11]          192.1.0.10      0          100        0      ?
* i [2]:[0]:[0]:[00:11:01:00:00:01]:[192.1.1.11]          192.1.0.10      0          100        0      ?
*>i [2]:[0]:[0]:[00:11:01:00:00:01]:[]                    192.1.0.10      0          100        0      ?
* i [2]:[0]:[0]:[00:11:01:00:00:01]:[]                    192.1.0.10      0          100        0      ?
*>i [2]:[0]:[0]:[00:12:01:00:00:01]:[192.1.1.12]          192.1.0.10      0          100        0      ?
* i [2]:[0]:[0]:[00:12:01:00:00:01]:[192.1.1.12]          192.1.0.10      0          100        0      ?
*>i [2]:[0]:[0]:[00:12:01:00:00:01]:[]                    192.1.0.10      0          100        0      ?
* i [2]:[0]:[0]:[00:12:01:00:00:01]:[]                    192.1.0.10      0          100        0      ?
```

```
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]            192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]            192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.1.3]            192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.1.3]            192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.1.2]            192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.1.2]            192.1.0.10      0          100        0       ?
*>i [3]:[0]:[192.1.0.10]                                   192.1.0.10      0          100        0       ?
* i [3]:[0]:[192.1.0.10]                                   192.1.0.10      0          100        0       ?

Route Distinguisher: 192.1.0.17:101       (L2VNI 101)
*>  [2]:[0]:[0]:[00:13:01:00:00:01]:[192.1.1.13]          192.1.0.17      0          100        0       ?
*>  [2]:[0]:[0]:[00:13:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
*>  [2]:[0]:[0]:[00:14:01:00:00:01]:[192.1.1.23]          192.1.0.17      0          100        0       ?
*>  [2]:[0]:[0]:[00:14:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.17      0          100        0       ?
*>  [2]:[0]:[0]:[54:80:28:3c:00:00]:[192.1.1.4]           192.1.0.17      0          100        0       ?
*>  [3]:[0]:[192.1.0.17]                                  192.1.0.17      0          100        0       ?

Route Distinguisher: 192.1.0.7:101        (L2VNI 101)
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]            192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]            192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.1.6]            192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.1.6]            192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.1.7]            192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.1.7]            192.1.0.7       0          100        0       ?
*>i [3]:[0]:[192.1.0.7]                                    192.1.0.7       0          100        0       ?
* i [3]:[0]:[192.1.0.7]                                    192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.10:102       (L2VNI 102)
*>i [2]:[0]:[0]:[00:11:01:00:00:02]:[]                     192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:02]:[]                     192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[00:12:01:00:00:02]:[192.1.2.12]           192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:02]:[192.1.2.12]           192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.2.1]            192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.2.1]            192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.2.3]            192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.2.3]            192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.2.2]            192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.2.2]            192.1.0.10      0          100        0       ?
*>i [3]:[0]:[192.1.0.10]                                   192.1.0.10      0          100        0       ?
* i [3]:[0]:[192.1.0.10]                                   192.1.0.10      0          100        0       ?

Route Distinguisher: 192.1.0.17:102       (L2VNI 102)
*>  [2]:[0]:[0]:[00:13:01:00:00:02]:[192.1.2.13]          192.1.0.17      0          100        0       ?
*>  [2]:[0]:[0]:[00:13:01:00:00:02]:[]                    192.1.0.17      0          100        0       ?
*>  [2]:[0]:[0]:[00:14:01:00:00:02]:[192.1.2.23]          192.1.0.17      0          100        0       ?
*>  [2]:[0]:[0]:[00:14:01:00:00:02]:[]                    192.1.0.17      0          100        0       ?
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.2.1]           192.1.0.17      0          100        0       ?
*>  [2]:[0]:[0]:[54:80:28:3c:00:00]:[192.1.2.4]           192.1.0.17      0          100        0       ?
*>  [3]:[0]:[192.1.0.17]                                  192.1.0.17      0          100        0       ?
!snip

Route Distinguisher: 192.1.0.7:107        (L3VNI 100001)
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.7.1]            192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.7.1]            192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.7.6]            192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.7.6]            192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.7.7]            192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.7.7]            192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.7:108        (L3VNI 100001)
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.8.1]            192.1.0.7       0          100        0       ?
```

```
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.8.1]            192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.8.6]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.8.6]           192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.8.7]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.8.7]           192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.7:109        (L3VNI 100001)
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.9.1]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.9.1]           192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.9.6]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.9.6]           192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.9.7]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.9.7]           192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.7:110        (L3VNI 100001)
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.10.1]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.10.1]          192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.10.6]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.10.6]          192.1.0.7       0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.10.7]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.10.7]          192.1.0.7       0          100        0       ?
Total number of entries 782
```

8325-border-prim

Configuration

```
!export-password: default
hostname 8325-border-prim
no ip icmp redirect
profile Leaf
vrf DC
    rd 192.1.0.7:1
    route-target export 65501:1 evpn
    route-target import 65501:1 evpn
cli-session
    timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 101
    ip igmp snooping enable
vlan 102
    ip igmp snooping enable
vlan 103
    ip igmp snooping enable
vlan 104
    ip igmp snooping enable
vlan 105
    ip igmp snooping enable
vlan 106
    ip igmp snooping enable
vlan 107
    ip igmp snooping enable
vlan 108
    ip igmp snooping enable
vlan 109
```

```
    ip igmp snooping enable
vlan 110
    ip igmp snooping enable
vlan 500
virtual-mac 00:00:00:0c:0c:0c
evpn
    redistribute local-svi
    vlan 101
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 102
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 103
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 104
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 105
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 106
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 107
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 108
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 109
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 110
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
interface mgmt
    no shutdown
    ip dhcp
system interface-group 1 speed 10g
    !interface group 1 contains ports 1/1/1-1/1/12
```

```
system interface-group 2 speed 10g
    !interface group 2 contains ports 1/1/13-1/1/24
system interface-group 3 speed 10g
    !interface group 3 contains ports 1/1/25-1/1/36
system interface-group 4 speed 10g
    !interface group 4 contains ports 1/1/37-1/1/48
interface lag 1
    no shutdown
    no routing
    vlan trunk native 1 tag
    vlan trunk allowed all
    lacp mode active
interface lag 2 multi-chassis
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 500
    lacp mode active
interface 1/1/1
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 24.0.0.1/30
    ip ospf 1 area 0.0.0.0
interface 1/1/2
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 24.0.0.5/30
    ip ospf 1 area 0.0.0.0
interface 1/1/4
    no shutdown
    mtu 9198
    lag 2
interface 1/1/6
    no shutdown
    mtu 9198
    lag 2
interface 1/1/14
    no shutdown
interface 1/1/49
    no shutdown
    mtu 9198
    lag 1
interface 1/1/55
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 192.168.3.1/30
interface loopback 0
    ip address 109.0.0.1/32
    ip ospf 1 area 0.0.0.0
interface loopback 1
    ip address 192.1.0.7/32
    ip ospf 1 area 0.0.0.0
interface loopback 2
    vrf attach DC
    ip address 192.1.0.18/32
    ip ospf 2 area 0.0.0.0
interface vlan 101
    vrf attach DC
    ip address 192.1.1.6/24
```

```
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.1.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 102
    vrf attach DC
    ip address 192.1.2.6/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.2.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 103
    vrf attach DC
    ip address 192.1.3.6/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.3.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 104
    vrf attach DC
    ip address 192.1.4.6/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.4.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 105
    vrf attach DC
    ip address 192.1.5.6/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.5.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 106
    vrf attach DC
    ip address 192.1.6.6/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.6.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 107
    vrf attach DC
    ip address 192.1.7.6/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.7.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 108
    vrf attach DC
```

```
    ip address 192.1.8.6/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.8.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 109
    vrf attach DC
    ip address 192.1.9.6/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.9.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 110
    vrf attach DC
    ip address 192.1.10.6/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.10.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 500
    vrf attach DC
    vsx active-forwarding
    ip address 192.1.0.53/29
    ip ospf 2 area 0.0.0.0
    ip ospf priority 100
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vxlan 1
    source ip 192.1.0.7
    no shutdown
    vni 101
        vlan 101
    vni 102
        vlan 102
    vni 103
        vlan 103
    vni 104
        vlan 104
    vni 105
        vlan 105
    vni 106
        vlan 106
    vni 107
        vlan 107
    vni 108
        vlan 108
    vni 109
        vlan 109
    vni 110
        vlan 110
    vni 100001
        vrf DC
        routing
vsx
    system-mac 00:00:00:0c:0c:0c
    inter-switch-link lag 1
```

```
    role primary
    keepalive peer 192.168.3.2 source 192.168.3.1
    no split-recovery
    vsx-sync evpn
!
!
!
!
!
router ospf 2 vrf DC
    router-id 192.1.0.18
    distance 210
    redistribute bgp
    redistribute connected
    area 0.0.0.0
router ospf 1
    router-id 9.9.9.9
    area 0.0.0.0
router bgp 1
    bgp router-id 109.0.0.1
    neighbor 4.4.4.4 remote-as 1
    neighbor 4.4.4.4 update-source loopback 0
    neighbor 5.5.5.5 remote-as 1
    neighbor 5.5.5.5 update-source loopback 0
    address-family l2vpn evpn
        neighbor 4.4.4.4 activate
        neighbor 4.4.4.4 send-community extended
        neighbor 5.5.5.5 activate
        neighbor 5.5.5.5 send-community extended
    exit-address-family
!
    vrf DC
        address-family ipv4 unicast
            redistribute connected
            redistribute ospf
        exit-address-family
!
router pim vrf DC
    enable
https-server vrf mgmt
```

Verification

Verify OSPF neighbors

```
8325-border-prim# show ip ospf neighbors all-vrfs
VRF : DC                                  Process : 2
================================================

Total Number of Neighbors : 3

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
192.1.0.1        1         FULL/DROther      192.1.0.49         vlan500

192.1.0.2        1         FULL/DROther      192.1.0.50         vlan500

192.1.10.7       200       FULL/DR           192.1.0.54         vlan500

VRF : default                             Process : 1
================================================
```

```
Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
44.44.44.44      1         FULL/DR           24.0.0.2           1/1/1

45.45.45.45      1         FULL/DR           24.0.0.6           1/1/2
```

Verify BGP EVPN neighbors

```
8325-border-prim# show bgp l2vpn evpn summary
VRF : default
BGP Summary
-----------
 Local AS               : 1           BGP Router Identifier  : 109.0.0.1
 Peers                  : 2           Log Neighbor Changes   : No
 Cfg. Hold Time         : 180         Cfg. Keep Alive        : 60
 Confederation Id       : 0

 Neighbor        Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
 4.4.4.4         1           303     62      00h:15m:22s  Established   Up
 5.5.5.5         1           300     62      00h:15m:22s  Established   Up
```

Verify VXLAN tunnel, VTEP peers, and VNIs

```
8325-border-prim# show interface vxlan vteps
Source           Destination      Origin       Status               VNI       Routing   VLAN  VRF
---------------- ---------------- ------------ -------------------- --------- --------- ----- ----
192.1.0.7        192.1.0.10       evpn         operational          101       disabled  101    --
192.1.0.7        192.1.0.10       evpn         operational          102       disabled  102    --
192.1.0.7        192.1.0.10       evpn         operational          103       disabled  103    --
192.1.0.7        192.1.0.10       evpn         operational          104       disabled  104    --
192.1.0.7        192.1.0.10       evpn         operational          105       disabled  105    --
192.1.0.7        192.1.0.10       evpn         operational          106       disabled  106    --
192.1.0.7        192.1.0.10       evpn         operational          107       disabled  107    --
192.1.0.7        192.1.0.10       evpn         operational          108       disabled  108    --
192.1.0.7        192.1.0.10       evpn         operational          109       disabled  109    --
192.1.0.7        192.1.0.10       evpn         operational          110       disabled  110    --
192.1.0.7        192.1.0.10       evpn         operational          100001    enabled   --     DC
192.1.0.7        192.1.0.17       evpn         operational          101       disabled  101    --
192.1.0.7        192.1.0.17       evpn         operational          102       disabled  102    --
192.1.0.7        192.1.0.17       evpn         operational          103       disabled  103    --
192.1.0.7        192.1.0.17       evpn         operational          104       disabled  104    --
192.1.0.7        192.1.0.17       evpn         operational          105       disabled  105    --
192.1.0.7        192.1.0.17       evpn         operational          106       disabled  106    --
192.1.0.7        192.1.0.17       evpn         operational          107       disabled  107    --
192.1.0.7        192.1.0.17       evpn         operational          108       disabled  108    --
192.1.0.7        192.1.0.17       evpn         operational          109       disabled  109    --
192.1.0.7        192.1.0.17       evpn         operational          110       disabled  110    --
192.1.0.7        192.1.0.17       evpn         operational          100001    enabled   --     DC
```

Verify PIM neighbors

```
8325-border-prim# show ip pim neighbor all-vrfs

PIM Neighbor
```

```
VRF                         : DC
Total number of neighbors : 45

IP Address                  : 192.1.0.10
Interface                   : vni100001
Up Time (HH:MM:SS)          : 00:14:44
Expire Time (HH:MM:SS)      : 00:03:24
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:03:30

IP Address                  : 192.1.0.17
Interface                   : vni100001
Up Time (HH:MM:SS)          : 00:14:47
Expire Time (HH:MM:SS)      : 00:03:19
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:03:30

IP Address                  : 192.1.0.49
Interface                   : vlan500
Up Time (HH:MM:SS)          : 00:14:38
Expire Time (HH:MM:SS)      : 00:01:37
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:01:45

IP Address                  : 192.1.0.50
Interface                   : vlan500
Up Time (HH:MM:SS)          : 00:14:39
Expire Time (HH:MM:SS)      : 00:01:40
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:01:45

IP Address                  : 192.1.0.54
Interface                   : vlan500
Up Time (HH:MM:SS)          : 00:16:12
Expire Time (HH:MM:SS)      : 00:01:40
DR Priority                 : 117440960
Hold Time (HH:MM:SS)        : 00:01:45
!snip

IP Address                  : 192.1.10.7
Interface                   : vlan110
Up Time (HH:MM:SS)          : 00:16:13
Expire Time (HH:MM:SS)      : 00:01:37
DR Priority                 : 117440960
Hold Time (HH:MM:SS)        : 00:01:45
Secondary IP Addresses :
 192.1.10.1
```

Verify PIM interfaces

```
8325-border-prim# show ip pim interface vlan 101

PIM Interfaces

VRF: DC

Interface  : vlan101
Neighbor count : 4
IP Address : 192.1.1.6/24
```

```
Mode       : sparse
Designated Router : 192.1.1.4
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 117440960
Neighbor Timeout          : 88


8325-border-prim# show ip pim interface vlan 102

PIM Interfaces

VRF: DC

Interface  : vlan102
Neighbor count : 4
IP Address : 192.1.2.6/24
Mode       : sparse
Designated Router : 192.1.2.4
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 117440960
Neighbor Timeout          : 88


8325-border-prim# show ip pim interface vlan 500

PIM Interfaces

VRF: DC

Interface  : vlan500
Neighbor count : 3
IP Address : 192.1.0.53/29
Mode       : sparse
Designated Router : 192.1.0.53
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 117440960
Neighbor Timeout          : 84



8325-border-prim# show ip pim interface vlan 110

PIM Interfaces
```

```
VRF: DC

Interface  : vlan110
Neighbor count : 4
IP Address : 192.1.10.6/24
Mode       : sparse
Designated Router : 192.1.10.4
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500             Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500              Configured DR Priority    : 1

Operational DR Priority   : 117440960
Neighbor Timeout          : 80
```

Verify mroutes

```
8325-border-prim# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : DC
Total number of entries : 54

Group Address           : 225.1.1.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101
Outgoing Interface List :
Interface       State
-----------     ----------
vlan500         forwarding

Group Address           : 225.1.2.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101
Outgoing Interface List :
Interface       State
-----------     ----------
vlan500         forwarding

Group Address           : 225.1.2.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan102

Group Address           : 225.1.3.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101
Outgoing Interface List :
Interface       State
-----------     ----------
vlan500         forwarding
!snip

Group Address           : 239.1.6.1
Source Address          : 192.1.151.101
Neighbor                : 192.1.0.50
```

```
Incoming interface      : vlan106

Group Address           : 239.1.7.1
Source Address          : 192.1.151.101
Neighbor                : 192.1.0.50
Incoming interface      : vlan500
Outgoing Interface List :
Interface       State
-----------     ----------
vni100001       forwarding

Group Address           : 239.1.7.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan107

Group Address           : 239.1.8.1
Source Address          : 192.1.151.101
Neighbor                : 192.1.0.50
Incoming interface      : vlan500
Outgoing Interface List :
Interface       State
-----------     ----------
vni100001       forwarding

Group Address           : 239.1.8.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan108

Group Address           : 239.1.9.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan109

Group Address           : 239.1.9.1
Source Address          : 192.1.151.101
Neighbor                : 192.1.0.50
Incoming interface      : vlan500
Outgoing Interface List :
Interface       State
-----------     ----------
vni100001       forwarding

Group Address           : 239.1.10.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan110

Group Address           : 239.1.10.1
Source Address          : 192.1.151.101
Neighbor                : 192.1.0.50
Incoming interface      : vlan500
Outgoing Interface List :
Interface       State
-----------     ----------
vni100001       forwarding
```

Verify BGP EVPN table

```
8325-border-prim# show bgp l2vpn evpn
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
              i internal, e external S Stale, R Removed, a additional-paths
Origin codes: i - IGP, e - EGP, ? - incomplete

EVPN Route-Type 2 prefix: [2]:[ESI]:[EthTag]:[MAC]:[OrigIP]
EVPN Route-Type 3 prefix: [3]:[EthTag]:[OrigIP]
EVPN Route-Type 5 prefix: [5]:[ESI]:[EthTag]:[IPAddrLen]:[IPAddr]
VRF : default
Local Router-ID 109.0.0.1

     Network                                          Nexthop         Metric     LocPrf    Weight   Path
-------------------------------------------------------------------------------------------------------------
Route Distinguisher: 192.1.0.10:101       (L2VNI 101)
*>i [2]:[0]:[0]:[00:11:01:00:00:01]:[192.1.1.11]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:01]:[192.1.1.11]          192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[00:11:01:00:00:01]:[]                    192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:01]:[]                    192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[00:12:01:00:00:01]:[192.1.1.12]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:01]:[192.1.1.12]          192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[00:12:01:00:00:01]:[]                    192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:01]:[]                    192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.1.3]           192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.1.3]           192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.1.2]           192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.1.2]           192.1.0.10      0          100        0       ?
*>i [3]:[0]:[192.1.0.10]                                  192.1.0.10      0          100        0       ?
* i [3]:[0]:[192.1.0.10]                                  192.1.0.10      0          100        0       ?

Route Distinguisher: 192.1.0.17:101       (L2VNI 101)
*>i [2]:[0]:[0]:[00:13:01:00:00:01]:[192.1.1.13]          192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:13:01:00:00:01]:[192.1.1.13]          192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[00:13:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:13:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[00:14:01:00:00:01]:[192.1.1.23]          192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:14:01:00:00:01]:[192.1.1.23]          192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[00:14:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:14:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[54:80:28:3c:00:00]:[192.1.1.4]           192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[54:80:28:3c:00:00]:[192.1.1.4]           192.1.0.17      0          100        0       ?
*>i [3]:[0]:[192.1.0.17]                                  192.1.0.17      0          100        0       ?
* i [3]:[0]:[192.1.0.17]                                  192.1.0.17      0          100        0       ?

Route Distinguisher: 192.1.0.7:101        (L2VNI 101)
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]          192.1.0.7       0          100        0       ?
*>  [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.1.6]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.1.7]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.1.7]          192.1.0.7       0          100        0       ?
*>  [3]:[0]:[192.1.0.7]                                  192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.10:102       (L2VNI 102)
*>i [2]:[0]:[0]:[00:11:01:00:00:02]:[192.1.2.11]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:02]:[192.1.2.11]          192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[00:11:01:00:00:02]:[]                    192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:02]:[]                    192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[00:12:01:00:00:02]:[192.1.2.12]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:02]:[192.1.2.12]          192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[00:12:01:00:00:02]:[]                    192.1.0.10      0          100        0       ?
```

```
* i [2]:[0]:[0]:[00:12:01:00:00:02]:[]                    192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.2.1]           192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.2.1]           192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.2.3]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.2.3]          192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.2.2]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.2.2]          192.1.0.10      0          100        0       ?
*>i [3]:[0]:[192.1.0.10]                                 192.1.0.10      0          100        0       ?
* i [3]:[0]:[192.1.0.10]                                 192.1.0.10      0          100        0       ?
!snip

Route Distinguisher: 192.1.0.7:106        (L3VNI 100001)
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.6.1]          192.1.0.7       0          100        0       ?
*>  [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.6.6]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.6.7]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.6.7]          192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.7:107        (L3VNI 100001)
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.7.1]          192.1.0.7       0          100        0       ?
*>  [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.7.6]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.7.7]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.7.7]          192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.7:108        (L3VNI 100001)
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.8.1]          192.1.0.7       0          100        0       ?
*>  [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.8.6]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.8.7]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.8.7]          192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.7:109        (L3VNI 100001)
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.9.1]          192.1.0.7       0          100        0       ?
*>  [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.9.6]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.9.7]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.9.7]          192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.7:110        (L3VNI 100001)
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.10.1]         192.1.0.7       0          100        0       ?
*>  [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.10.6]         192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.10.7]         192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.10.7]         192.1.0.7       0          100        0       ?
Total number of entries 825
```

8325-border-sec

Configuration

```
!export-password: default
hostname 8325-border-sec
no ip icmp redirect
profile Leaf
vrf DC
    rd 192.1.0.7:1
    route-target export 65501:1 evpn
    route-target import 65501:1 evpn
ntp server 10.100.0.12 minpoll 4 maxpoll 4 iburst
cli-session
    timeout 0
!
!
!
!
```

```
!
ssh server vrf mgmt
vlan 1
vlan 101
    ip igmp snooping enable
vlan 102
    ip igmp snooping enable
vlan 103
    ip igmp snooping enable
vlan 104
    ip igmp snooping enable
vlan 105
    ip igmp snooping enable
vlan 106
    ip igmp snooping enable
vlan 107
    ip igmp snooping enable
vlan 108
    ip igmp snooping enable
vlan 109
    ip igmp snooping enable
vlan 110
    ip igmp snooping enable
vlan 500
virtual-mac 00:00:00:0c:0c:0c
evpn
    redistribute local-svi
    vlan 101
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 102
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 103
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 104
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 105
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 106
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 107
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
```

```
    vlan 108
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 109
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
    vlan 110
        rd auto
        route-target export auto
        route-target import auto
        redistribute host-route
interface mgmt
    no shutdown
    ip dhcp
system interface-group 1 speed 10g
    !interface group 1 contains ports 1/1/1-1/1/12
system interface-group 2 speed 10g
    !interface group 2 contains ports 1/1/13-1/1/24
system interface-group 3 speed 10g
    !interface group 3 contains ports 1/1/25-1/1/36
system interface-group 4 speed 10g
    !interface group 4 contains ports 1/1/37-1/1/48
interface lag 1
    no shutdown
    no routing
    vlan trunk native 1 tag
    vlan trunk allowed all
    lacp mode active
interface lag 2 multi-chassis
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 500
    lacp mode active
interface 1/1/1
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 25.0.0.1/30
    ip ospf 1 area 0.0.0.0
interface 1/1/2
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 25.0.0.5/30
    ip ospf 1 area 0.0.0.0
interface 1/1/13
    no shutdown
    mtu 9198
    lag 2
interface 1/1/25
    no shutdown
    lag 2
interface 1/1/49
    no shutdown
    mtu 9198
    lag 1
interface 1/1/56
```

```
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 192.168.3.2/30
interface loopback 0
    ip address 110.0.0.1/32
    ip ospf 1 area 0.0.0.0
interface loopback 1
    ip address 192.1.0.7/32
    ip ospf 1 area 0.0.0.0
interface vlan 101
    vrf attach DC
    ip address 192.1.1.7/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.1.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 102
    vrf attach DC
    ip address 192.1.2.7/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.2.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 103
    vrf attach DC
    ip address 192.1.3.7/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.3.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 104
    vrf attach DC
    ip address 192.1.4.7/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.4.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 105
    vrf attach DC
    ip address 192.1.5.7/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.5.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 106
    vrf attach DC
    ip address 192.1.6.7/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.6.1
    ip igmp enable
    ip igmp version 2
```

```
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 107
    vrf attach DC
    ip address 192.1.7.7/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.7.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 108
    vrf attach DC
    ip address 192.1.8.7/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.8.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 109
    vrf attach DC
    ip address 192.1.9.7/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.9.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 110
    vrf attach DC
    ip address 192.1.10.7/24
    active-gateway ip mac 02:aa:bb:cc:00:01
    active-gateway ip 192.1.10.1
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 500
    vrf attach DC
    vsx active-forwarding
    ip address 192.1.0.54/29
    ip ospf 2 area 0.0.0.0
    ip ospf priority 200
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vxlan 1
    source ip 192.1.0.7
    no shutdown
    vni 101
        vlan 101
    vni 102
        vlan 102
    vni 103
        vlan 103
    vni 104
        vlan 104
    vni 105
        vlan 105
    vni 106
        vlan 106
    vni 107
```

```
        vlan 107
    vni 108
        vlan 108
    vni 109
        vlan 109
    vni 110
        vlan 110
    vni 100001
        vrf DC
        routing
vsx
    system-mac 00:00:00:0c:0c:0c
    inter-switch-link lag 1
    role secondary
    keepalive peer 192.168.3.1 source 192.168.3.2
    no split-recovery
    vsx-sync evpn
!
!
!
!
!
router ospf 2 vrf DC
    distance 210
    redistribute bgp
    redistribute connected
    area 0.0.0.0
router ospf 1
    router-id 99.99.99.99
    area 0.0.0.0
router bgp 1
    bgp router-id 110.0.0.1
    neighbor 4.4.4.4 remote-as 1
    neighbor 4.4.4.4 update-source loopback 0
    neighbor 5.5.5.5 remote-as 1
    neighbor 5.5.5.5 update-source loopback 0
    address-family l2vpn evpn
        neighbor 4.4.4.4 activate
        neighbor 4.4.4.4 send-community extended
        neighbor 5.5.5.5 activate
        neighbor 5.5.5.5 send-community extended
    exit-address-family
!
    vrf DC
        address-family ipv4 unicast
            redistribute connected
            redistribute ospf
        exit-address-family
!
router pim vrf DC
    enable
https-server vrf mgmt.
```

Verification

Verify OSPF neighbors

```
8325-border-sec# show ip ospf neighbors all-vrfs
VRF : DC                                Process : 2
================================================
```

```
Total Number of Neighbors : 3

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
192.1.0.1        1         FULL/DROther      192.1.0.49         vlan500

192.1.0.2        1         FULL/DROther      192.1.0.50         vlan500

192.1.0.18       100       FULL/BDR          192.1.0.53         vlan500

VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
44.44.44.44      1         FULL/BDR          25.0.0.2           1/1/1

45.45.45.45      1         FULL/BDR          25.0.0.6           1/1/2
```

Verify BGP EVPN neighbors

```
8325-border-sec#  show bgp l2vpn evpn summary
VRF : default
BGP Summary
-----------
 Local AS               : 1            BGP Router Identifier  : 110.0.0.1
 Peers                  : 2            Log Neighbor Changes   : No
 Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
 Confederation Id       : 0

 Neighbor        Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
 4.4.4.4         1           310     64      00h:16m:33s  Established   Up
 5.5.5.5         1           308     63      00h:16m:30s  Established   Up
```

Verify VXLAN tunnel, VTEP peers, and VNIs

```
8325-border-sec# show interface vxlan vteps
Source           Destination      Origin       Status               VNI       Routing   VLAN  VRF
---------------- ---------------- ------------ -------------------- --------- --------- ----- ----
192.1.0.7        192.1.0.10       evpn         operational          101       disabled  101    --
192.1.0.7        192.1.0.10       evpn         operational          102       disabled  102    --
192.1.0.7        192.1.0.10       evpn         operational          103       disabled  103    --
192.1.0.7        192.1.0.10       evpn         operational          104       disabled  104    --
192.1.0.7        192.1.0.10       evpn         operational          105       disabled  105    --
192.1.0.7        192.1.0.10       evpn         operational          106       disabled  106    --
192.1.0.7        192.1.0.10       evpn         operational          107       disabled  107    --
192.1.0.7        192.1.0.10       evpn         operational          108       disabled  108    --
192.1.0.7        192.1.0.10       evpn         operational          109       disabled  109    --
192.1.0.7        192.1.0.10       evpn         operational          110       disabled  110    --
192.1.0.7        192.1.0.10       evpn         operational          100001    enabled   --     DC
192.1.0.7        192.1.0.17       evpn         operational          101       disabled  101    --
192.1.0.7        192.1.0.17       evpn         operational          102       disabled  102    --
192.1.0.7        192.1.0.17       evpn         operational          103       disabled  103    --
192.1.0.7        192.1.0.17       evpn         operational          104       disabled  104    --
192.1.0.7        192.1.0.17       evpn         operational          105       disabled  105    --
192.1.0.7        192.1.0.17       evpn         operational          106       disabled  106    --
192.1.0.7        192.1.0.17       evpn         operational          107       disabled  107    --
```

```
192.1.0.7       192.1.0.17      evpn        operational         108      disabled  108    --
192.1.0.7       192.1.0.17      evpn        operational         109      disabled  109    --
192.1.0.7       192.1.0.17      evpn        operational         110      disabled  110    --
192.1.0.7       192.1.0.17      evpn        operational         100001   enabled   --     DC
```

Verify PIM neighbors

```
8325-border-sec# show ip pim neighbor all-vrfs

PIM Neighbor


VRF                         : DC
Total number of neighbors : 45

IP Address                  : 192.1.0.10
Interface                   : vni100001
Up Time (HH:MM:SS)          : 00:15:58
Expire Time (HH:MM:SS)      : 00:03:10
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:03:30

IP Address                  : 192.1.0.17
Interface                   : vni100001
Up Time (HH:MM:SS)          : 00:16:01
Expire Time (HH:MM:SS)      : 00:03:05
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:03:30

IP Address                  : 192.1.0.49
Interface                   : vlan500
Up Time (HH:MM:SS)          : 00:15:52
Expire Time (HH:MM:SS)      : 00:01:23
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:01:45

IP Address                  : 192.1.0.50
Interface                   : vlan500
Up Time (HH:MM:SS)          : 00:15:54
Expire Time (HH:MM:SS)      : 00:01:26
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:01:45
!snip

IP Address                  : 192.1.10.3
Interface                   : vlan110
Up Time (HH:MM:SS)          : 00:15:56
Expire Time (HH:MM:SS)      : 00:01:25
DR Priority                 : 167772608
Hold Time (HH:MM:SS)        : 00:01:45

IP Address                  : 192.1.10.4
Interface                   : vlan110
Up Time (HH:MM:SS)          : 00:15:58
Expire Time (HH:MM:SS)      : 00:01:21
DR Priority                 : 285213120
Hold Time (HH:MM:SS)        : 00:01:45

IP Address                  : 192.1.10.6
Interface                   : vlan110
Up Time (HH:MM:SS)          : 00:17:30
```

```
Expire Time (HH:MM:SS)    : 00:01:24
DR Priority               : 117440960
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses :
 192.1.10.1
```

Verify mroutes

```
8325-border-sec# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : DC
Total number of entries : 64

Group Address           : 225.1.1.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan500

Group Address           : 225.1.1.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101
Outgoing Interface List :
Interface       State
-----------     ----------
vlan500         forwarding

Group Address           : 225.1.2.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan500

Group Address           : 225.1.2.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101
Outgoing Interface List :
Interface       State
-----------     ----------
vlan500         forwarding

Group Address           : 225.1.2.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan102

Group Address           : 225.1.3.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan500

Group Address           : 225.1.3.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101
Outgoing Interface List :
Interface       State
-----------     ----------
vlan500         forwarding
```

```
Group Address           : 225.1.3.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan103

Group Address           : 225.1.4.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan101
Outgoing Interface List :
Interface       State
-----------     ----------
vlan500         forwarding
!snip

Group Address           : 239.1.8.1
Source Address          : 192.1.151.101
Neighbor                : 192.1.0.50
Incoming interface      : vlan108

Group Address           : 239.1.9.1
Source Address          : 192.1.151.101
Neighbor                : 192.1.0.50
Incoming interface      : vlan500
Outgoing Interface List :
Interface       State
-----------     ----------
vni100001       forwarding

Group Address           : 239.1.9.1
Source Address          : 192.1.151.101
Neighbor                : 192.1.0.50
Incoming interface      : vlan109

Group Address           : 239.1.10.1
Source Address          : 192.1.151.101
Neighbor                : 192.1.0.50
Incoming interface      : vlan500
Outgoing Interface List :
Interface       State
-----------     ----------
vni100001       forwarding

Group Address           : 239.1.10.1
Source Address          : 192.1.151.101
Neighbor                : 192.1.0.50
Incoming interface      : vlan110
```

Verify PIM interfaces

```
8325-border-sec# show ip pim interface vlan 101

PIM Interfaces

VRF: DC

Interface  : vlan101
Neighbor count : 4
IP Address : 192.1.1.7/24
Mode       : sparse
Designated Router : 192.1.1.4
```

```
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 117440960
Neighbor Timeout          : 97



8325-border-sec# show ip pim interface vlan 102

PIM Interfaces

VRF: DC

Interface  : vlan102
Neighbor count : 4
IP Address : 192.1.2.7/24
Mode       : sparse
Designated Router : 192.1.2.4
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 117440960
Neighbor Timeout          : 97



8325-border-sec# show ip pim interface vlan 110

PIM Interfaces

VRF: DC

Interface  : vlan110
Neighbor count : 4
IP Address : 192.1.10.7/24
Mode       : sparse
Designated Router : 192.1.10.4
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 117440960
Neighbor Timeout          : 95



8325-border-sec# show ip pim interface vlan 500

PIM Interfaces
```

```
VRF: DC

Interface  : vlan500
Neighbor count : 3
IP Address : 192.1.0.54/29
Mode       : sparse
Designated Router : 192.1.0.54
Proxy DR               : false
Hello Interval (sec)   : 30
Hello Delay (sec)      : 5
Override Interval (msec)  : 2500             Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500              Configured DR Priority    : 1

Operational DR Priority   : 117440960
Neighbor Timeout          : 93
```

Verify BGP EVPN table

```
8325-border-sec# show bgp l2vpn evpn
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
              i internal, e external S Stale, R Removed, a additional-paths
Origin codes: i - IGP, e - EGP, ? - incomplete

EVPN Route-Type 2 prefix: [2]:[ESI]:[EthTag]:[MAC]:[OrigIP]
EVPN Route-Type 3 prefix: [3]:[EthTag]:[OrigIP]
EVPN Route-Type 5 prefix: [5]:[ESI]:[EthTag]:[IPAddrLen]:[IPAddr]
VRF : default
Local Router-ID 110.0.0.1

     Network                                          Nexthop         Metric     LocPrf    Weight   Path
-------------------------------------------------------------------------------------------------------------
Route Distinguisher: 192.1.0.10:101       (L2VNI 101)
*>i [2]:[0]:[0]:[00:11:01:00:00:01]:[192.1.1.11]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:01]:[192.1.1.11]          192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[00:11:01:00:00:01]:[]                    192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:01]:[]                    192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[00:12:01:00:00:01]:[192.1.1.12]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:01]:[192.1.1.12]          192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[00:12:01:00:00:01]:[]                    192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:01]:[]                    192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.1.3]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.1.3]          192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.1.2]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.1.2]          192.1.0.10      0          100        0       ?
*>i [3]:[0]:[192.1.0.10]                                 192.1.0.10      0          100        0       ?
* i [3]:[0]:[192.1.0.10]                                 192.1.0.10      0          100        0       ?

Route Distinguisher: 192.1.0.17:101       (L2VNI 101)
*>i [2]:[0]:[0]:[00:13:01:00:00:01]:[192.1.1.13]          192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:13:01:00:00:01]:[192.1.1.13]          192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[00:13:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:13:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[00:14:01:00:00:01]:[192.1.1.23]          192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:14:01:00:00:01]:[192.1.1.23]          192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[00:14:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[00:14:01:00:00:01]:[]                    192.1.0.17      0          100        0       ?
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]           192.1.0.17      0          100        0       ?
```

```
*>i [2]:[0]:[0]:[54:80:28:3c:00:00]:[192.1.1.4]            192.1.0.17      0          100        0       ?
* i [2]:[0]:[0]:[54:80:28:3c:00:00]:[192.1.1.4]            192.1.0.17      0          100        0       ?
*>i [3]:[0]:[192.1.0.17]                                   192.1.0.17      0          100        0       ?
* i [3]:[0]:[192.1.0.17]                                   192.1.0.17      0          100        0       ?

Route Distinguisher: 192.1.0.7:101        (L2VNI 101)
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]            192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]            192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.1.1]            192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.1.6]            192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.1.6]            192.1.0.7       0          100        0       ?
*>  [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.1.7]            192.1.0.7       0          100        0       ?
*>  [3]:[0]:[192.1.0.7]                                   192.1.0.7       0          100        0       ?
* i [3]:[0]:[192.1.0.7]                                   192.1.0.7       0          100        0       ?
* i [3]:[0]:[192.1.0.7]                                   192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.10:102       (L2VNI 102)
*>i [2]:[0]:[0]:[00:11:01:00:00:02]:[192.1.2.11]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:02]:[192.1.2.11]          192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[00:11:01:00:00:02]:[]                    192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:11:01:00:00:02]:[]                    192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[00:12:01:00:00:02]:[192.1.2.12]          192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:02]:[192.1.2.12]          192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[00:12:01:00:00:02]:[]                    192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[00:12:01:00:00:02]:[]                    192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.2.1]           192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.2.1]           192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.2.3]           192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e4:42]:[192.1.2.3]           192.1.0.10      0          100        0       ?
*>i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.2.2]           192.1.0.10      0          100        0       ?
* i [2]:[0]:[0]:[b8:6a:97:21:e9:42]:[192.1.2.2]           192.1.0.10      0          100        0       ?
*>i [3]:[0]:[192.1.0.10]                                  192.1.0.10      0          100        0       ?
* i [3]:[0]:[192.1.0.10]                                  192.1.0.10      0          100        0       ?
!snip       ?

Route Distinguisher: 192.1.0.7:108        (L3VNI 100001)
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.8.1]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.8.1]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.8.1]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.8.6]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.8.6]           192.1.0.7       0          100        0       ?
*>  [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.8.7]           192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.7:109        (L3VNI 100001)
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.9.1]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.9.1]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.9.1]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.9.6]           192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.9.6]           192.1.0.7       0          100        0       ?
*>  [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.9.7]           192.1.0.7       0          100        0       ?

Route Distinguisher: 192.1.0.7:110        (L3VNI 100001)
*>  [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.10.1]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.10.1]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[02:aa:bb:cc:00:01]:[192.1.10.1]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.10.6]          192.1.0.7       0          100        0       ?
* i [2]:[0]:[0]:[3c:2c:99:ff:da:a5]:[192.1.10.6]          192.1.0.7       0          100        0       ?
*>  [2]:[0]:[0]:[b8:6a:97:21:f5:42]:[192.1.10.7]          192.1.0.7       0          100        0       ?
Total number of entries 1083
```

Edge-primary

Configuration

```
!export-password: default
hostname Edge-primary
no ip icmp redirect
profile Aggregation-Leaf
ntp server 10.100.0.12 minpoll 4 maxpoll 4 iburst
cli-session
    timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 301
    ip igmp snooping enable
vlan 302
    ip igmp snooping enable
vlan 303
    ip igmp snooping enable
vlan 304
    ip igmp snooping enable
vlan 305
    ip igmp snooping enable
vlan 306
    ip igmp snooping enable
vlan 307
    ip igmp snooping enable
vlan 308
    ip igmp snooping enable
vlan 309
    ip igmp snooping enable
vlan 310
    ip igmp snooping enable
vlan 500
interface mgmt
    no shutdown
    ip dhcp
system interface-group 1 speed 10g
    !interface group 1 contains ports 1/1/1-1/1/4
interface lag 1
    no shutdown
    no routing
    vlan trunk native 1 tag
    vlan trunk allowed all
    lacp mode active
interface lag 2 multi-chassis
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 500
    lacp mode active
interface lag 3 multi-chassis
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 1,301-310
    lacp mode active
interface 1/1/1
    no shutdown
    lag 3
interface 1/1/20
```

```
    no shutdown
    ip address 192.168.4.1/30
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface 1/1/31
    no shutdown
    lag 2
interface 1/1/32
    no shutdown
    lag 2
interface 1/1/33
    no shutdown
    lag 1
interface 1/1/34
    no shutdown
    lag 1
interface loopback 0
    ip address 192.1.0.1/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface vlan 301
    ip address 192.1.151.3/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.151.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 302
    ip address 192.1.152.3/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.152.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 303
    ip address 192.1.153.3/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.153.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 304
    ip address 192.1.154.3/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.154.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 305
    ip address 192.1.155.3/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.155.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
```

```
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 306
    ip address 192.1.156.3/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.156.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 307
    ip address 192.1.157.3/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.157.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 308
    ip address 192.1.158.3/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.158.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 309
    ip address 192.1.159.3/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.159.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 310
    ip address 192.1.160.3/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.160.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 500
    vsx active-forwarding
    ip address 192.1.0.49/29
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
vsx
    inter-switch-link lag 1
    role primary
    keepalive peer 192.168.4.2 source 192.168.4.1
!
!
!
!
!
```

```
router ospf 1
    router-id 192.1.0.1
    redistribute connected
    area 0.0.0.0
router pim
    enable
    rp-candidate source-ip-interface loopback0 group-prefix 224.0.0.0/4
    rp-candidate priority 180
    bsr-candidate source-ip-interface loopback0
    active-active
https-server vrf mgmt
```

Verification

Verify OSPF neighbors

```
Edge-primary# show ip ospf neighbors all-vrfs
VRF : default                              Process : 1
================================================

Total Number of Neighbors : 4

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
192.1.0.2        1         FULL/DR           192.168.4.2        1/1/20

192.1.0.2        1         2-WAY/DROther     192.1.0.50         vlan500

192.1.0.18       100       FULL/BDR          192.1.0.53         vlan500

192.1.10.7       200       FULL/DR           192.1.0.54         vlan500
```

Verify PIM neighbors

```
Edge-primary# show ip pim neighbor all-vrfs

PIM Neighbor


VRF                         : default
Total number of neighbors : 14

IP Address                  : 192.1.0.50
Interface                   : vlan500
Up Time (HH:MM:SS)          : 00:16:45
Expire Time (HH:MM:SS)      : 00:01:41
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:01:45

IP Address                  : 192.1.0.53
Interface                   : vlan500
Up Time (HH:MM:SS)          : 00:16:39
Expire Time (HH:MM:SS)      : 00:01:42
DR Priority                 : 117440960
Hold Time (HH:MM:SS)        : 00:01:45

IP Address                  : 192.1.0.54
Interface                   : vlan500
Up Time (HH:MM:SS)          : 00:16:38
```

```
Expire Time (HH:MM:SS)    : 00:01:40
DR Priority               : 117440960
Hold Time (HH:MM:SS)      : 00:01:45

IP Address                : 192.1.151.2
Interface                 : vlan301
Up Time (HH:MM:SS)        : 00:16:46
Expire Time (HH:MM:SS)    : 00:01:30
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses :
 192.1.151.1
!snip

IP Address                : 192.1.159.2
Interface                 : vlan309
Up Time (HH:MM:SS)        : 00:16:46
Expire Time (HH:MM:SS)    : 00:01:30
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses :
 192.1.159.1

IP Address                : 192.1.160.2
Interface                 : vlan310
Up Time (HH:MM:SS)        : 00:16:46
Expire Time (HH:MM:SS)    : 00:01:30
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses :
 192.1.160.1

IP Address                : 192.168.4.2
Interface                 : 1/1/20
Up Time (HH:MM:SS)        : 00:16:48
Expire Time (HH:MM:SS)    : 00:01:27
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:01:45
```

Verify PIM interfaces

```
Edge-primary# show ip pim interface vlan 301

PIM Interfaces

VRF: default

Interface  : vlan301
Neighbor count : 1
IP Address : 192.1.151.3/24
Mode       : sparse
Designated Router : 192.1.151.3
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500             Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500              Configured DR Priority    : 1

Operational DR Priority   : 4294967295
Neighbor Timeout          : 85
```

```
Edge-primary# show ip pim interface vlan 310

PIM Interfaces

VRF: default

Interface  : vlan310
Neighbor count : 1
IP Address : 192.1.160.3/24
Mode       : sparse
Designated Router : 192.1.160.3
Proxy DR              : false
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 4294967295
Neighbor Timeout          : 83
```

Verify mroutes

```
Edge-primary# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : default
Total number of entries : 40

Group Address           : 225.1.1.1
Source Address          : 192.1.1.11
Neighbor                : 192.1.0.54
Incoming interface      : vlan500
Outgoing Interface List :
Interface       State          VSX Role
-----------     ----------     --------
vlan301         forwarding     DR

Group Address           : 225.1.2.1
Source Address          : 192.1.1.11
Neighbor                : 192.1.0.54
Incoming interface      : vlan500
Outgoing Interface List :
Interface       State          VSX Role
-----------     ----------     --------
vlan302         forwarding     DR
!snip

Group Address           : 239.1.8.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan301

Group Address           : 239.1.9.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan301

Group Address           : 239.1.9.1
```

```
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan500

Group Address           : 239.1.10.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan500

Group Address           : 239.1.10.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan301
```

Edge-secondary

Configuration

```
!export-password: default
hostname Edge-secondary
no ip icmp redirect
profile Aggregation-Leaf
ntp server 10.100.0.12 minpoll 4 maxpoll 4 iburst
cli-session
    timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 301
    ip igmp snooping enable
vlan 302
    ip igmp snooping enable
vlan 303
    ip igmp snooping enable
vlan 304
    ip igmp snooping enable
vlan 305
    ip igmp snooping enable
vlan 306
    ip igmp snooping enable
vlan 307
    ip igmp snooping enable
vlan 308
    ip igmp snooping enable
vlan 309
    ip igmp snooping enable
vlan 310
    ip igmp snooping enable
vlan 500
interface mgmt
    no shutdown
    ip dhcp
system interface-group 1 speed 10g
    !interface group 1 contains ports 1/1/1-1/1/4
interface lag 1
    no shutdown
    no routing
```

```
    vlan trunk native 1 tag
    vlan trunk allowed all
    lacp mode active
interface lag 2 multi-chassis
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 500
    lacp mode active
interface lag 3 multi-chassis
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 1,301-310
    lacp mode active
interface 1/1/1
    no shutdown
    lag 3
interface 1/1/3
    no shutdown
    ip address 192.168.4.2/30
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface 1/1/31
    no shutdown
    lag 2
interface 1/1/32
    no shutdown
    lag 2
interface 1/1/35
    no shutdown
    lag 1
interface 1/1/36
    no shutdown
    lag 1
interface loopback 0
    ip address 192.1.0.2/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface vlan 301
    ip address 192.1.151.2/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.151.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 302
    ip address 192.1.152.2/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.152.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 303
    ip address 192.1.153.2/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.153.1
    ip ospf 1 area 0.0.0.0
```

```
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 304
    ip address 192.1.154.2/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.154.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 305
    ip address 192.1.155.2/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.155.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 306
    ip address 192.1.156.2/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.156.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 307
    ip address 192.1.157.2/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.157.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 308
    ip address 192.1.158.2/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.158.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 309
    ip address 192.1.159.2/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.159.1
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 310
    ip address 192.1.160.2/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 192.1.160.1
```

```
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip igmp enable
    ip igmp version 2
    ip pim-sparse enable
interface vlan 500
    vsx active-forwarding
    ip address 192.1.0.50/29
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
vsx
    inter-switch-link lag 1
    role secondary
    keepalive peer 192.168.4.1 source 192.168.4.2
!
!
!
!
!
router ospf 1
    router-id 192.1.0.2
    redistribute connected
    area 0.0.0.0
router pim
    enable
    rp-candidate source-ip-interface loopback0 group-prefix 224.0.0.0/4
    bsr-candidate source-ip-interface loopback0
    active-active
https-server vrf mgmt
```

Verification

Verify OSPF neighbors

```
Edge-secondary# show ip ospf neighbors all-vrfs
VRF : default                              Process : 1
================================================

Total Number of Neighbors : 4

Neighbor ID      Priority  State              Nbr Address       Interface
-------------------------------------------------------------------------
192.1.0.1        1         FULL/BDR           192.168.4.1        1/1/3

192.1.0.1        1         2-WAY/DROther      192.1.0.49         vlan500

192.1.0.18       100       FULL/BDR           192.1.0.53         vlan500

192.1.10.7       200       FULL/DR            192.1.0.54         vlan500
```

Verify PIM neighbors

```
Edge-secondary# show ip pim neighbor all-vrfs

PIM Neighbor


VRF                        : default
Total number of neighbors : 14
```

```
IP Address                : 192.1.0.49
Interface                 : vlan500
Up Time (HH:MM:SS)        : 00:17:05
Expire Time (HH:MM:SS)    : 00:01:45
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:01:45

IP Address                : 192.1.0.53
Interface                 : vlan500
Up Time (HH:MM:SS)        : 00:17:02
Expire Time (HH:MM:SS)    : 00:01:18
DR Priority               : 117440960
Hold Time (HH:MM:SS)      : 00:01:45

IP Address                : 192.1.0.54
Interface                 : vlan500
Up Time (HH:MM:SS)        : 00:17:01
Expire Time (HH:MM:SS)    : 00:01:17
DR Priority               : 117440960
Hold Time (HH:MM:SS)      : 00:01:45

IP Address                : 192.1.151.3
Interface                 : vlan301
Up Time (HH:MM:SS)        : 00:17:08
Expire Time (HH:MM:SS)    : 00:01:37
DR Priority               : 4294967295
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses :
 192.1.151.1

IP Address                : 192.1.152.3
Interface                 : vlan302
Up Time (HH:MM:SS)        : 00:17:08
Expire Time (HH:MM:SS)    : 00:01:37
DR Priority               : 4294967295
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses :
 192.1.152.1

IP Address                : 192.1.153.3
Interface                 : vlan303
Up Time (HH:MM:SS)        : 00:17:08
Expire Time (HH:MM:SS)    : 00:01:37
DR Priority               : 4294967295
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses :
 192.1.153.1

IP Address                : 192.1.154.3
Interface                 : vlan304
Up Time (HH:MM:SS)        : 00:17:08
Expire Time (HH:MM:SS)    : 00:01:37
DR Priority               : 4294967295
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses :
 192.1.154.1
!snip

IP Address                : 192.1.160.3
Interface                 : vlan310
Up Time (HH:MM:SS)        : 00:17:09
```

```
Expire Time (HH:MM:SS)    : 00:01:36
DR Priority               : 4294967295
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses :
 192.1.160.1

IP Address                : 192.168.4.1
Interface                 : 1/1/3
Up Time (HH:MM:SS)        : 00:17:11
Expire Time (HH:MM:SS)    : 00:01:39
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:01:45
```

Verify PIM interfaces

```
Edge-secondary# show ip pim interface vlan 301

PIM Interfaces

VRF: default

Interface  : vlan301
Neighbor count : 1
IP Address : 192.1.151.2/24
Mode       : sparse
Designated Router : 192.1.151.2
Proxy DR              : true
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 1
Neighbor Timeout          : 87


Edge-secondary# show ip pim interface vlan 310

PIM Interfaces

VRF: default

Interface  : vlan310
Neighbor count : 1
IP Address : 192.1.160.2/24
Mode       : sparse
Designated Router : 192.1.160.2
Proxy DR              : true
Hello Interval (sec)  : 30
Hello Delay (sec)     : 5
Override Interval (msec)  : 2500              Lan Prune Delay     : Yes

Propagation Delay (msec)  : 500               Configured DR Priority    : 1

Operational DR Priority   : 1
Neighbor Timeout          : 85
```

Verify mroutes

```
Edge-secondary# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : default
Total number of entries : 50

Group Address           : 225.1.1.1
Source Address          : 192.1.1.11
Neighbor                : 192.1.0.54
Incoming interface      : vlan500
Outgoing Interface List :
Interface       State          VSX Role
-----------     ----------     --------
vlan301         forwarding     Proxy DR

Group Address           : 225.1.1.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan301

Group Address           : 225.1.2.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan500

Group Address           : 225.1.2.1
Source Address          : 192.1.1.11
Neighbor                :
Incoming interface      : vlan302

Group Address           : 225.1.3.1
Source Address          : 192.1.1.11
Neighbor                : 192.1.0.54
Incoming interface      : vlan303

Group Address           : 225.1.3.1
Source Address          : 192.1.1.11
Neighbor                : 192.1.0.54
Incoming interface      : vlan500
Outgoing Interface List :
Interface       State          VSX Role
-----------     ----------     --------
vlan303         forwarding     Proxy DR
!snip

Group Address           : 239.1.8.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan301
Outgoing Interface List :
Interface       State          VSX Role
-----------     ----------     --------
vlan500         forwarding     DR

Group Address           : 239.1.9.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan301
Outgoing Interface List :
Interface       State          VSX Role
-----------     ----------     --------
vlan500         forwarding     DR
```

```
Group Address           : 239.1.10.1
Source Address          : 192.1.151.101
Neighbor                :
Incoming interface      : vlan301
Outgoing Interface List :
Interface       State          VSX Role
-----------     ----------     --------
vlan500         forwarding     DR
```

Use Case 3: IPv6 VXLAN tunnel source with dual stack IPv4/IPv6 multicast overlay

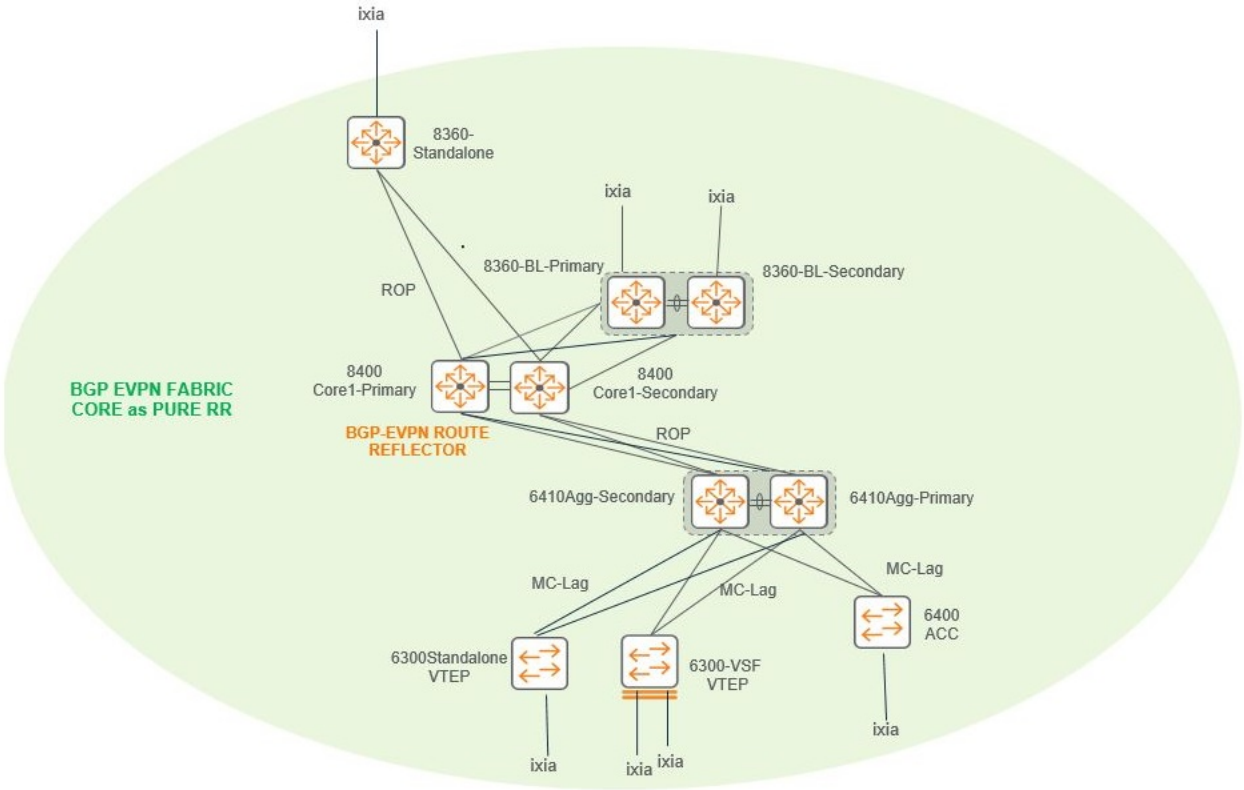
PIM supports both IPv4 and IPv6 as underlay VTEP IP addresses. In deployments with an IPv6 underlay, PIM forms an auto-generated link-local address to exchange control packets and forms a PIM neighborship over an L3VNI interface with other VTEPs. The auto generated IP will be a link local IP in case of overlay IPv6.

The following command introduced in AOS-CX 10.12.1000 to configure an IP address for L3VNI neighborship.

```
ipv6 multicast pim6 l3vni-source-ip  X:X::X:X
```

This configuration provides greater network manageability by overriding the auto-generated IPv6 address with a user-specified IPv6 address for the PIM L3VNI interface. This configuration is optional and only applicable for deployments using an IPv6 underlay type. The IPv6 address configured with this command will be used only for PIM control packet exchanges and will not reside in the router's forwarding tables.

Figure 1 *IPv6 VXLAN tunnel source with dual stack IPv4/IPv6 multicast overlay*



Configuration example for the 8360-Standalone switch:

```
!
!Version ArubaOS-CX LL.10.12.1000L
!export-password: default
hostname 8360-Stub-Std-Sec

vrf vrf_emp
    rd 172.19.105.8:10010
    route-target export 65001:10010 evpn
    route-target import 65001:10010 evpn
vrf vrf_guest
    rd 172.19.105.8:10020
    route-target export 65001:10020 evpn
    route-target import 65001:10020 evpn
vrf vrf_loc
    rd 172.19.105.8:10030
    route-target export 65001:10030 evpn
    route-target import 65001:10030 evpn
vrf vrf_server
    rd 172.19.105.8:10040
    route-target export 65001:10040 evpn
    route-target import 65001:10040 evpn
ntp server 10.5.6.10 minpoll 4 maxpoll 4 iburst
ntp enable
cli-session
    timeout 0
!
!

vlan 30
    name vlan_30_vrf_emp
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 40
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 50
    name vlan_50_vrf_emp
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 60
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 3500-3640,3810-3949
virtual-mac 02:00:a8:00:00:01
evpn
    arp-suppression
    redistribute local-mac
    redistribute local-svi
    vlan 30
        rd auto
        route-target export 100:30
        route-target import 100:30
        redistribute host-route
    vlan 40
        rd auto
        route-target export 100:40
        route-target import 100:40
        redistribute host-route
```

```
    vlan 50
        rd auto
        route-target export 100:50
        route-target import 100:50
        redistribute host-route
    vlan 60
        rd auto
        route-target export 100:60
        route-target import 100:60
        redistribute host-route

interface mgmt
    no shutdown
    ip dhcp
interface lag 90 multi-chassis
    description Conn-Ctrl-7220
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 120,2010,2040
    lacp mode active
    lacp fallback

interface 1/1/15
    description 8400core1-1/1/16
    no shutdown
    mtu 9198
    ip mtu 9198
    ipv6 address 183::19:1:50/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/16
    description 8400-core2-1/1/15
    no shutdown
    mtu 9198
    ip mtu 9198
    ipv6 address 180::19:1:62/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/17
    description ixia-15-5-12/6
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 30,40,50,60,3800

interface loopback 0
    ipv6 address 172:19:105::7/128
    ipv6 ospfv3 1 area 0.0.0.0
interface loopback 1
    ipv6 address 172:19:106::7/128
    ipv6 ospfv3 1 area 0.0.0.0
interface loopback 10
    vrf attach vrf_emp
    ipv6 address 33:33::1/128
    ipv6 pim6-sparse enable
interface loopback 11
    vrf attach vrf_guest
    ipv6 address 44:44::1/128
    ipv6 pim6-sparse enable
interface loopback 12
    vrf attach vrf_loc
```

```
    ipv6 address 55:55::1/128
    ipv6 pim6-sparse enable
interface loopback 13
    vrf attach vrf_server
    ipv6 address 66:66::1/128
    ipv6 pim6-sparse enable
interface vlan 30
    vrf attach vrf_emp
    ip address 10.101.128.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.128.1
    ipv6 address 2000:101:80::7/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::80
    ipv6 address autoconfig
    no ipv6 nd suppress-ra dnssl
    no ipv6 nd suppress-ra rdnss
    ip helper-address 10.5.5.11 vrf default
    ip igmp enable
    ip pim-sparse enable
    ipv6 mld enable
    ipv6 pim6-sparse enable

interface vlan 40
    vrf attach vrf_guest
    ip address 10.101.138.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.138.1
    ipv6 address 2000:101:8a::7/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::8a
    ipv6 address autoconfig
    no ipv6 nd suppress-ra dnssl
    no ipv6 nd suppress-ra rdnss
    ip helper-address 10.5.5.11 vrf default
    ip igmp enable
    ip pim-sparse enable
    ipv6 mld enable
    ipv6 pim6-sparse enable

interface vlan 50
    vrf attach vrf_loc
    ip address 10.101.148.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.148.1
    ipv6 address 2000:101:94::7/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::94
    ipv6 address autoconfig
    no ipv6 nd suppress-ra dnssl
    no ipv6 nd suppress-ra rdnss
    ip helper-address 10.5.5.11 vrf default
    ip igmp enable
    ip pim-sparse enable
    ipv6 mld enable
    ipv6 pim6-sparse enable

interface vlan 60
    vrf attach vrf_server
    ip address 10.101.158.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.158.1
```

```
    ipv6 address 2000:101:9e::7/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::9e
    ipv6 address autoconfig
    no ipv6 nd suppress-ra dnssl
    no ipv6 nd suppress-ra rdnss
    ip helper-address 10.5.5.11 vrf default
    ip igmp enable
    ip pim-sparse enable
    ipv6 mld enable
    ipv6 pim6-sparse enable

interface vlan 3500
    vrf attach vrf_emp
    ip address 35.1.0.1/16
    active-gateway ip mac 00:00:00:00:00:40
    active-gateway ip 35.1.0.1
    ipv6 address 2035:135:1::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 2035:135:1::5
    active-gateway ipv6 fe80::1
    ipv6 address autoconfig
    no ipv6 nd suppress-ra dnssl
    no ipv6 nd suppress-ra rdnss
    ip helper-address 10.5.5.11 vrf default
    ip helper-address 10.5.7.11 vrf default
    ip pim-sparse enable
    ipv6 pim6-sparse enable

interface vlan 3535
    vrf attach vrf_guest
    ip address 35.36.0.1/16
    active-gateway ip mac 00:00:00:00:00:40
    active-gateway ip 35.36.0.1
    ipv6 address 2035:135:24::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 2035:135:24::5
    active-gateway ipv6 fe80::24
    ipv6 address autoconfig
    no ipv6 nd suppress-ra dnssl
    no ipv6 nd suppress-ra rdnss
    ip helper-address 10.5.5.11 vrf default
    ip helper-address 10.5.7.11 vrf default
    ipv6 pim6-sparse enable

interface vlan 3570
    vrf attach vrf_loc
    ip address 35.71.0.1/16
    active-gateway ip mac 00:00:00:00:00:40
    active-gateway ip 35.71.0.1
    ipv6 address 2035:135:47::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 2035:135:47::5
    active-gateway ipv6 fe80::47
    ipv6 address autoconfig
    no ipv6 nd suppress-ra dnssl
    no ipv6 nd suppress-ra rdnss
    ip helper-address 10.5.5.11 vrf default
    ip helper-address 10.5.7.11 vrf default
    ipv6 pim6-sparse enable

interface vlan 3606
```

```
    vrf attach vrf_server
    ip address 35.107.0.1/16
    active-gateway ip mac 00:00:00:00:00:40
    active-gateway ip 35.107.0.1
    ipv6 address 2035:135:6b::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 2035:135:6b::5
    active-gateway ipv6 fe80::6b
    ipv6 address autoconfig
    no ipv6 nd suppress-ra dnssl
    no ipv6 nd suppress-ra rdnss
    ip helper-address 10.5.5.11 vrf default
    ip helper-address 10.5.7.11 vrf default

interface vxlan 1 mode ipv6
    source ipv6 172:19:106::7
    no shutdown
    vni 30
        vlan 30
    vni 40
        vlan 40
    vni 50
        vlan 50
    vni 60
        vlan 60
    vni 10010
        vrf vrf_emp
        routing
    vni 10020
        vrf vrf_guest
        routing
    vni 10030
        vrf vrf_loc
        routing
    vni 10040
        vrf vrf_server
        routing

!
router ospfv3 1
    router-id 77.77.77.12
    area 0.0.0.0
router bgp 65050
    bgp router-id 172.19.105.8
    no bgp fast-external-fallover
    neighbor ntlcampus peer-group
    neighbor ntlcampus remote-as 65050
    neighbor ntlcampus fall-over
    neighbor ntlcampus update-source loopback 0
    neighbor 172:19:105::5 peer-group ntlcampus
    neighbor 172:19:105::6 peer-group ntlcampus
    address-family l2vpn evpn
        neighbor 172:19:105::5 send-community extended
        neighbor 172:19:105::5 activate
        neighbor 172:19:105::6 send-community extended
        neighbor 172:19:105::6 activate
    exit-address-family
!
    vrf vrf_emp
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
```

```
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
            redistribute local loopback
        exit-address-family
!
    vrf vrf_guest
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
            redistribute local loopback
        exit-address-family
!
    vrf vrf_loc
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
            redistribute local loopback
        exit-address-family
!
    vrf vrf_server
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
            redistribute local loopback
        exit-address-family
!
router pim vrf vrf_emp
    enable
    rp-candidate source-ip-interface vlan3500 group-prefix 224.0.0.0/4
    bsr-candidate source-ip-interface vlan3500
router pim vrf vrf_guest
    enable
router pim vrf vrf_loc
    enable
router pim vrf vrf_server
    enable
router pim6 vrf vrf_emp
    enable
    rp-candidate source-ip-interface loopback10 group-prefix ff00::/8
    bsr-candidate source-ip-interface loopback10
router pim6 vrf vrf_guest
    enable
    rp-candidate source-ip-interface loopback11 group-prefix ff00::/8
    bsr-candidate source-ip-interface loopback11
router pim6 vrf vrf_loc
    enable
    rp-candidate source-ip-interface loopback12 group-prefix ff00::/8
    bsr-candidate source-ip-interface loopback12
router pim6 vrf vrf_server
    enable
    rp-candidate source-ip-interface loopback13 group-prefix ff00::/8
    bsr-candidate source-ip-interface loopback13
```

```
ip source-interface radius interface loopback0
ip source-interface dhcp_relay interface loopback1
https-server vrf mgmt
```

Configuration example for the 8360-BL-Primary switch:

```
!
!Version ArubaOS-CX LL.10.12.1000L
!export-password: default
hostname 8360-BL-Primary

profile aggregation-leaf
vrf VRF-KA
vrf vrf_emp
    rd 172.19.105.4:10010
    route-target export 65001:10010 evpn
    route-target import 65001:10010 evpn
vrf vrf_guest
    rd 172.19.105.4:10020
    route-target export 65001:10020 evpn
    route-target import 65001:10020 evpn
vrf vrf_loc
    rd 172.19.105.4:10030
    route-target export 65001:10030 evpn
    route-target import 65001:10030 evpn
vrf vrf_server
    rd 172.19.105.4:10040
    route-target export 65001:10040 evpn
    route-target import 65001:10040 evpn
cli-session
    timeout 0
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 30
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 40
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 50
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 60
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 2900,3700-3707,3800
virtual-mac 02:00:a5:00:00:01
evpn
    arp-suppression
    redistribute local-mac
    redistribute local-svi
    vlan 30
```

```
        rd auto
        route-target export 100:30
        route-target import 100:30
        redistribute host-route
    vlan 40
        rd auto
        route-target export 100:40
        route-target import 100:40
        redistribute host-route
    vlan 50
        rd auto
        route-target export 100:50
        route-target import 100:50
        redistribute host-route
    vlan 60
        rd auto
        route-target export 100:60
        route-target import 100:60
        redistribute host-route
interface mgmt
    no shutdown
    ip dhcp
interface lag 1
    description ISL-Between-8360-BL
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
    lacp mode active
interface 1/1/1
    description 1/1/1-ISL-1/1/1
    no shutdown
    lag 1
interface 1/1/2
    description 1/1/2-ISL-1/1/2
    no shutdown
    lag 1
interface 1/1/3
    description 1/1/3-KAG-1/1/3
    no shutdown
    vrf attach VRF-KA
    ip address 177.1.1.1/24
interface 1/1/9
    description to core2
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 172.19.1.181/30
    ipv6 address 172:19::181/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/10
    description to core1
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 172.19.1.177/30
    ipv6 address 172:20::177/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/33
    description Ixia15.5 12/13
```

```
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 30,40.50,60
interface loopback 0
    ip address 172.19.105.4/32
    ipv6 address 172:19:105::4/128
    ipv6 ospfv3 1 area 0.0.0.0
interface loopback 1
    ip address 172.19.106.4/32
    ipv6 address 172:19:106::4/128
    ipv6 ospfv3 1 area 0.0.0.0
interface vlan 30
    vrf attach vrf_emp
    ip address 10.101.128.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.128.1
    ipv6 address 2000:101:80::8/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::80
    ip helper-address 10.5.5.11 vrf default
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
    ipv6 pim6-sparse enable
    ipv6 pim6-sparse vsx-virtual-neighbor

interface vlan 40
    vrf attach vrf_guest
    ip address 10.101.138.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.138.1
    ipv6 address 2000:101:8a::7/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::8a
    ip igmp enable
    ipv6 mld enable
    ipv6 pim6-sparse enable
    ipv6 pim6-sparse vsx-virtual-neighbor
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor

interface vlan 50
    vrf attach vrf_loc
    ip address 10.101.148.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.148.1
    ipv6 address 2000:101:94::8/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::94
    ip igmp enable
    ipv6 mld enable
    ipv6 pim6-sparse enable
    ipv6 pim6-sparse vsx-virtual-neighbor
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor

interface vlan 60
    vrf attach vrf_server
    ip address 10.101.158.1/24
    active-gateway ip mac 00:00:00:00:00:30
```

```
    active-gateway ip 10.101.158.1
    ipv6 address 2000:101:9e::8/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::9e
    ip igmp enable
    ipv6 mld enable
    ipv6 pim6-sparse enable
    ipv6 pim6-sparse vsx-virtual-neighbor
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor

interface vxlan 1 mode ipv6
    source ipv6 172:19:106::4
    no shutdown
    vni 30
        vlan 30
    vni 40
        vlan 40
    vni 50
        vlan 50
    vni 60
        vlan 60
    vni 10010
        vrf vrf_emp
        routing
    vni 10020
        vrf vrf_guest
        routing
    vni 10030
        vrf vrf_loc
        routing
    vni 10040
        vrf vrf_server
        routing
vsx
    inter-switch-link lag 1
    role primary
    keepalive peer 177.1.1.2 source 177.1.1.1 vrf VRF-KA
!
!
router ospfv3 1
    router-id 77.77.77.10
    area 0.0.0.0
router bgp 65050
    bgp router-id 172.19.105.4
    no bgp fast-external-fallover
    neighbor ntlcampus peer-group
    neighbor ntlcampus remote-as 65050
    neighbor ntlcampus fall-over
    neighbor ntlcampus update-source loopback 0
    neighbor 172:19:105::5 peer-group ntlcampus
    neighbor 172:19:105::6 peer-group ntlcampus
    address-family l2vpn evpn
        neighbor 172:19:105::5 send-community extended
        neighbor 172:19:105::5 activate
        neighbor 172:19:105::6 send-community extended
        neighbor 172:19:105::6 activate
    exit-address-family
!
    vrf vrf_emp
        no bgp fast-external-fallover
        address-family ipv4 unicast
```

```
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
    vrf vrf_guest
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
    vrf vrf_loc
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
    vrf vrf_server
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
router pim vrf vrf_emp
    enable
router pim vrf vrf_guest
    enable
router pim vrf vrf_loc
    enable
router pim vrf vrf_server
    enable
router pim6 vrf vrf_emp
    enable
router pim6 vrf vrf_guest
    enable
router pim6 vrf vrf_loc
    enable
router pim6 vrf vrf_server
    enable
https-server vrf mgmt
```

Configuration example for the 8360-BL-Secondary switch:

```
!
!Version ArubaOS-CX LL.10.12.1000L
!export-password: default
hostname 8360-BL-Secondary
profile aggregation-leaf
vrf VRF-KA
vrf vrf_emp
    rd 172.19.105.3:10010
```

```
    route-target export 65001:10010 evpn
    route-target import 65001:10010 evpn
vrf vrf_guest
    rd 172.19.105.3:10020
    route-target export 65001:10020 evpn
    route-target import 65001:10020 evpn
vrf vrf_loc
    rd 172.19.105.3:10030
    route-target export 65001:10030 evpn
    route-target import 65001:10030 evpn
vrf vrf_server
    rd 172.19.105.3:10040
    route-target export 65001:10040 evpn
    route-target import 65001:10040 evpn
cli-session
    timeout 0
!
!
!

vlan 30
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 40
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 50
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 60
    ip igmp snooping enable
    ipv6 mld snooping enable

virtual-mac 02:00:a5:00:00:01
evpn
    arp-suppression
    redistribute local-mac
    redistribute local-svi
    vlan 30
        rd auto
        route-target export 100:30
        route-target import 100:30
        redistribute host-route
    vlan 40
        rd auto
        route-target export 100:40
        route-target import 100:40
        redistribute host-route
    vlan 50
        rd auto
        route-target export 100:50
        route-target import 100:50
        redistribute host-route
    vlan 60
        rd auto
        route-target export 100:60
        route-target import 100:60
        redistribute host-route
interface mgmt
```

```
    no shutdown
    ip dhcp
interface lag 1
    description ISL-Between-8360-BL
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 1,30-69,2900,3700-3707,3800
    lacp mode active
interface 1/1/1
    description 1/1/1-ISL-1/1/1
    no shutdown
    lag 1
interface 1/1/2
    description 1/1/2-ISL-1/1/2
    no shutdown
    lag 1
interface 1/1/3
    description 1/1/3-KAG-1/1/3
    no shutdown
    vrf attach VRF-KA
    ip address 177.1.1.2/24
interface 1/1/9
    description 8400-1/3/18
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 172.19.1.169/30
    ipv6 address 172:22::169/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/10
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 172.19.1.173/30
    ipv6 address 172:21::173/126
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/33
    description Ixia 12/14
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 30-69,3700-3707
interface loopback 0
    ip address 172.19.105.3/32
    ipv6 address 172:19:105::3/128
    ipv6 ospfv3 1 area 0.0.0.0
interface loopback 1
    ip address 172.19.106.4/32
    ipv6 address 172:19:106::4/128
    ipv6 ospfv3 1 area 0.0.0.0
interface vlan 30
    vrf attach vrf_emp
    ip address 10.101.128.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.128.1
    ipv6 address 2000:101:80::9/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::80
    ip igmp enable
```

```
    ipv6 mld enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
    ipv6 pim6-sparse enable
    ipv6 pim6-sparse vsx-virtual-neighbor

interface vlan 40
    vrf attach vrf_guest
    ip address 10.101.138.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.138.1
    ipv6 address 2000:101:8a::7/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::8a
    ip igmp enable
    ipv6 mld enable
    ipv6 pim6-sparse enable
    ipv6 pim6-sparse vsx-virtual-neighbor
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor

interface vlan 50
    vrf attach vrf_loc
    ip address 10.101.148.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.148.1
    ipv6 address 2000:101:94::9/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::94
    ip igmp enable
    ipv6 mld enable
    ipv6 pim6-sparse enable
    ipv6 pim6-sparse vsx-virtual-neighbor
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor

interface vlan 60
    vrf attach vrf_server
    ip address 10.101.158.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.158.1
    ipv6 address 2000:101:9e::9/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::9e
    ip igmp enable
    ipv6 mld enable
    ipv6 pim6-sparse enable
    ipv6 pim6-sparse vsx-virtual-neighbor
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 3800
    vrf attach vrf_emp
    ip mtu 9198
    ip address 38.1.0.1/16
    active-gateway ip mac 00:00:00:00:00:01
    active-gateway ip 38.1.0.1
    ipv6 address 2038:138:1::5/64
    active-gateway ipv6 mac 00:00:00:00:00:01
    active-gateway ipv6 fe80::1
    ip pim-sparse enable
interface vxlan 1 mode ipv6
    source ipv6 172:19:106::4
```

```
    no shutdown
    vni 30
        vlan 30
    vni 40
        vlan 40
    vni 50
        vlan 50
    vni 60
        vlan 60
    vni 10010
        vrf vrf_emp
        routing
    vni 10020
        vrf vrf_guest
        routing
    vni 10030
        vrf vrf_loc
        routing
    vni 10040
        vrf vrf_server
        routing
vsx
    inter-switch-link lag 1
    role secondary
    keepalive peer 177.1.1.1 source 177.1.1.2 vrf VRF-KA
!
!
!
!
!
router ospfv3 1
    router-id 77.77.77.11
    area 0.0.0.0
router bgp 65050
    bgp router-id 172.19.105.3
    no bgp fast-external-fallover
    neighbor ntlcampus peer-group
    neighbor ntlcampus remote-as 65050
    neighbor ntlcampus fall-over
    neighbor ntlcampus update-source loopback 0
    neighbor 172:19:105::5 peer-group ntlcampus
    neighbor 172:19:105::6 peer-group ntlcampus
    address-family l2vpn evpn
        neighbor 172:19:105::5 send-community extended
        neighbor 172:19:105::5 activate
        neighbor 172:19:105::6 send-community extended
        neighbor 172:19:105::6 activate
    exit-address-family
!
    vrf vrf_emp
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
    vrf vrf_guest
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
```

```
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
    vrf vrf_loc
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
    vrf vrf_server
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
router pim vrf vrf_emp
    enable
router pim vrf vrf_guest
    enable
router pim vrf vrf_loc
    enable
router pim vrf vrf_server
    enable
router pim6 vrf vrf_emp
    enable
router pim6 vrf vrf_guest
    enable
router pim6 vrf vrf_loc
    enable
router pim6 vrf vrf_server
    enable
https-server vrf mgmt
```

Configuration example for the 8400 Core1-Primary switch:

```
!
!Version ArubaOS-CX XL.10.12.1000J
!export-password: default
hostname 8400-Core1-Primary

spanning-tree mode rpvst
spanning-tree
interface mgmt
    no shutdown
    ip dhcp

interface 1/1/13
    description 1/1/17-To-RightAggPri@1/6/24
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 172.19.1.126/30
    ipv6 address 176::19:1:126/64
```

```
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/14
    description 1/1/18-To-RightAggSec@1/6/24
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 172.19.1.134/30
    ipv6 address 177::19:1:126/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point

interface 1/1/16
    description 1/1/16-toStubsec-1/1/15
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 172.19.1.53/30
    ipv6 address 183::19:1:49/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point

interface 1/2/8
    no shutdown
    no routing
    vlan trunk native 1 tag
    vlan trunk allowed all

interface 1/3/17
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 172.19.1.178/30
    ipv6 address 172:20::178/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/3/18
    mtu 9198
    ip mtu 9198
    ip address 172.19.1.174/30
    ipv6 address 172:21::172/126
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point

interface loopback 0
    ip address 172.19.105.5/32
    ipv6 address 172:19:105::5/128
    ipv6 ospfv3 1 area 0.0.0.0

vsx
    system-mac 08:f1:ea:61:aa:00
    inter-switch-link 1/2/8
    role primary
    keepalive peer 10.7.222.34 source 10.7.222.33
    vsx-sync mgmd-global

router ospfv3 1
    router-id 77.77.77.9
    area 0.0.0.0
router bgp 65050
    bgp router-id 172.19.105.5
    neighbor ntlcampus peer-group
```

```
    neighbor ntlcampus remote-as 65050
    neighbor ntlcampus fall-over
    neighbor ntlcampus update-source loopback 0
    neighbor 172:19:105::10 peer-group ntlcampus
    neighbor 172:19:105::2 peer-group ntlcampus
    neighbor 172:19:105::4 peer-group ntlcampus
    neighbor 172:19:105::7 peer-group ntlcampus
    neighbor 172:19:105::9 peer-group ntlcampus
    address-family l2vpn evpn
        neighbor 172:19:105::10 route-reflector-client
        neighbor 172:19:105::10 send-community both
        neighbor 172:19:105::10 activate
        neighbor 172:19:105::2 route-reflector-client
        neighbor 172:19:105::2 send-community both
        neighbor 172:19:105::2 activate
        neighbor 172:19:105::4 route-reflector-client
        neighbor 172:19:105::4 send-community both
        neighbor 172:19:105::4 activate
        neighbor 172:19:105::7 route-reflector-client
        neighbor 172:19:105::7 send-community both
        neighbor 172:19:105::7 activate
        neighbor 172:19:105::9 route-reflector-client
        neighbor 172:19:105::9 send-community both
        neighbor 172:19:105::9 activate
    exit-address-family
!
https-server rest access-mode read-only
no https-server vrf mgmt
```

Configuration example for the 8400 Core1-Secondary switch:

```
!
!Version ArubaOS-CX XL.10.12.1000J
!export-password: default
hostname 8400-Core1-Secondary

module 1/1 product-number jl363a
module 1/2 product-number jl365a
module 1/3 product-number jl687a

spanning-tree mode rpvst
spanning-tree
interface mgmt
    no shutdown
    ip dhcp

interface 1/1/13
    description 1/1/18-To-RightAggSec@1/5/47
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 172.19.1.138/30
    ipv6 address 179::19:1:130/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/14
    description 1/1/14-To-RightAggPri@1/5/11
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 172.19.1.130/30
```

```
    ipv6 address 178::19:1:130/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/15
    description 1/1/15to-StubSec-1/1/16
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 172.19.1.61/30
    ipv6 address 180::19:1:61/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point

interface 1/3/17
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 172.19.1.182/30
    ipv6 address 172:19::182/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/3/18
    no shutdown
    mtu 9198
    ip mtu 9198
    ip address 172.19.1.170/30
    ipv6 address 172:22::170/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point

interface loopback 0
    ip address 172.19.105.6/32
    ipv6 address 172:19:105::6/128
    ipv6 ospfv3 1 area 0.0.0.0

vsx
    system-mac 08:f1:ea:61:0a:00
    inter-switch-link 1/2/8
    role secondary
    keepalive peer 10.7.222.33 source 10.7.222.34
    vsx-sync mgmd-global

router ospfv3 1
    router-id 6.6.6.2
    area 0.0.0.0
router bgp 65050
    bgp router-id 172.19.105.6
    neighbor ntlcampus peer-group
    neighbor ntlcampus remote-as 65050
    neighbor ntlcampus fall-over
    neighbor ntlcampus update-source loopback 0
    neighbor 172:19:105::10 peer-group ntlcampus
    neighbor 172:19:105::2 peer-group ntlcampus
    neighbor 172:19:105::4 peer-group ntlcampus
    neighbor 172:19:105::7 peer-group ntlcampus
    neighbor 172:19:105::9 peer-group ntlcampus
    address-family l2vpn evpn
        neighbor 172:19:105::10 route-reflector-client
        neighbor 172:19:105::10 send-community both
        neighbor 172:19:105::10 activate
        neighbor 172:19:105::2 route-reflector-client
        neighbor 172:19:105::2 send-community both
```

```
        neighbor 172:19:105::2 activate
        neighbor 172:19:105::4 route-reflector-client
        neighbor 172:19:105::4 send-community both
        neighbor 172:19:105::4 activate
        neighbor 172:19:105::7 route-reflector-client
        neighbor 172:19:105::7 send-community both
        neighbor 172:19:105::7 activate
        neighbor 172:19:105::9 route-reflector-client
        neighbor 172:19:105::9 send-community both
        neighbor 172:19:105::9 activate
    exit-address-family
!
https-server rest access-mode read-only
no https-server vrf mgmt
```

Configuration example for the 6410Agg-Primary switch:

```
!
!Version ArubaOS-CX FL.10.12.1000L
!export-password: default
hostname 6410-RightAggPri

no ip icmp redirect
profile default
vrf VSX-KA
cli-session
    timeout 0
!
!
!
!
vlan 3004
    name 6400-Rig-Acc-Uplink
    vsx-sync
vlan 3005
    name 6300-SA-Rig-Acc-Uplink
    vsx-sync
vlan 3006
    name 6300-VSF-Rig-Acc-Uplin
    vsx-sync
    description uplink-6300-standalone-right
spanning-tree mode rpvst
no spanning-tree
spanning-tree priority 2
spanning-tree vlan 1030,3004,3005
interface mgmt
    no shutdown
    ip static 10.10.28.66/21
    default-gateway 10.10.24.1
    nameserver 16.183.202.108 16.110.135.52

interface lag 1 multi-chassis
    description MCLAG to 6405-Right-Acc
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 20,1030,3004
    lacp mode active
interface lag 90 multi-chassis
```

```
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 1030,3005
    lacp mode active
interface lag 91 multi-chassis
    description uplink-6300-standalone-right
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 1030,3006
    lacp mode active
interface lag 255
    description ISL-1/5/48-To-1/5/48
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
    lacp mode active

interface 1/5/8
    description 6300RightSA-1/5/8-To-1/1/28
    no shutdown
    mtu 9198
    lag 90

interface 1/5/10
    description 1/5/10-To-8400core1-1/1/13
    no shutdown
    mtu 9198
    routing
    ip mtu 9198
    ip address 172.19.1.125/30
    ipv6 address 176::19:1:127/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/5/11
    description core2-1/5/47-To-1/1/17
    no shutdown
    mtu 9198
    routing
    ip mtu 9198
    ip address 172.19.1.129/30
    ipv6 address 178::19:1:131/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point

interface 1/5/16
    description 6300RightVSF-1/5/16-To-3/1/27
    no shutdown
    mtu 9198
    lag 90

interface 1/5/26
    description 6405RightAcc-1/5/26-To-1/4/52
    no shutdown
    mtu 9198
    lag 1

interface 1/5/48
    description ISL-1/5/48-To-1/5/48
    no shutdown
```

```
    mtu 9198
    lag 255

interface 1/6/23
    description VSX-KA-RightAggSec-1/6/23-To-1/6/23
    no shutdown
    mtu 9198
    routing
    vrf attach VSX-KA
    ip address 172.19.99.1/30

interface 1/6/25
    description uplink-6300-standalone-right
    no shutdown
    mtu 9198
    lag 91

interface vlan 3004
    ip mtu 9198
    ip address 10.101.250.37/29
    ipv6 address 10::101:250:43/64
    ipv6 ospfv3 1 area 0.0.0.0
interface vlan 3005
    ip mtu 9198
    ip address 10.101.250.41/29
    ipv6 address 11::101:250:43/64
    ipv6 ospfv3 1 area 0.0.0.0
interface vlan 3006
    description uplink-6300-standalone-right
    ip mtu 9198
    ip address 10.101.250.49/29
    ipv6 address 12::101:250:43/64
    ipv6 ospfv3 1 area 0.0.0.0
vsx
    inter-switch-link lag 255
    role primary
    keepalive peer 172.19.99.2 source 172.19.99.1 vrf VSX-KA
!
!
!
!
router ospfv3 1
    router-id 77.77.77.8
    area 0.0.0.0
https-server vrf default
https-server vrf mgmt
```

Configuration example for the 6410Agg-Secondary switch:

```
!
!Version ArubaOS-CX FL.10.12.1000L
!export-password: default

no ip icmp redirect
profile default
vrf VSX-KA
cli-session
    timeout 0
!
!
!
```

```
!
!
!
ssh server vrf default

vlan 3004
    name 6400-Rig-Acc-Uplink
    vsx-sync
vlan 3005
    name 6300-SA-Rig-Acc-Uplink
    vsx-sync
vlan 3006
    name 6300-VSF-Rig-Acc-Uplin
    vsx-sync
    description uplink-6300-standalone-right
spanning-tree mode rpvst
no spanning-tree
spanning-tree priority 2
interface mgmt
    no shutdown
    ip dhcp
interface lag 1 multi-chassis
    description MCLAG to 6405-Right-Acc
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 20,3004
    lacp mode active
interface lag 90 multi-chassis
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
    lacp mode active
interface lag 91 multi-chassis
    description uplink-6300-standalone-right
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
    lacp mode active
interface lag 255
    description ISL-1/5/48-To-1/5/48
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
    lacp mode active

interface 1/5/8
    description 6300RightSA-1/5/8-To-1/1/27
    no shutdown
    mtu 9198
    lag 90

interface 1/5/10
    description core2-1/5/48-To-1/1/18
    no shutdown
    mtu 9198
    routing
    ip mtu 9198
    ip address 172.19.1.137/30
```

```
    ipv6 address 179::19:1:131/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/5/11
    description core1-1/6/24-1/1/18
    no shutdown
    mtu 9198
    routing
    ip mtu 9198
    ip address 172.19.1.133/30
    ipv6 address 177::19:1:127/64
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point

interface 1/5/16
    description RightVSF-1/5/16-To-1/1/27
    no shutdown
    mtu 9198
    lag 90

interface 1/5/26
    description 6405RightAcc-1/5/26-To-1/4/51
    no shutdown
    mtu 9198
    lag 1

interface 1/5/47
    description core2-1/5/48-To-1/1/18
    no shutdown
    mtu 9198
    no routing
    vlan access 1
interface 1/5/48
    description ISL-1/5/48-To-1/5/48
    no shutdown
    mtu 9198
    lag 255

interface 1/6/23
    description VSX-KA-1/6/23-To-1/6/23
    no shutdown
    mtu 9198
    routing
    vrf attach VSX-KA
    ip address 172.19.99.2/30
interface 1/6/24
    description core1-1/6/24-1/1/18
    no shutdown
    mtu 9198
    no routing
    vlan access 1
interface 1/6/25
    description uplink-6300-standalone-right
    no shutdown
    mtu 9198
    lag 91

interface vlan 1
    ip dhcp

interface vlan 3004
    ip mtu 9198
```

```
    ip address 10.101.250.34/29
    ipv6 address 10::101:250:34/64
    ipv6 ospfv3 1 area 0.0.0.0
interface vlan 3005
    ip mtu 9198
    ip address 10.101.250.42/29
    ipv6 address 11::101:250:42/64
    ipv6 ospfv3 1 area 0.0.0.0
interface vlan 3006
    description uplink-6300-standalone-right
    ip mtu 9198
    ip address 10.101.250.50/29
    ipv6 address 12::101:250:42/64
    ipv6 ospfv3 1 area 0.0.0.0
vsx
    inter-switch-link lag 255
    role secondary
    keepalive peer 172.19.99.1 source 172.19.99.2 vrf VSX-KA
!
!
!
!
router ospfv3 1
    router-id 23.23.23.7
    area 0.0.0.0
https-server vrf default
https-server vrf mgmt
```

Configuration Example for the 6300 standalone VTEP switch:

```
!
!
!Version ArubaOS-CX FL.10.12.1000L
!export-password: default
hostname 6300-standalone-right

vrf vrf_emp
    rd 172.19.105.2:10010
    route-target export 65001:10010 evpn
    route-target import 65001:10010 evpn
vrf vrf_guest
    rd 172.19.105.2:10020
    route-target export 65001:10020 evpn
    route-target import 65001:10020 evpn
vrf vrf_loc
    rd 172.19.105.2:10030
    route-target export 65001:10030 evpn
    route-target import 65001:10030 evpn
vrf vrf_server
    rd 172.19.105.2:10040
    route-target export 65001:10040 evpn
    route-target import 65001:10040 evpn

vlan 30
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 40
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 50
```

```
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 60
    ip igmp snooping enable
    ipv6 mld snooping enable

virtual-mac 02:00:a3:00:00:01
evpn
    arp-suppression
    redistribute local-mac
    redistribute local-svi
    vlan 30
        rd auto
        route-target export 100:30
        route-target import 100:30
        redistribute host-route
    vlan 40
        rd auto
        route-target export 100:40
        route-target import 100:40
        redistribute host-route
    vlan 50
        rd auto
        route-target export 100:50
        route-target import 100:50
        redistribute host-route
    vlan 60
        rd auto
        route-target export 100:60
        route-target import 100:60
        redistribute host-route
spanning-tree
interface mgmt
    no shutdown
    ip dhcp
interface lag 91
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 3006
    lacp mode active

interface 1/1/50
    description 15.5-12/2
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 30,40,50,60
interface 1/1/51
    no shutdown
    mtu 9198
    lag 91
interface 1/1/52
    no shutdown
    mtu 9198
    lag 91
interface loopback 0
    ip address 172.19.105.2/32
    ipv6 address 172:19:105::2/128
    ipv6 ospfv3 1 area 0.0.0.0
interface loopback 1
    ip address 172.19.106.2/32
```

```
    ipv6 address 172:19:106::2/128
    ipv6 ospfv3 1 area 0.0.0.0
interface vlan 1
    ip dhcp


interface vlan 30
    vrf attach vrf_emp
    ip address 10.101.128.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.128.1
    ipv6 address 2000:101:80::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::80
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable

interface vlan 40
    vrf attach vrf_guest
    ip address 10.101.138.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.138.1
    ipv6 address 2000:101:8a::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::8a
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable

interface vlan 50
    vrf attach vrf_loc
    ip address 10.101.148.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.148.1
    ipv6 address 2000:101:94::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::94
    ip igmp enable
    ipv6 mld enable
       ip pim-sparse enable
    ipv6 pim6-sparse enable

interface vlan 60
    vrf attach vrf_server
    ip address 10.101.158.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.158.1
    ipv6 address 2000:101:9e::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::9e
    ip igmp enable
    ipv6 mld enable
       ip pim-sparse enable
    ipv6 pim6-sparse enable

interface vlan 3006
    description Uplinkvlan6400Agg
    ip mtu 9198
    ip address 10.101.250.51/29
```

```
    ipv6 address 12::101:250:44/64
    ipv6 ospfv3 1 area 0.0.0.0
interface vxlan 1 mode ipv6
    source ipv6 172:19:106::2
    no shutdown
    vni 30
        vlan 30
    vni 40
        vlan 40
    vni 50
        vlan 50
    vni 60
        vlan 60
    vni 4020
    vni 10010
        vrf vrf_emp
        routing
    vni 10020
        vrf vrf_guest
        routing
    vni 10030
        vrf vrf_loc
        routing
    vni 10040
        vrf vrf_server
        routing
!
router ospfv3 1
    router-id 77.77.77.13
    area 0.0.0.0
router bgp 65050
    bgp router-id 172.19.105.2
    no bgp fast-external-fallover
    neighbor ntlcampus peer-group
    neighbor ntlcampus remote-as 65050
    neighbor ntlcampus fall-over
    neighbor ntlcampus update-source loopback 0
    neighbor 172:19:105::5 peer-group ntlcampus
    neighbor 172:19:105::6 peer-group ntlcampus
    address-family l2vpn evpn
        neighbor 172:19:105::5 send-community extended
        neighbor 172:19:105::5 activate
        neighbor 172:19:105::6 send-community extended
        neighbor 172:19:105::6 activate
    exit-address-family
!
    vrf vrf_emp
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
    vrf vrf_guest
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
```

```
        exit-address-family
!
    vrf vrf_loc
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
    vrf vrf_server
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
router pim vrf vrf_emp
    enable
router pim vrf vrf_guest
    enable
router pim vrf vrf_loc
    enable
router pim vrf vrf_server
    enable
router pim6 vrf vrf_emp
    enable
router pim6 vrf vrf_guest
    enable
router pim6 vrf vrf_loc
    enable
router pim6 vrf vrf_server
    enable
https-server vrf default
https-server vrf mgmt
```

Configuration example for the 6300-VSF VTEP switch:

```
!
!Version ArubaOS-CX FL.10.12.1000L
!export-password: default
hostname 6300-VSF-right

vrf vrf_emp
    rd 172.19.105.10:10010
    route-target export 65001:10010 evpn
    route-target import 65001:10010 evpn
vrf vrf_guest
    rd 172.19.105.10:10020
    route-target export 65001:10020 evpn
    route-target import 65001:10020 evpn
vrf vrf_loc
    rd 172.19.105.10:10030
    route-target export 65001:10030 evpn
    route-target import 65001:10030 evpn
vrf vrf_server
    rd 172.19.105.10:10040
    route-target export 65001:10040 evpn
```

```
    route-target import 65001:10040 evpn

vsf secondary-member 2
vsf member 1
    type jl668a
    link 1 1/1/26
    link 2 1/1/25
vsf member 2
    type jl660a
    link 1 2/1/25
    link 2 2/1/26
vsf member 3
    type jl660a
    link 1 3/1/25
    link 2 3/1/26
vsf member 4
    type jl662a
    link 1 4/1/25
    link 2 4/1/26
vsf member 5
    type jl662a
    link 1 5/1/25
    link 2 5/1/26
vsf member 6
    type jl667a
    link 1 6/1/49
    link 2 6/1/50

vlan 30
    name vlan_30_vrf_emp
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 40
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 50
    name vlan_50_vrf_emp
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 60
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 850
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 885
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 920
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 955
    ip igmp snooping enable
    ipv6 mld snooping enable
```

```
virtual-mac 02:00:a2:00:00:01
evpn
    arp-suppression
    redistribute local-mac
    redistribute local-svi
    vlan 30
        rd auto
        route-target export 100:30
        route-target import 100:30
        redistribute host-route
    vlan 40
        rd auto
        route-target export 100:40
        route-target import 100:40
        redistribute host-route
    vlan 50
        rd auto
        route-target export 100:50
        route-target import 100:50
        redistribute host-route
    vlan 60
        rd auto
        route-target export 100:60
        route-target import 100:60
        redistribute host-route
    vlan 4020
        rd auto
        route-target export 100:4020
        route-target import 100:4020
        redistribute host-route
spanning-tree mode rpvst
spanning-tree
spanning-tree priority 15
interface mgmt
    no shutdown
    ip dhcp

interface lag 90
    description uplinkVlan3005
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 3005
    lacp mode active

interface 1/1/27
    description 1/1/27-6410-RightAggSec-1/5/16
    no shutdown
    mtu 9198
    lag 90
interface 1/1/28
    description 1/1/28-6410-RightAggPri-1/5/8
    no shutdown
    mtu 9198
    lag 90

interface 3/1/27
    description 3/1/27-6410RightAggPri-1/5/16
    no shutdown
    mtu 9198
    lag 90
```

```
interface 3/1/28
    description 3/1/28-6410RightAggSec-1/5/8
    no shutdown
    mtu 9198
    lag 90

interface loopback 0
    ip address 172.19.105.10/32
    ipv6 address 172:19:105::10/128
    ipv6 ospfv3 1 area 0.0.0.0
interface loopback 1
    ip address 172.19.106.10/32
    ipv6 address 172:19:106::10/128
    ipv6 ospfv3 1 area 0.0.0.0
interface loopback 5
    vrf attach vrf_emp
    ip address 5.5.5.1/32
    ip pim-sparse enable
interface vlan 1
    ip dhcp
interface vlan 30
    vrf attach vrf_emp
    ip address 10.101.128.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.128.1
    ipv6 address 2000:101:80::3/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::80
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable

interface vlan 40
    vrf attach vrf_guest
    ip address 10.101.138.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.138.1
    ipv6 address 2000:101:8a::3/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 fe80::8a
    ipv6 address autoconfig
    no ipv6 nd suppress-ra dnssl
    no ipv6 nd suppress-ra rdnss
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable

interface vlan 50
    vrf attach vrf_loc
    ip address 10.101.148.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.148.1
    ipv6 address 2000:101:94::3/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 2001:101:94::3
    active-gateway ipv6 fe80::94
    ipv6 address autoconfig
    no ipv6 nd suppress-ra dnssl
    no ipv6 nd suppress-ra rdnss
    ip igmp enable
```

```
    ipv6 mld enable
    ipv6 pim6-sparse enable
    ip pim-sparse enable
interface vlan 60
    vrf attach vrf_server
    ip address 10.101.158.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.158.1
    ipv6 address 2000:101:9e::3/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 2001:101:9e::3
    active-gateway ipv6 fe80::9e
    ipv6 address autoconfig
    no ipv6 nd suppress-ra dnssl
    no ipv6 nd suppress-ra rdnss
    ip igmp enable
    ipv6 mld enable
    ipv6 pim6-sparse enable

interface vlan 850
    vrf attach vrf_emp
    ip address 30.1.0.1/16
    active-gateway ip mac 00:00:00:00:00:30
    ipv6 address 2003:103:1::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 2003:103:1::5
    active-gateway ipv6 fe80::1
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable

interface vlan 885
    vrf attach vrf_guest
    ip address 30.36.0.1/16
    active-gateway ip mac 00:00:00:00:00:30
    ipv6 address 2003:103:24::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 2003:103:24::5
    active-gateway ipv6 fe80::24
    ipv6 mld enable
    ipv6 pim6-sparse enable

interface vlan 920
    vrf attach vrf_loc
    ip address 30.71.0.1/16
    active-gateway ip mac 00:00:00:00:00:30
    ipv6 address 2003:103:47::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 2003:103:47::5
    active-gateway ipv6 fe80::47
    ipv6 mld enable
    ipv6 pim6-sparse enable

interface vlan 955
    vrf attach vrf_server
    ip address 30.106.0.1/16
    active-gateway ip mac 00:00:00:00:00:30
    ipv6 address 2003:103:6a::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 2003:103:6a::5
    active-gateway ipv6 fe80::6a
```

```
    ipv6 mld enable
    ipv6 pim6-sparse enable

interface vlan 3005
    description uplinkInterfaceToRightAgg
    ip address 10.101.250.43/29
    ip mtu 9198
    ipv6 address 11::101:250:44/64
    ipv6 ospfv3 1 area 0.0.0.0
    exit


interface vxlan 1 mode ipv6
    source ipv6 172:19:106::10
    no shutdown
    vni 30
        vlan 30
    vni 40
        vlan 40
    vni 50
        vlan 50
    vni 60
        vlan 60
    vni 4020
    vni 10010
        vrf vrf_emp
        routing
    vni 10020
        vrf vrf_guest
        routing
    vni 10030
        vrf vrf_loc
        routing
    vni 10040
        vrf vrf_server
        routing

router ospfv3 1
    area 0.0.0.0
router bgp 65050
    bgp router-id 172.19.105.10
    no bgp fast-external-fallover
    neighbor ntlcampus peer-group
    neighbor ntlcampus remote-as 65050
    neighbor ntlcampus fall-over
    neighbor ntlcampus update-source loopback 0
    neighbor 172:19:105::5 peer-group ntlcampus
    neighbor 172:19:105::6 peer-group ntlcampus
    address-family l2vpn evpn
        neighbor 172:19:105::5 send-community extended
        neighbor 172:19:105::5 activate
        neighbor 172:19:105::6 send-community extended
        neighbor 172:19:105::6 activate
    exit-address-family
!
    vrf vrf_emp
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
```

```
        exit-address-family
!
    vrf vrf_guest
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
    vrf vrf_loc
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
    vrf vrf_server
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
router pim vrf vrf_emp
    enable
    rp-candidate source-ip-interface vlan850 group-prefix 224.0.0.0/4
    bsr-candidate source-ip-interface vlan850
router pim vrf vrf_guest
    enable
router pim vrf vrf_loc
    enable
router pim vrf vrf_server
    enable
router pim6 vrf vrf_emp
    enable
router pim6 vrf vrf_guest
    enable
router pim6 vrf vrf_loc
    enable
router pim6 vrf vrf_server
    enable
```

Configuration example for the 6400 access switch:

```
!
!Version ArubaOS-CX FL.10.12.1000L
!export-password: default
hostname 6405RightAcc

profile default
vrf vrf_emp
    rd 172.19.100.4:10010
    route-target export 65001:10010 evpn
    route-target import 65001:10010 evpn
```

```
vrf vrf_guest
    rd 172.19.100.4:10020
    route-target export 65001:10020 evpn
    route-target import 65001:10020 evpn
vrf vrf_loc
    rd 172.19.100.4:10030
    route-target export 65001:10030 evpn
    route-target import 65001:10030 evpn
vrf vrf_server
    rd 172.19.100.4:10040
    route-target export 65001:10040 evpn
    route-target import 65001:10040 evpn
cli-session
    timeout 0
!
vlan 30
    name vrf_emp
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 40
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 50
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 60
    ip igmp snooping enable
    ipv6 mld snooping enable

vlan 700
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 701
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 702
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 703
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 704
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 705
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 706
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 707
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 708
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 709
    ip igmp snooping enable
    ipv6 mld snooping enable
```

```
vlan 3004
    name 6400-Rig-Acc-Uplink

virtual-mac 02:00:a9:00:00:01
evpn
    arp-suppression
    redistribute local-mac
    redistribute local-svi
    vlan 30
        rd auto
        route-target export 100:30
        route-target import 100:30
        redistribute host-route
    vlan 40
        rd auto
        route-target export 100:40
        route-target import 100:40
        redistribute host-route
    vlan 50
        rd auto
        route-target export 100:50
        route-target import 100:50
        redistribute host-route
    vlan 60
        rd auto
        route-target export 100:60
        route-target import 100:60
        redistribute host-route
no spanning-tree
interface mgmt
    no shutdown
    ip dhcp

interface lag 1
    description con-6410-RightAgg-VSX
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 30,40,50,60,3004
    lacp mode active


interface 1/4/51
    description RightAggSec-1/4/51-To-1/5/26
    no shutdown
    mtu 9198
    lag 1
interface 1/4/52
    description RightAggPri-1/4/52-To-1/5/26
    no shutdown
    mtu 9198
    lag 1
interface loopback 0
    ip address 172.19.100.4/32
    ipv6 address 172:19:105::9/128
    ipv6 ospfv3 1 area 0.0.0.0
interface loopback 1
    ipv6 address 172:19:106::9/128
    ipv6 ospfv3 1 area 0.0.0.0
interface vlan 1
    ip dhcp
```

```
interface vlan 30
    vrf attach vrf_emp
    ip address 10.101.128.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.128.1
    ipv6 address 2000:101:80::11/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 2000:101:80::10
    active-gateway ipv6 fe80::80
    ip igmp enable
    ipv6 mld enable
    ipv6 pim6-sparse enable
    ip pim-sparse enable

interface vlan 40
    vrf attach vrf_guest
    ip address 10.101.138.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.138.1
    ipv6 address 2000:101:8a::11/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 2000:101:8A::10
    active-gateway ipv6 fe80::8A
    l3-counters
    ip igmp enable
    ipv6 mld enable
    ipv6 pim6-sparse enable
    ip pim-sparse enable

interface vlan 50
    vrf attach vrf_loc
    ip address 10.101.148.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.148.1
    ipv6 address 2000:101:94::11/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 2000:101:94::10
    active-gateway ipv6 fe80::94
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable

interface vlan 60
    vrf attach vrf_server
    ip address 10.101.158.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.101.158.1
    ipv6 address 2000:101:9e::11/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 2000:101:9E::10
    active-gateway ipv6 fe80::9E
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable

interface vlan 700
    vrf attach vrf_emp
    ip address 70.1.1.1/24
    active-gateway ip mac 00:00:00:00:00:30
```

```
    active-gateway ip 70.1.1.1
    ipv6 address 70:101:1::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 70:101:1::5
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable
interface vlan 701
    vrf attach vrf_emp
    ip address 70.1.2.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 70.1.2.1
    ipv6 address 70:101:2::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 70:101:2::5
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable
interface vlan 702
    vrf attach vrf_emp
    ip address 70.1.3.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 70.1.3.1
    ipv6 address 70:101:3::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 70:101:3::5
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable
interface vlan 703
    vrf attach vrf_emp
    ip address 70.1.4.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 70.1.4.1
    ipv6 address 70:101:4::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 70:101:4::5
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable
interface vlan 704
    vrf attach vrf_emp
    ip address 70.1.5.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 70.1.5.1
    ipv6 address 70:101:5::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 70:101:5::5
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable
interface vlan 705
    vrf attach vrf_emp
    ip address 70.1.6.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 70.1.6.1
    ipv6 address 70:101:6::5/64
```

```
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 70:101:6::5
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable
interface vlan 706
    vrf attach vrf_emp
    ip address 70.1.7.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 70.1.7.1
    ipv6 address 70:101:7::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 70:101:7::5
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable
interface vlan 707
    vrf attach vrf_emp
    ip address 70.1.8.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 70.1.8.1
    ipv6 address 70:101:8::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 70:101:8::5
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable
interface vlan 708
    vrf attach vrf_emp
    ip address 70.1.9.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 70.1.9.1
    ipv6 address 70:101:9::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 70:101:9::5
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable
interface vlan 709
    vrf attach vrf_emp
    ip address 70.1.10.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 70.1.10.1
    ipv6 address 70:101:a::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 70:101:a::5
    ip igmp enable
    ipv6 mld enable
    ip pim-sparse enable
    ipv6 pim6-sparse enable
interface vlan 710
    vrf attach vrf_guest
    ipv6 address 70:101:b::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 70:101:b::10
    ipv6 mld enable
    ipv6 pim6-sparse enable
```

```
interface vlan 720
    vrf attach vrf_loc
    ipv6 address 70:101:15::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 70:101:15::10
    ipv6 mld enable
    ipv6 pim6-sparse enable

interface vlan 732
    vrf attach vrf_server
    ipv6 address 70:101:21::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 70:101:21::5
    ipv6 mld enable
    ipv6 pim6-sparse enable

interface vlan 3004
    ip mtu 9198
    ip address 10.101.250.35/29
    ipv6 address 1::101:250:44/64
    ipv6 ospfv3 1 area 0.0.0.0
interface vxlan 1 mode ipv6
    source ipv6 172:19:106::9
    no shutdown
    vni 30
        vlan 30
    vni 40
        vlan 40
    vni 50
        vlan 50
    vni 60
        vlan 60
    vni 10010
        vrf vrf_emp
        routing
    vni 10020
        vrf vrf_guest
        routing
    vni 10030
        vrf vrf_loc
        routing
    vni 10040
        vrf vrf_server
        routing
!
!
!
router ospfv3 1
    router-id 77.77.77.7
    area 0.0.0.0
router bgp 65050
    bgp router-id 172.19.100.4
    no bgp fast-external-fallover
    neighbor ntlcampus peer-group
    neighbor ntlcampus remote-as 65050
    neighbor ntlcampus fall-over
    neighbor ntlcampus update-source loopback 0
    neighbor 172:19:105::5 peer-group ntlcampus
    neighbor 172:19:105::6 peer-group ntlcampus
    address-family l2vpn evpn
        neighbor 172:19:105::5 send-community extended
        neighbor 172:19:105::5 activate
```

```
        neighbor 172:19:105::6 send-community extended
        neighbor 172:19:105::6 activate
    exit-address-family
!
    vrf vrf_emp
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
    vrf vrf_guest
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
    vrf vrf_loc
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
    vrf vrf_server
        no bgp fast-external-fallover
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
        address-family ipv6 unicast
            redistribute connected
        exit-address-family
!
router pim vrf vrf_emp
    enable
router pim vrf vrf_guest
    enable
router pim vrf vrf_loc
    enable
router pim vrf vrf_server
    enable
router pim6
    enable
router pim6 vrf vrf_emp
    enable
router pim6 vrf vrf_guest
    enable
router pim6 vrf vrf_loc
    enable
router pim6 vrf vrf_server
    enable
https-server vrf default
https-server vrf mgmt
```

Verifying the configuration

Use the following procedure to verify the correct configuration of a IPv6 VXLAN tunnel source with dual stack IPv4/IPv6 multicast overlay, as shown in Use Case#3.

1. Verify the Access VTEP configuration.
   a. Verify ospfv3 output on the 6300 VSF VTEP switch using the **show ipv6 ospfv3 neighbors command.**

```
6300-standalone-right# show ipv6 ospfv3 neighbors
VRF : default                              Process : 1
=============================================

Total Number of Neighbors: 2

Neighbor ID      Priority  State              Interface
-------------------------------------------------------
23.23.23.7       1         FULL/DROther       vlan3006
  Neighbor address fe80::883a:308b:bef9:8300

77.77.77.8       1         FULL/DR            vlan3006
  Neighbor address fe80::883a:308b:bef9:c200
```

   b. Verify BGP neighborship on the 6300 VSF VTEP switch using the command **show bgp all summary**.

```
6300-standalone-right# show bgp all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
 Local AS              : 65050       BGP Router Identifier  : 172.19.105.2
 Peers                 : 2           Log Neighbor Changes   : No
 Cfg. Hold Time        : 180         Cfg. Keep Alive        : 60
 Confederation Id      : 0

Address-family : IPv4 Unicast
-----------------------------

Address-family : IPv6 Unicast
-----------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
-----------------------------
 Neighbor                        Remote-AS   MsgRcvd MsgSent Up/Down Time State        AdminStatus
 172:19:105::5                   65050       7309    8827    01d:08h:06m  Established  Up
 172:19:105::6                   65050       11742   8964    01d:08h:07m  Established  Up
```

2. Verify IPv6 VXLAN tunnels are operational.
   a. On the 6400 access switch, verify L2VNI tunnels and L3VNI tunnels are UP using the **show interface vxlan vteps** command.

```
6405RightAcc# show interface vxlan vteps
Source                                    Destination               Origin      Status
 VNI       Routing   VLAN  VRF
------------------------------------------ ------------------------- ----------- ----------------
 --------- --------- ----- ----------
172:19:106::9                             172:19:106::7             evpn        operational
 30        disabled  30    --
172:19:106::9                             172:19:106::7             evpn        operational
 40        disabled  40    --
172:19:106::9                             172:19:106::7             evpn        operational
 50        disabled  50    --
172:19:106::9                             172:19:106::7             evpn        operational
 60        disabled  60    --
172:19:106::9                             172:19:106::7             evpn        operational
 10010     enabled   --    vrf_emp
172:19:106::9                             172:19:106::7             evpn        operational
 10020     enabled   --    vrf_guest
172:19:106::9                             172:19:106::7             evpn        operational
 10030     enabled   --    vrf_loc
172:19:106::9                             172:19:106::7             evpn        operational
 10040     enabled   --    vrf_server
172:19:106::9                             172:19:106::4             evpn        operational
 30        disabled  30    --
172:19:106::9                             172:19:106::4             evpn        operational
 40        disabled  40    --
172:19:106::9                             172:19:106::4             evpn        operational
 50        disabled  50    --
172:19:106::9                             172:19:106::4             evpn        operational
 60        disabled  60    --
172:19:106::9                             172:19:106::4             evpn        operational
 10010     enabled   --    vrf_emp
172:19:106::9                             172:19:106::4             evpn        operational
 10020     enabled   --    vrf_guest
172:19:106::9                             172:19:106::4             evpn        operational
 10030     enabled   --    vrf_loc
172:19:106::9                             172:19:106::4             evpn        operational
 10040     enabled   --    vrf_server
172:19:106::9                             172:19:106::2             evpn        operational
 30        disabled  30    --
172:19:106::9                             172:19:106::2             evpn        operational
 40        disabled  40    --
172:19:106::9                             172:19:106::2             evpn        operational
 50        disabled  50    --
172:19:106::9                             172:19:106::2             evpn        operational
 60        disabled  60    --
172:19:106::9                             172:19:106::2             evpn        operational
 10010     enabled   --    vrf_emp
172:19:106::9                             172:19:106::2             evpn        operational
 10020     enabled   --    vrf_guest
```

b. On the 6400 access switch, verify PIM6 neighbors are UP over vxlan for each VRF using the **show ipv6 pim6 neighbor brief vrf <vrf>** command.

```
6405RightAcc# show ipv6 pim6 neighbor brief vrf vrf_emp
--------------------------------------------------------------------------------------------------------------------------------------------
--------------------------------------------------
                  VRF : vrf_emp                          Total number of neighbors : 9
--------------------------------------------------------------------------------------------------------------------------------------------
--------------------------------------------------
Interface    Neighbor                                  Uptime              Expires             DR          Hold Time
             Secondary Address
              (IPV6)                                   (HH:MM:SS)          (HH:MM:SS)          Priority    (HH:MM:SS)
             (IPV6)
-----------  ----------------------------------------  ------------------  ------------------  ----------  ----------
----------  ----------------------------------------
vni10010     fe80::36:130:31:8                         1 days 01:44:18     00:03:21            1           00:03:30

vni10010     fe80::36:130:31:11                        1 days 01:44:21     00:03:22            1           00:03:30

vni10010     fe80::36:130:31:13                        1 days 01:44:20     00:03:18            1           00:03:30

vni10010     fe80::36:130:31:31                        1 days 01:44:21     00:03:20            1           00:03:30

vlan30       fe80::fd:4580:1e68:180                    1 days 01:44:15     00:01:37            136282660   00:01:45
             2000:101:80::7
vlan30       fe80::8c85:c180:1e41:9c80                 1 days 01:44:13     00:01:39            186614308   00:01:45
             2000:101:80::8 ,

           fe80::80
vlan30       fe80::8c85:c180:1e64:c400                 1 days 01:44:20     00:01:36            220168740   00:01:45
             2000:101:80::5
vlan30       fe80::8c85:c180:1ee6:4e00                 1 days 01:44:16     00:01:36            186614308   00:01:45
             2000:101:80::9
vlan30       fe80::9020:c280:1e1f:ac00                 1 days 01:44:20     00:01:39            522158628   00:01:45
             2000:101:80::3
```

3. Verify MLD joins are acting expected for all VLANs using the **show ipv6 mld snooping vlan <vlan>**and **show ipv6 mld interface <interface>** commands on the 6400 access switch.

```
6405RightAcc# show ipv6 mld snooping vlan 700
MLD Snooping Protocol Info

Total VLANs with MLD enabled              : 81
Current count of multicast groups joined  : 1

MLD Drop Unknown Multicast                : Global
VLAN ID : 700
VLAN Name : VLAN700
MLD Configured Version : 2
MLD Operating Version : 2
Querier Address [this switch] : fe80::f860:f082:bcd0:6500
Querier Port :
Querier UpTime :29m 21s
Querier Expiration Time :1m 7s

Active Group Address                       Tracking Vers Mode  Uptime    Expires
------------------------------------------ -------- ---- ----- --------- ---------
ff7e::1                                    Filter    2    INC  24m 24s   3m 31s
```


```
6405RightAcc# show ipv6 mld snooping vlan 700
MLD Snooping Protocol Info

Total VLANs with MLD enabled              : 81
Current count of multicast groups joined  : 1

MLD Drop Unknown Multicast                : Global
VLAN ID : 700
VLAN Name : VLAN700
MLD Configured Version : 2
MLD Operating Version : 2
Querier Address [this switch] : fe80::f860:f082:bcd0:6500
Querier Port :
Querier UpTime :29m 21s
Querier Expiration Time :1m 7s

Active Group Address                       Tracking Vers Mode  Uptime    Expires
------------------------------------------ -------- ---- ----- --------- ---------
ff7e::1                                    Filter    2    INC  24m 24s   3m 31s
```

4. Verify pim6 mroute using the **show ipv6 mld mrout vrf <vrf>** command on the 6400 access switch.

```
6405RightAcc# show ipv6 mld snooping vlan 700
MLD Snooping Protocol Info

Total VLANs with MLD enabled              : 81
Current count of multicast groups joined  : 1

MLD Drop Unknown Multicast                : Global
VLAN ID : 700
VLAN Name : VLAN700
MLD Configured Version : 2
MLD Operating Version : 2
Querier Address [this switch] : fe80::f860:f082:bcd0:6500
Querier Port :
Querier UpTime :29m 21s
Querier Expiration Time :1m 7s

Active Group Address                        Tracking Vers Mode  Uptime    Expires
------------------------------------------- -------- ---- ----- --------- ---------
ff7e::1                                     Filter    2    INC  24m 24s   3m 31s
```

5. Verify RP-set info is learned on all VTEPs.
   a. Issue the **show ipv6 pim6 rp-set vrf <vrf>** command on the 6300 standalone VTEP switch.

```
6300-standalone-right# show ipv6 pim6 rp-set vrf vrf_emp

VRF: vrf_emp

Status and Counters - PIM-SM(IPv6) Learned RP-Set Information

Group Prefix      : ff00::/8
RP Address        : 33:33::1
Hold Time (sec)   : 150
Expire Time (sec) : 118
Priority          : 192
```

b. Issue the **show ipv6 pim6 rp-set vrf all-vrfs** command on the 6300 VTEP VSF switch.

```
6300-VSF-right# show ipv6 pim6 rp-set all-vrfs

VRF: vrf_emp

Status and Counters - PIM-SM(IPv6) Learned RP-Set Information

Group Prefix        : ff00::/8
RP Address          : 33:33::1
Hold Time (sec)     : 150
Expire Time (sec)   : 132
Priority            : 192


VRF: vrf_guest

Status and Counters - PIM-SM(IPv6) Learned RP-Set Information

Group Prefix        : ff00::/8
RP Address          : 44:44::1
Hold Time (sec)     : 150
Expire Time (sec)   : 116
Priority            : 192


VRF: vrf_loc

Status and Counters - PIM-SM(IPv6) Learned RP-Set Information

Group Prefix        : ff00::/8
RP Address          : 55:55::1
Hold Time (sec)     : 150
Expire Time (sec)   : 131
```

Example Configuration Outputs

The following image displays example output of the **show run interface VXLAN** command on the 6400 access switch.

```
8360-Stub-Std-Sec# show run pim6
router pim6 vrf vrf_emp
    enable
    rp-candidate source-ip-interface loopback10 group-prefix ff00::/8
    bsr-candidate source-ip-interface loopback10
router pim6 vrf vrf_guest
    enable
    rp-candidate source-ip-interface loopback11 group-prefix ff00::/8
    bsr-candidate source-ip-interface loopback11
router pim6 vrf vrf_loc
    enable
    rp-candidate source-ip-interface loopback12 group-prefix ff00::/8
    bsr-candidate source-ip-interface loopback12
router pim6 vrf vrf_server
    enable
    rp-candidate source-ip-interface loopback13 group-prefix ff00::/8
    bsr-candidate source-ip-interface loopback13
```

The following image displays example output of the **show run interface <vlan>** command on the 6400 access switch.

```
6405RightAcc# show run interface vlan700
interface vlan 700
    vrf attach vrf_emp
    ip address 70.1.1.1/24
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 70.1.1.1
    ipv6 address 70:101:1::5/64
    active-gateway ipv6 mac 00:00:00:00:00:30
    active-gateway ipv6 70:101:1::5
    ip pim-sparse enable
    ipv6 pim6-sparse enable
    ip igmp enable
    ipv6 mld enable
    exit
```

The following image displays example output of the **show run pim6** command on the 8360 standalone switch.

```
8360-Stub-Std-Sec# show run pim6
router pim6 vrf vrf_emp
    enable
    rp-candidate source-ip-interface loopback10 group-prefix ff00::/8
    bsr-candidate source-ip-interface loopback10
router pim6 vrf vrf_guest
    enable
    rp-candidate source-ip-interface loopback11 group-prefix ff00::/8
    bsr-candidate source-ip-interface loopback11
router pim6 vrf vrf_loc
    enable
    rp-candidate source-ip-interface loopback12 group-prefix ff00::/8
    bsr-candidate source-ip-interface loopback12
router pim6 vrf vrf_server
    enable
    rp-candidate source-ip-interface loopback13 group-prefix ff00::/8
    bsr-candidate source-ip-interface loopback13
```

Scale-IPv6 Underlay

Platform				
	6300	6400	8360	8100
VTEPs	32	32	32	32
MROUTE	2000	2000	2000	2000
MLD join	2000	2000	2000	2000
L3VNI	16	16	16	8
L2VNI	128	128	128	64

Sample Multicast over VXLAN Config of a VSX Leaf in Symmetric IRB topology



In cases of IPv6 overlay, use the IPv6 version of the commands. Examples in this section show the IPv4 version of commands.

Leaf-1A configuration:

```
hostname Leaf-1A
vrf Test1
    rd 100.0.0.1:15000
    route-target export 1234567:15000 evpn
    route-target import 1234567:15000 evpn
vlan 1
vlan 101
#Enable IGMP snooping
    ip igmp snooping enable
vlan 200
virtual-mac 00:00:00:0a:0a:0a

#evpn configuration
evpn
    redistribute local-svi
    vlan 101
        rd 100.0.0.1:101
        route-target export 101:101
        route-target import 101:101


#L2vni svi configuration       Enable IGMP and PIM on the L2 VNI mapped SVI
interface vlan 101
    vrf attach Test1
    ip address 101.1.1.2/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.1.1.1
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor

#MC-LAG-AF SVI Connection to device Outside Fabric
interface vlan 200
    vrf attach Test1
    vsx active-forwarding
    ip address 101.2.1.2/24
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor

#vxlan configuration
interface vxlan 1
    source ip 100.0.0.1
    vxlan-counters aggregate
    no shutdown
    vni 101
        vlan 101
    vni 15001
        vrf Test1
        routing
```

```
vsx
    inter-switch-link lag 1
    role primary
    keepalive peer 192.168.1.2 source 192.168.1.1
router ospf 1
    router-id 11.11.11.11
    area 0.0.0.0
router bgp 1
    bgp router-id 1.1.1.1
    neighbor 3.3.3.3 remote-as 1
    neighbor 3.3.3.3 update-source loopback 0
    neighbor 4.4.4.4 remote-as 1
    neighbor 4.4.4.4 update-source loopback 0
    neighbor 5.5.5.5 remote-as 1
    neighbor 5.5.5.5 update-source loopback 0
    address-family ipv4 unicast
        redistribute connected
    exit-address-family
    address-family l2vpn evpn
        neighbor 3.3.3.3 activate
        neighbor 3.3.3.3 send-community extended
        neighbor 4.4.4.4 activate
        neighbor 4.4.4.4 send-community extended
        neighbor 5.5.5.5 activate
        neighbor 5.5.5.5 send-community extended
    exit-address-family
!
    vrf Test1
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
!
#Enable PIM
router pim vrf Test1
    enable
```

Leaf-1B configuration:

```
hostname Leaf-1B
vrf Test1
    rd 100.0.0.1:15000
    route-target export 1234567:15000 evp
    route-target import 1234567:15000 evpn
vlan 1
vlan 101
   #Enable IGMP snooping
    ip igmp snooping enable
vlan 200
virtual-mac 00:00:00:0a:0a:0a

#evpn configuration
evpn
    redistribute local-svi
    vlan 101
        rd 100.0.0.1:101
        route-target export 101:101
        route-target import 101:101

#L2vni svi configuration. Configure IGMP and PIM on the L2 VNI mapped SVI
interface vlan 101
    vrf attach Test1
```

```
    ip address 101.1.1.3/24
    active-gateway ip mac 00:00:20:00:10:01
    active-gateway ip 101.1.1.1
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor

#MC-LAG-AF SVI Connection to device Outside Fabric
interface vlan 200
    vrf attach Test1
    vsx active-forwarding
    ip address 101.2.1.1/24
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor

#vxlan configuration
interface vxlan 1
    source ip 100.0.0.1
    vxlan-counters aggregate
    no shutdown
    vni 101
        vlan 101
    vni 15001
        vrf Test1
        routing

vsx
    inter-switch-link lag 1
    role secondary
    keepalive peer 192.168.1.1 source 192.168.1.2
router ospf 1
    router-id 1.1.2.1
    area 0.0.0.0
router bgp 1
    bgp router-id 1.1.2.1
    neighbor 3.3.3.3 remote-as 1
    neighbor 3.3.3.3 update-source loopback 0
    neighbor 4.4.4.4 remote-as 1
    neighbor 4.4.4.4 update-source loopback 0
    neighbor 5.5.5.5 remote-as 1
    neighbor 5.5.5.5 update-source loopback 0
    address-family ipv4 unicast
        redistribute connected
    exit-address-family
    address-family l2vpn evpn
        neighbor 3.3.3.3 activate
        neighbor 3.3.3.3 send-community extended
        neighbor 4.4.4.4 activate
        neighbor 4.4.4.4 send-community extended
        neighbor 5.5.5.5 activate
        neighbor 5.5.5.5 send-community extended
    exit-address-family
!
    vrf Test1
        address-family ipv4 unicast
            redistribute connected
        exit-address-family
!
#Enable PIM
router pim vrf Test1
    enable
```

RP configuration on PIM router outside fabric:

```
# SVI Connection to VxLAN VSX Leaf-1
interface vlan 200
    ip address 101.2.1.3/24
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable

router ospf 1
    router-id 7.7.7.7
    area 0.0.0.0

router pim
    enable
    rp-candidate source-ip-interface loopback0
    rp-candidate group-prefix 224.0.0.0/4
    bsr-candidate source-ip-interface loopback0
```

Multicast support over static VXLAN tunnels

In heterogeneous networks with static and dynamic VXAN tunnels, decisions on forwarding multicast control packets are determined by the configuration of tunnel origin and inter-vxlan-bridging-mode.

Table 1: *When the inter-vxlan-bridging mode is static-evpn*

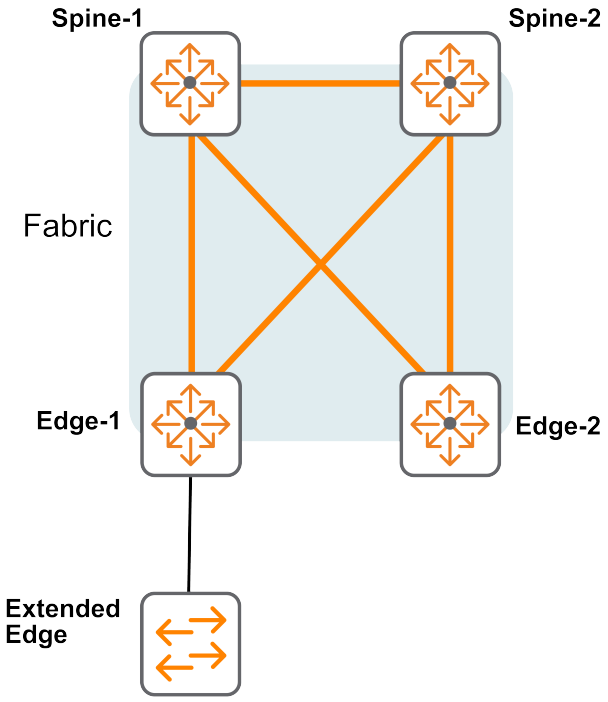
static-evpn	Static	EVPN
Static	Block	Allow
EVPN	Allow	Block

Table 2: *When the inter-vxlan-bridging mode is static-all*

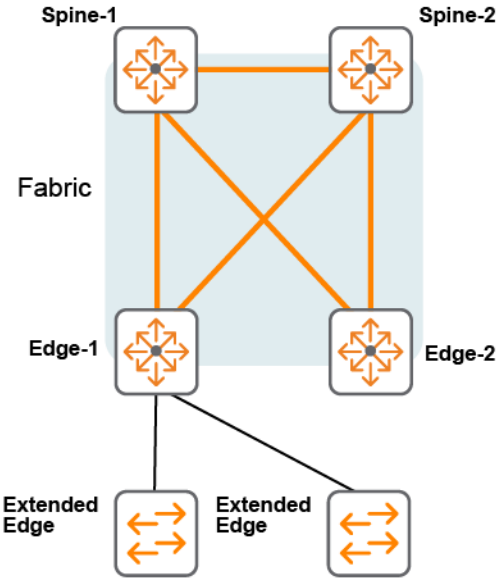
static-all	Static	EVPN
Static	Allow	Allow
EVPN	Allow	Block

Deployment scenarios

In the following topology, **static-evpn** is required for IGMP/MLD control packets to flow between Extended Edge and Edge-2. Extended Edge is a 6200 Switch Series which supports only static VXLAN configuration. A dynamic tunnel will be formed between Edge-1 and Edge-2. For data and control packets to flow between extended Edge-1 and Edge-2, **inter-vxlan-briding-mode** should be configured as **static-evpn** on Edge-1. With this configuration, the traffic will flow between static and dynamic tunnels.



In the following topology, **static-all** is required for IGMP/MLD control packets to flow between Extended Edges, and between Extended Edges and Edge-2. Extended edges are 6200 which supports only static VXLAN configuration. A dynamic tunnel will be formed between Edge-1 and Edge-2. For data and control packets to flow between extended Edge-1 and Edge-2 as well as between two extended edges, **inter-vxlan-briding-mode** should be configured as **static-all** on Edge-1. With this configuration, the traffic will flow from static tunnels to static as well as dynamic tunnels.



In the typical deployment, the Edge act as the layer-3 gateway for the static VXLAN clients (extended edges). The static VXLAN will be terminated on the edge and PIM routing handles routing. Depending on requirements, the VLAN can be stretched from Extended Edge to Edge, to the core VTEP, and across different fabrics as well.

Limitations

- PIM over static VXLAN is not supported, hence it is not recommended to enable PIM on Extended Edge.
- The chain topology with multiple 6200 switches are connected one after another as extended edges is not supported.

Troubleshooting

To check whether the querier is learned correctly on the extended edge, use the following show command on Extended Edges:

```
switch# show ip igmp snooping

VLAN ID : 10
VLAN Name : VLAN10
IGMP Configured Version : 3
IGMP Operating Version : 3
IGMP preprogram-starg-flow is not operational
Querier Address : 10.10.10.1
Querier Port : vxlan1(1.1.1.1)
Querier UpTime :0m 25s
Querier Expiration Time :0m 12s
```

In the output, **Querier Port : vxlan1(1.1.1.1)** ensures that the querier is learned through the static tunnel of Edge.

To make sure joins are learned correctly from the VXLAN port, use the following show command on Edge-1:

```
EDGE-1# show ip igmp snooping vlan 100 detail
IGMP Snooping Protocol Info

Total VLANs with IGMP enabled             : 1
Current count of multicast groups joined  : 3

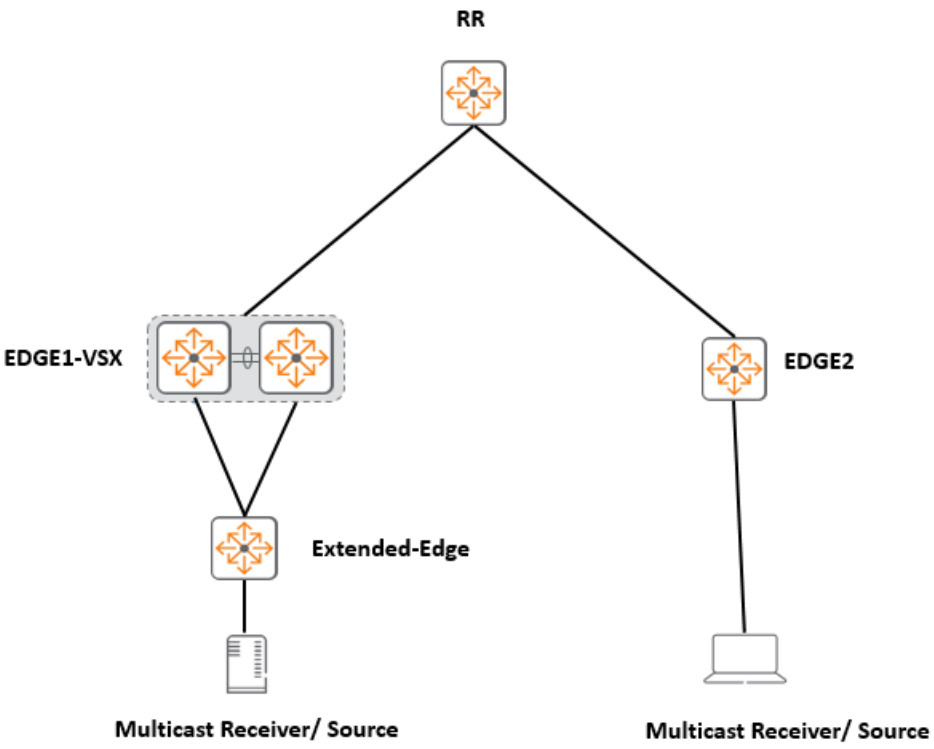
IGMP Drop Unknown Multicast               : Global
VLAN ID : 100
VLAN Name : VLAN100
IGMP Configured Version : 3
IGMP Operating Version : 3
IGMP preprogram-starg-flow is not operational
Querier Address [this switch] : 10.10.10.1
Querier Port :
Querier UpTime :59m 21s
Querier Expiration Time :3m 57s
Router Detected Port(s) :

Active Group Address   Tracking  Vers Mode Uptime    Expires    Ports/Vteps
-------------------- ---------- ---- ---- --------- ---------- ------------------
------------
225.1.1.1              Filter    3    EXC  51m 54s   4m 8s      2.2.2.2
                                                                1/3/8
225.1.1.2              Filter    3    EXC  51m 54s   4m 8s      2.2.2.2
                                                                1/3/8
225.1.1.3              Filter    3    EXC  51m 54s   4m 8s      2.2.2.2
                                                                1/3/8
```

In the output, **Ports/Vteps** ensures that querier is learnt through the static tunnel of Edge.

VSX deployment scenario

The following is the example of typical VSX deployment scenario:



VSX is supported on the static VXLAN feature. Configuration and verification details for the devices in this use case are provided in the following sections:

RR

Configuration

```
!export-password: default
hostname SPINE
!
!
ssh server vrf mgmt
vlan 1
interface mgmt
    no shutdown
    ip static 192.168.1.1/24
interface 1/1/34
    no shutdown
    ip address 11.1.1.1/24
    ip ospf 10 area 0.0.0.0
interface 1/1/35
    no shutdown
    ip address 12.1.1.1/24
    ip ospf 10 area 0.0.0.0
interface 1/1/48
```

```
    no shutdown
    ip address 13.1.1.1/24
    ip ospf 10 area 0.0.0.0
interface loopback 1
    ip address 1.1.1.1/32
    ip ospf 10 area 0.0.0.0
!
!
!
!
!
router ospf 10
    router-id 1.1.1.1
    redistribute connected
    area 0.0.0.0
router bgp 65001
    bgp router-id 5.5.5.5
    neighbor 4.4.4.4 remote-as 65001
    neighbor 4.4.4.4 update-source loopback 1
    neighbor 5.5.5.5 remote-as 65001
    neighbor 5.5.5.5 update-source loopback 1
    neighbor 6.6.6.6 remote-as 65001
    neighbor 6.6.6.6 update-source loopback 1
    address-family l2vpn evpn
        neighbor 4.4.4.4 route-reflector-client
        neighbor 4.4.4.4 send-community extended
        neighbor 4.4.4.4 activate
        neighbor 5.5.5.5 route-reflector-client
        neighbor 5.5.5.5 send-community extended
        neighbor 5.5.5.5 activate
        neighbor 6.6.6.6 route-reflector-client
        neighbor 6.6.6.6 send-community extended
        neighbor 6.6.6.6 activate
    exit-address-family
!
https-server vrf mgmt
```

Edge-1 (VSX primary)

Configuration

```
!export-password: default
hostname L1-P
!
!
ssh server vrf mgmt
vlan 1
vlan 10
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 20
    ip igmp snooping enable
    ipv6 mld snooping enable
evpn
    arp-suppression
    redistribute local-mac
    redistribute local-svi
    vlan 10
        rd auto
        route-target export auto
```

```
        route-target import auto
    vlan 20
        rd auto
        route-target export auto
        route-target import auto
interface mgmt
    no shutdown
    ip static 192.168.1.1/24
interface 1/1/5
    no shutdown
    ip address 11.1.1.2/24
    ip ospf 10 area 0.0.0.0
interface 1/1/46
    no shutdown
    ip address 9.9.9.9/24
interface 1/1/47
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
interface 1/1/48
    no shutdown
    ip address 15.1.1.2/24
    ip ospf 10 area 0.0.0.0
interface loopback 1
    ip address 3.3.3.3/32
    ip ospf 10 area 0.0.0.0
interface loopback 2
    ip address 5.5.5.5/32
    ip ospf 10 area 0.0.0.0
interface vlan 10
    ip address 172.16.1.1/16
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 172.16.1.1
    ip igmp enable
interface vlan 20
    ip address 10.1.1.1/16
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.1.1.1
    ip igmp enable
interface vxlan 1
    source ip 3.3.3.3
    inter-vxlan-bridging-mode static-all
    no shutdown
    vni 10
        vlan 10
        vtep-peer 66.66.66.66
    vni 20
        vlan 20
        vtep-peer 66.66.66.66
vsx
    inter-switch-link 1/1/47
    role primary
    keepalive peer 9.9.9.8 source 9.9.9.9
    linkup-delay-timer 30
!
!
!
!
!
router ospf 10
    router-id 3.3.3.3
```

```
    redistribute connected
    area 0.0.0.0
router bgp 65001
    bgp router-id 3.3.3.3
    neighbor 1.1.1.1 remote-as 65001
    neighbor 1.1.1.1 update-source loopback 2
    address-family l2vpn evpn
        neighbor 1.1.1.1 send-community extended
        neighbor 1.1.1.1 activate
    exit-address-family
!
https-server vrf mgmt
```

Verification

```
EDGE-1 Primary# show interface  vxlan  vteps

Source       Destination    Origin       Status           VNI       Routing
VLAN  VRF
-------------------------------------------- ----------------------------------
-----------
3.3.3.3      4.4.4.4         evpn         operational      10       disabled   10
   -
3.3.3.3      4.4.4.4         evpn         operational      20       disabled   20
   -
3.3.3.3      66.66.66.66     static       operational      10       disabled   10
   -
3.3.3.3      66.66.66.66     static       operational      20       disabled   20
   -
```

Edge-1 (VSX secondary)

Configuration

```
!export-password: default
hostname L1-S
!
!
ssh server vrf mgmt
vlan 1
vlan 10
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 20
    ip igmp snooping enable
    ipv6 mld snooping enable
evpn
    arp-suppression
    redistribute local-mac
    redistribute local-svi
    vlan 10
        rd auto
        route-target export auto
        route-target import auto
    vlan 20
        rd auto
        route-target export auto
        route-target import auto
```

```
interface mgmt
    no shutdown
    ip static 192.168.1.1/24
interface 1/1/5
    no shutdown
    ip address 12.1.1.2/24
    ip ospf 10 area 0.0.0.0
interface 1/1/46
    no shutdown
    ip address 9.9.9.8/24
interface 1/1/47
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
interface 1/1/48
    no shutdown
    ip address 16.1.1.2/24
    ip ospf 10 area 0.0.0.0
interface loopback 1
    ip address 3.3.3.3/32
    ip ospf 10 area 0.0.0.0
interface loopback 2
    ip address 6.6.6.6/32
    ip ospf 10 area 0.0.0.0
interface vlan 10
    ip address 172.16.1.1/16
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 172.16.1.1
    ip igmp enable
interface vlan 20
    ip address 10.1.1.1/16
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.1.1.1
    ip igmp enable
interface vxlan 1
    source ip 3.3.3.3
    inter-vxlan-bridging-mode static-all
    no shutdown
    vni 10
        vlan 10
        vtep-peer 66.66.66.66
    vni 20
        vlan 20
        vtep-peer 66.66.66.66
vsx
    inter-switch-link 1/1/47
    role secondary
    keepalive peer 9.9.9.9 source 9.9.9.8
    linkup-delay-timer 30
!
!
!
!
!
router ospf 10
    router-id 33.33.33.33
    redistribute connected
    area 0.0.0.0
router bgp 65001
    bgp router-id 33.33.33.33
    neighbor 1.1.1.1 remote-as 65001
```

```
    neighbor 1.1.1.1 update-source loopback 2
    address-family l2vpn evpn
        neighbor 1.1.1.1 send-community extended
        neighbor 1.1.1.1 activate
    exit-address-family
!
https-server vrf mgmt
```

Verification

```
EDGE1-VSX Secondary(config)# show interface  vxlan  vteps

Source       Destination    Origin     Status        VNI       Routing    VLAN  VRF
-------------------------------------------- ----------------------------------
----------
3.3.3.3       4.4.4.4        evpn      operational    10        disabled  10     -
3.3.3.3       4.4.4.4        evpn      operational    20        disabled  20     -
3.3.3.3       66.66.66.66    static    operational    10        disabled  10     -
3.3.3.3       66.66.66.66    static    operational    20        disabled  20     -
```

EDGE-2

```
!export-password: default
hostname L2
!
!
ssh server vrf mgmt
vlan 1
vlan 10
    ip igmp snooping enable
vlan 20
    ip igmp snooping enable
evpn
    arp-suppression
    redistribute local-mac
    redistribute local-svi
    vlan 10
        rd auto
        route-target export auto
        route-target import auto
    vlan 20
        rd auto
        route-target export auto
        route-target import auto
interface mgmt
    no shutdown
    ip static 192.168.1.1/24
interface 1/1/5
    no shutdown
    ip address 13.1.1.2/24
    ip ospf 10 area 0.0.0.0
interface 1/1/6
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 10
interface loopback 1
    ip address 4.4.4.4/32
    ip ospf 10 area 0.0.0.0
```

```
interface vlan 10
    ip address 172.16.1.1/16
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 172.16.1.1
    ip igmp enable
interface vlan 20
    ip address 10.1.1.1/16
    active-gateway ip mac 00:00:00:00:00:30
    active-gateway ip 10.1.1.1
    ip igmp enable
interface vxlan 1
    source ip 4.4.4.4
    no shutdown
    vni 10
        vlan 10
    vni 20
        vlan 20
!
!
!
!
!
router ospf 10
    router-id 4.4.4.4
    redistribute connected
    area 0.0.0.0
router bgp 65001
    bgp router-id 4.4.4.4
    neighbor 1.1.1.1 remote-as 65001
    neighbor 1.1.1.1 update-source loopback 1
    address-family l2vpn evpn
        neighbor 1.1.1.1 send-community extended
        neighbor 1.1.1.1 activate
    exit-address-family
!
https-server vrf mgmt
```

Verification

```
EDGE2(config)# show interface  vxlan vteps

Source      Destination     Origin    Status         VNI       Routing   VLAN  VRF
------------------------------------------- ----------------------------------
-
4.4.4.4      3.3.3.3        evpn      operational     10        disabled  10     -
4.4.4.4      3.3.3.3        evpn      operational     20        disabled  20     -
```

Extended Edge

Configuration

```
!export-password: default
hostname EE

ssh server vrf default
ssh server vrf mgmt
vsf member 1
```

```
    type jl724b
system internal-vlan-range 3000-4094
vlan 1
vlan 10
    ip igmp snooping enable
    ipv6 mld snooping enable
vlan 20
    ip igmp snooping enable
    ipv6 mld snooping enable
spanning-tree
interface mgmt
    no shutdown
    ip static 192.168.1.1/24
interface 1/1/9
    no shutdown
    routing
    ip address 15.1.1.1/24
    ip ospf 10 area 0.0.0.0
interface 1/1/10
    no shutdown
    routing
    ip address 16.1.1.1/24
    ip ospf 10 area 0.0.0.0
interface 1/1/11
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 10
interface loopback 1
    ip address 66.66.66.66/32
    ip ospf 10 area 0.0.0.0
interface vlan 1
    ip dhcp
interface vxlan 1
    source ip 66.66.66.66
    no shutdown
    vni 10
        vlan 10
        vtep-peer 3.3.3.3
    vni 20
        vlan 20
        vtep-peer 3.3.3.3
!
!
!
!
!
router ospf 10
    router-id 66.66.66.66
    redistribute connected
    area 0.0.0.0
https-server vrf default
https-server vrf mgmt
```

Verification

```
Extended-Edge(config)# show interface  vxlan vteps

Source          Destination   Origin       Status           VNI       VLAN
------------------------------------------------------------------------------ ----
```

```
66.66.66.66     3.3.3.3       static       operational      10        10
66.66.66.66     3.3.3.3       static       operational      20        20
```

Multicast VXLAN commands

clear ip mroute

```
clear ip mroute
   all-vrfs
   group-prefix <group-prefix>
   <group-address>[<source-address>]
   <port>
   vrf <vrf-name>
```

Description

Clears the multicast routing information for a specified VRF or all VRFs. If you do not include VRF information in these commands, the **clear ip mroute** commands clear the **default** VRF.

Parameter	Description
`all-vrfs`	Clears multicast routing for all VRFs.
`<group-address>`	Clears the multicast routing information for the group address in the specified VRF or all VRFs. If the command does not include VRF information, it clears routing information for the group address in the **default** VRF.
`<source-address>`	Clears multicast routing information for the group and source addresses in the specified VRF or all VRFs. If the command does not include VRF information, it clears routing information for the group and source addresses in the **default** VRF.
`group-prefix <group-prefix>`	Clears the multicast routing information for the group prefix in the specified VRF or all VRFs. The group prefix must be in the format **A.B.C.D/length**. If the command does not include VRF information, it clears routing information for the group address in the **default** VRF.
`<port>`	Clears the multicast routing information for the port in the specified VRF or all VRFs. If the command does not include VRF information, it clears routing information for the port in the **default** VRF.
`vrf <VRF-NAME>`	Clears multicast routing information for a specific VRF.

Examples

Clears multicast routing information for the default VRF.

```
switch# clear ip mroute
```

Clears multicast routing information the group address **225.1.1.1** for the VRF **Lab2**.

```
switch# clear ip mroute 225.1.1.1 vrf Lab2
```

Clears multicast routing information the group address **225.1.1.1** and source address 192.0.2.6 for all VRFs

```
switch# clear ip mroute 225.1.1.1 192.0.2.6 all-vrfs
```

Clears multicast routing information for the port **VLAN10** on the **Default** VRF.

```
clear ip mroute vlan10
```

Clears multicast routing information for the port **VLAN10** for the group address **225.1.1.1** and source address **192.0.2.6** for the VRF **Lab3**.

```
switch# clear ip mroute vlan20 225.1.1.1 192.0.2.6 Lab3
```

Command History

Release	Modification
10.12	Command introduced.

Command Information

Platforms	Command context	Authority
6300 6400 8100 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

dyn-vxlan-tunnel-bridging-mode

```
dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
no dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
```

Description

Specifies the dyn-vxlan-tunnel-bridging-mode and provides the configurations to enable bridging between dynamic tunnels (BGP-EVPN-provisioned VXLAN tunnels). By default, split-horizon is enabled for all dynamic tunnels; therefore, bridging is disabled between them.

The default value is NULL.

The **no** form of this command disables bridging between dynamic tunnels.

Usage

- Configuration of static tunnels is not recommended on VTEPs where iBGP-eBGP split horizon is disabled.
- iBGP and eBGP tunnels are part of different broadcast groups and bridging is permitted between them.
- Route Targets (RTs) have to be manually configured by the user.

Examples

Enabling bridging between dynamic tunnels:

```
switch(config-evpn)#dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
```

Disabling bridging between dynamic tunnels:

```
switch(config-evpn)# no dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
```

Command History

Release	Modification
10.09	Command introduced

Command Information

Platforms	Command context	Authority
8325 8360 9300 10000	`config-evpn`	Administrators or local user group members with execution rights for this command.

ip pim-sparse datapath-auto-include

```
ip pim-sparse datapath-auto-include
no ip pim-sparse datapath-auto-include
```

Description

Enables the router to forward multicast data received on the VXLAN L3VNI fabric to this interface, regardless of whether a multicast join was received on this interface or not. This allows the interface to be in the same multicast data path state on both the VSX peers.

This command must be enabled on the VSX VXLAN routers to support multicast receivers over ROP or P2P SVI extensions. This command can be enabled on a transit L3 peering between VSX peers. This command is optional when the uplink is an MCLAG SVI.

The **no** form of the command disables forwarding of multicast data on the interface.



- An IP address must be configured on the interface and `pim-sparse` must be enabled.
- This command must be enabled only on one interface per VRF.

PIM enabled VXLAN VTEPs can be extended to other routers that can be connected to sources or clients. The following types of L3 or L2 extensions are supported:

- L2 VSX LAG: Upstream or downstream routers are connected using L2 VSX LAG links.
- L3 VSX LAG: Upstream or downstream routers are connected using L3 VSX LAG links.
- ROP extension: L3 extension for sources or clients using ROPs is supported.
- Point-to-point SVI extension: L3 extension for sources or clients using point-to-point SVIs is supported.

If the source is connected using ROP or P2P SVIs, it is recommended to have an additional L3 link per VRF between the VSX devices for upstream redundancy. If the L3 link is an SVI, it is recommended to not add an ISL port in that VLAN.

Parameter	Description
`datapath-auto-include`	Includes the interface for multicast data forwarding.

Examples

Configuring interface 40.0.0.4/24 of the router to forward multicast data:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip address 40.0.0.4/24
switch(config-if-vlan)# ip pim-sparse enable
switch(config-if-vlan)# ip pim-sparse datapath-auto-include
```

Command History

Release	Modification
10.09	Command introduced

Command Information

Platforms	Command context	Authority
6400 8325 8360 8400 9300 10000	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ip pim-sparse vsx-virtual-neighbor

```
ip pim-sparse vsx-virtual-neighbor
no ip pim-sparse vsx-virtual-neighbor
```

Description

Once configured, the router processes IGMP/MLD and PIM joins received on this interface regardless of its DR or Prime Neighbor role. The command must be enabled for VSX VXLAN leaf switches for both L2

and L3 extensions. This allows for the interface to be in the same multicast data path state on both the VSX peers.

The **no** form of the command disables the vsx-virtual-neighbor on the interface.



This command is applicable for normal SVI interfaces and L2 VNI mapped SVI interfaces. It is valid for VXLAN-enabled VLANs only and has no effect on non-VXLAN-enabled VLANs.

Examples

```
switch(config)# interface vlan40
switch(config-if-vlan)# ip address 40.0.0.4/24
switch(config-if-vlan)# ip pim-sparse enable
switch(config-if-vlan)# ip pim-sparse vsx-virtual-neighbor
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8325 8360 8400 9300 10000	config-if-vlan	Administrators or local user group members with execution rights for this command.

ipv6 pim6-sparse datapath-auto-include

```
ipv6 pim6-sparse datapath-auto-include
no ipv6 pim6-sparse datapath-auto-include
```

Description

Enables the router to forward multicast data received on the VXLAN L3VNI fabric to this interface, regardless of whether a multicast join was received on this interface or not. This allows the interface to be in the same multicast data path state on both the VSX peers.

This command must be enabled on the VSX VXLAN routers to support multicast receivers over ROP or P2P SVI extensions. This command can be enabled on a transit L3 peering between VSX peers. This command should not be enabled when the uplink is an MCLAG SVI.

The **no** form of the command disables forwarding of multicast data on the interface.

- An IP address must be configured on the interface and `pim-sparse` must be enabled.
- This command must be enabled only on one interface per VRF.

PIM enabled VXLAN VTEPs can be extended to other routers that can be connected to sources or clients. The following types of L3 or L2 extensions are supported:

- L2 VSX LAG: Upstream or downstream routers are connected using L2 VSX LAG links.
- L3 VSX LAG: Upstream or downstream routers are connected using L3 VSX LAG links.
- ROP extension: L3 extension for sources or clients using ROPs is supported.
- Point-to-point SVI extension: L3 extension for sources or clients using point-to-point SVIs is supported.

If the source is connected using ROP or P2P SVIs, it is recommended to have an additional L3 link per VRF between the VSX devices for upstream redundancy. If the L3 link is an SVI, it is recommended to not add an ISL port in that VLAN.

Parameter	Description
`datapath-auto-include`	Includes the interface for multicast data forwarding.

Examples

Configuring interface 40.0.0.4/24 of the router to forward multicast data:

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 address 40:40::4/64
switch(config-if-vlan)# ipv6 pim6-sparse enable
switch(config-if-vlan)# ipv6 pim6-sparse datapath-auto-include
```

Command History

Release	Modification
10.12	Command introduced

Command Information

Platforms	Command context	Authority
6400 8325 8360 8400 9300 10000	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ipv6 pim6-sparse vsx-virtual-neighbor

```
ipv6 pim6-sparse vsx-virtual-neighbor
no ipv6 pim6-sparse vsx-virtual-neighbor
```

Description

Once configured, the router processes IGMP/MLD and PIM joins received on this interface regardless of its DR or Prime Neighbor role. The command must be enabled for VSX VXLAN leaf switches for both L2 and L3 extensions. This allows for the interface to be in the same multicast data path state on both the VSX peers.

The **no** form of the command disables the vsx-virtual-neighbor on the interface.



This command is applicable for normal SVI interfaces and L2 VNI mapped SVI interfaces. It is valid for VXLAN-enabled VLANs only and has no effect on non-VXLAN-enabled VLANs.

Examples

```
switch(config)# interface vlan40
switch(config-if-vlan)# ipv6 address 40:40::4/64
switch(config-if-vlan)# ipv6 pim6-sparse enable
switch(config-if-vlan)# ipv6 pim6-sparse vsx-virtual-neighbor
```

Command History

Release	Modification
10.12	Command introduced

Command Information

Platforms	Command context	Authority
6300 6400 8325 8360 8400 9300 10000	config-if-vlan	Administrators or local user group members with execution rights for this command.

register-source

```
register-source <INTERFACE-NAME>
no register-source <INTERFACE-NAME>
```

Description

Specifies the source interface to be used for PIM registration in the case of VXLAN anycast interfaces. When the PIM enabled anycast VLAN is directly connected to a multicast source, **register-source** is used to send registration messages to the RP and this interface receives the register-stop messages from the RP.

The **no** form of this command removes the register source configuration.

Parameter	Description
<INTERFACE-NAME>	Specifies the name of the interface to use.

Usage

- This is a global configuration under router-pim configuration and is required in Symmetric IRB with anycast IP address configuration.
- This configuration is required in the source connected switch only when the PIM-DR and RP are in two different switches.
- Without this configuration, there will be traffic loss as the registration sequence will not be successful. It is mandatory to have this source interface configured with a non-anycast IP address which is unique to the VTEP, and with PIM enabled.

Examples

Configuring the source interface for PIM registrations:

```
switch# config
switch(config)# router pim vrf vrf1
switch(config-pim)# register-source loopback1
```

Removing the **register-source** configuration:

```
switch(config-pim)# no register-source loopback1
```

Command History

Release	Modification
10.09.1000	Command introduced

Command Information

Platforms	Command context	Authority
6300 6400 8325 8360 8400 9300 10000	config-pim	Administrators or local user group members with execution rights for this command.

show ip mroute

`show ip mroute [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows multicast routing information. Optionally, you can show specific information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows all PIM neighbors information.
`vrf <VRF-NAME>`	Shows PIM neighbor information for a specific VRF.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Multicast route with L3VNI in Incoming Interface List:

```
switch# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : red
Total number of entries : 1

Group Address           : 225.1.1.1
Source Address          : 80.1.1.11
Neighbor                : 1.1.1.1
Incoming interface      : vni2
Outgoing Interface List :
Interface       State
-----------     ----------
vlan10          forwarding

switch# show ip mroute 225.1.1.1 80.1.1.11 all-vrfs

IP Multicast Route Entries

VRF : red

Group Address                 : 225.1.1.1
Source Address                : 80.1.1.11
Neighbor                      : 1.1.1.1
Incoming interface            : vni2
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 00:07:23
Downstream Interface
Interface       State
-----------     ----------
vni2            forwarding
vni2            forwarding
```

Multicast route with L3VNI in Outgoing Interface List:

```
switch# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : red
Total number of entries : 1
```

```
Group Address           : 225.1.1.1
Source Address          : 80.1.1.11
Neighbor                :
Incoming interface      : vlan20
Outgoing Interface List :
Interface       State
-----------     ----------
vni2               forwarding

switch# show ip mroute 225.1.1.1 80.1.1.11 vrf red

IP Multicast Route Entries

VRF : red
Total number of entries : 1

Group Address                 : 225.1.1.1
Source Address                : 80.1.1.11
Neighbor                      :
Incoming interface            : vlan20
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 00:06:32
Downstream Interface
Interface       State
-----------     ----------
vni2               forwarding
```

Detailed multicast route that displays the individual VTEPs to which the packet is forwarded:

```
switch# show ip mroute 239.2.2.2 100.2.1.4 vrf red detail

VRF : red

Group Address           : 239.2.2.2
Source Address          : 100.2.1.4
SSM Mroute              : False
Neighbor                : 20.20.20.2
Incoming interface      : 1/1/2
Unicast Routing Protocol: OSPF
Metric                  : 200
Metric Pref             : 110
Downstream Interface
Interface      State          Proxy-DR     VTEPS
-----------    ----------     --------     -------
vni1000        forwarding     false        3.3.3.3
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip pim neighbor

```
show ip pim neighbor [<IP-ADDR>] [all-vrfs | vrf <VRF-NAME>]
show ip pim neighbor [<BRIEF>] [all-vrfs | vrf <VRF-NAME>]
```

Description

Displays the information about PIM interfaces currently configured in the router for the given VRF. If VRF is not given, it displays for default VRF.

Parameter	Description
<IP-ADDR>	Shows PIM neighbor information.
<BRIEF>	Shows brief PIM neighbor information.
`all-vrfs`	Shows all PIM neighbors information
`vrf` *<VRF-NAME>*	Shows PIM neighbor information for a specific VRF.

Examples

Show information for all VRFs:

```
switch# show ip pim neighbor all-vrfs

PIM Neighbor

VRF                         : Test_1
Total number of neighbors : 2

IP Address                  : 100.1.1.252
Interface                   : vlan100
Up Time (HH:MM:SS)          : 00:44:38
Expire Time (HH:MM:SS)      : 00:01:32
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:01:45

IP Address                  : 172.1.1.1
Interface                   : vni1000
Up Time (HH:MM:SS)          : 00:44:35
Expire Time (HH:MM:SS)      : 00:03:25
DR Priority                 : 1
Hold Time (HH:MM:SS)        : 00:03:30
```

PIM supports both IPv4 and IPv6 as underlay VTEP IP addresses. In deployments with an IPv6 underlay, PIM forms an auto-generated link-local address to exchange control packets and forms a PIM

neighborship over an L3VNI interface with other VTEPs. The auto generated IP will be a link local IP in case of overlay IPv6.

The following example displays L3VNI neighbors for an IPv6 underlay tunnel with an IPv4 overlay.

```
switch# show ip pim neighbor all-vrfs
PIM Neighbor
VRF                        : Test_1
Total number of neighbors : 1
IP Address                 : 169.254.125.33
Interface                  : vni1000
Up Time (HH:MM:SS)         : 00:44:35
Expire Time (HH:MM:SS)     : 00:03:25
DR Priority                : 1
Hold Time (HH:MM:SS)       : 00:03:30
```

In deployments with an IPv4 overlay, multicast route entries with an incoming L3VNI interface will have a neighbor ip address that is an auto-generated IPv4 address derived from the underlay V6 tunnel address,

```
switch# show ip mroute 230.1.1.1 vrf Test_1 detail
IP Multicast Route Entries
VRF : Test_1
Total number of entries : 1
Group Address                  : 230.1.1.1
Source Address                 : 40.40.1.100
Neighbor                       : 169.254.125.33
Incoming interface             : vni1000
Unicast Routing Protocol       : BGP
Metric                         : 0
Metric  Pref                   : 200
Uptime (HH:MM:SS)              : 00:01:45
Downstream Interface
Interface       State
-----------     ----------
vlan20          forwarding
```

Show **brief** information for PIM neighbor:

```
switch# show ip pim neighbor brief

-------------------------------------------------------------------------------
---------
        VRF: default                Total number of neighbor : 2
-------------------------------------------------------------------------------
---------
Interface     Neighbor    Uptime       Expires       DR       Hold Time
Secondary Address             (IPV4)     (HH:MM:SS)   (HH:MM:SS)   Priority  (HH:MM:SS)
  (IPV4)
-----------   ----------  ----------   ----------   -------   ----------  --------
---------
1/1/1         40.0.0.5     11:54:21    00:01:31    1000      00:01:45   Nil
1/1/2         50.0.0.5     00:03:23    00:01:23    500       00:01:45   60.0.0.4 ,
70.0.0.4
-------------------------------------------------------------------------------
---------
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 mroute

`show ipv6 mroute [all-vrfs | vrf <VRF-NAME>] [vsx-peer]`

Description

Shows multicast routing information. Optionally, you can show specific information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows all PIM neighbors information.
`vrf <VRF-NAME>`	Shows PIM neighbor information for a specific VRF.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Showing multicast route with L3VNI in Incoming Interface List:

```
switch# show ipv6 mroute all-vrfs
IP Multicast Route Entries

VRF : red
Total number of entries : 1

Group Address           : ff55::100:1
Source Address          : 200:200::100
SSM Mroute              : False
Neighbor                : fe80::5:5:5:5
Uptime                  : 00:02:37
State                   : route
Incoming interface      : vni2
Outgoing Interface List :
```

```
Interface       State
-----------     ----------
vlan10          forwarding
```

```
switch# show ipv6 mroute ff55::100:1 200:200::100 vrf red

IP Multicast Route Entries

VRF : red

Group Address                 : ff55::100:1
Source Address                : 200:200::100
Neighbor                      :
Incoming interface            : vni2
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 00:10:24
```

Showing multicast route with L3VNI in Outgoing Interface List:

```
switch# show ipv6 mroute all-vrfs
IP Multicast Route Entries

VRF : red
Total number of entries : 1

Group Address           : ff55::100:1
Source Address          : 200:200::100
Neighbor                :
Uptime                  : 00:06:38
State                   : route
Incoming interface      : vlan20
Outgoing Interface List :
Interface       State
-----------     ----------
vni2            forwarding
```

```
switch# show ipv6 mroute ff55::100:1 200:200::100 vrf red
IP Multicast Route Entries

VRF : red
Total number of entries : 1

Group Address                 : ff55::100:1
Source Address                : 200:200::100
Neighbor                      :
Incoming interface            : vlan20
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 00:06:38
Downstream Interface
Interface       State
-----------     ----------
```

```
vni2            forwarding
```

Showing detailed multicast route that displays the individual VTEPs to which the packet is forwarded:

```
switch# show ipv6 mroute all-vrfs ff55::100:1 200:200::100 vrf red detail

VRF : red
Total number of entries : 1

Group Address           : ff55::100:1
Source Address          : 200:200::100
SSM Mroute              : False
Neighbor                :
Incoming Interface      : vlan20
Unicast Routing Protocol: connected
Metric                  : 0
Metric Pref             : 0
Downstream Interface
Interface      State        Proxy-DR    VTEPs
-----------   ----------    ---------   ---------
vni2          forwarding    false       3.3.3.3
```

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 pim6 interface vlan

`show ipv6 pim6 interface vlan <vlan name>`

Description

Displays the IPV6 information about PIM6 interfaces currently configured in the router for the given VLAN. If VLAN is not given, it displays for default VLAN.

Parameter	Description
`vlan <vlan name>`	Specifies the vlan.

Examples

Showing the IPV6 information about PIM6 interfaces currently configured in the router for VLAN 301:

```
switch(config)# show ipv6 pim6 interface vlan301
Interface                   : vlan301
Neighbor count              : 1
IPv6 Address                : fe80::5480:2881:2dfc:b200/64
Mode                        : sparse
Designated Router           : fe80::5480:2881:2dfc:b200
Proxy DR                    : false
Hello Interval (sec)        : 30
Hello Delay (sec)           : 5
Override Interval (msec)    : 2500              Lan Prune Delay     : Yes
Propagation Delay (msec)    : 500               Configured DR Priority    : 100
Operational DR Priority     : 100
Neighbor Timeout            : 82
VSX Virtual Neighbor        : true
Datapath Auto Include       : true
```

```
switch (config-if-vlan)# show traffic-insight test monitor-type dns-average-
latency
                            mon2 error-statistics

Type                                : dns-average-latency
Start time for error monitoring     : 10/10/2022 04:12:13.923691 UTC
End time for error monitoring       : 10/10/2022 04:17:13.964505 UTC

client_mac        dns_server_ip      number_of_  dns_name   dns_server  dns_format
                                    dns_failures  _errors     _failures     _errors
-------------------------------------------------------------------------------
--
aa:aa:aa:aa:aa:aa   172.0.0.1           200        50          100          50
bb:bb:bb:bb:bb:bb   172.1.1.1           50         10          20           20
cc:cc:cc:cc:cc:cc   172.2.2.2           150        75          25           50
```

Command History

Release	Modification
10.12	Command introduced

Command Information

Platforms	Command context	Authority
6300 6400 8325 8360 8400 9300 10000	config-if-vlan	Administrators or local user group members with execution rights for this command.

show ipv6 pim6 neighbor

```
show ipv6 pim6 neighbor [<IP-ADDR>] [all-vrfs | vrf <VRF-NAME>]
```

Description

Displays the information about PIM interfaces currently configured in the router for the given VRF. If VRF is not given, it displays for default VRF.



The overlay IPv6 address of the LRVNI is an autogenerated link local IP that is derived by PIM using the VXLAN source IP.

Parameter	Description
<IP-ADDR>	Shows PIM neighbor information.
`all-vrfs`	Shows all PIM neighbors information
`vrf` *<VRF-NAME>*	Shows PIM neighbor information for a specific VRF.

Examples

Show information for all VRFs:

```
switch# show ipv6 pim6 neighbor all-vrfs

PIM Neighbor

VRF                         : red
Total number of neighbors : 2

IPv6 Address              : fe80::5:5:5:5
Interface                 : vni10000
Up Time (HH:MM:SS)        : 06:57:307
Expire Time (HH:MM:SS)    : 00:03:26
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:03:30

IPv6 Address              : fe80::3281:c780:a5c:18c0
Interface                 : vlan10
Up Time (HH:MM:SS)        : 00:01:46
Expire Time (HH:MM:SS)    : 00:01:29
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:01:45
Secondary IP Addresses    : 100:100::3
```

PIM supports both IPv4 and IPv6 as underlay VTEP IP addresses. If the outgoing interface is a L3VNI, the forwarded VTEP IP address will be displayed as the actual IPv6 underlay tunnel source IP address.

```
switch# show ipv6 mroute 230.1.1.1 vrf Test_1 detail
IP Multicast Route Entries
VRF : Test_1
Total number of entries : 1
Group Address                 : 230.1.1.1
Source Address                : 40.40.1.100
Neighbor                      : 100.100.1.1
Incoming interface            : 1/1/6
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
```

```
Uptime (HH:MM:SS)             : 00:02:06
Downstream Interface
Interface       State          Vteps
-----------     ----------     -----
vni1000         forwarding     5::5
```

The following example displays L3VNI neighbors for an underlay IPv6 tunnel with an IPv6 overlay

```
switch# show ipv6 pim6 neighbor all-vrfs
PIM Neighbor
VRF                       : Test_1
Total number of neighbors : 1
IP Address                : fe80::165:72:119
Interface                 : vni1000
Up Time (HH:MM:SS)        : 00:40:38
Expire Time (HH:MM:SS)    : 00:01:32
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:01:45
```

In deployments with an IPv6 overlay, multicast route entries with an incoming L3VNI interface will have a neighbor IP that is an auto-generated IPv6 address derived from the IPv6 underlay tunnel. This example displays multicast routes for an IPv6 underlay tunnel with an IPV6 overlay.

```
switch# show ipv6 mroute ff55::1 vrf Test_1 detail
IP Multicast Route Entries
VRF : Test_1
Total number of entries : 1
Group Address                 : ff55::1
Source Address                : 40:40::100
Neighbor                      : fe80::165:72:119
Incoming interface            : vni1000
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 00:01:45
Downstream Interface
Interface       State
-----------     ----------
vlan20          forwarding
```

If the outgoing interface is L3VNI, the forwarded VTEP IP address will be displayed as the actual underlay IPv6 tunnel source IP.

```
switch# show ipv6 mroute ff55::1 vrf Test_1 detail
IP Multicast Route Entries
VRF : Test_1
Total number of entries : 1
Source Address                : 40:40::100
Neighbor                      : fe80::f860:f001:4057:6900
Incoming interface            : 1/1/6
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:02:06
Downstream Interface
```

```
Interface       State          Vteps
-----------     ----------     -----
vni1000         forwarding     5::5
Group Address                 : ff55::1
```

Command History

Release	Modification
10.12	Command introduced.

Command Information

Platforms	Command context	Authority
6300 6400 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

IGMP/MLD

In a VXLAN deployment, enabling IGMP/MLD snooping prevents flooding of unknown multicast packets to all the VTEPs in the L2VNI. AHQ from the querier is sent to all the VTEPs in the L2VNI along with the regular ports in the associated VLAN. Additionally, IGMP/MLD Membership Reports from local hosts are forwarded to all the VTEPs in the L2VNI.

In a situation where a VSX pair is acting like a VTEP, IGMP/MLD Membership Reports from remote VTEPS are synchronized among the VSX peers. Both the VSX peers learn the join on the same VTEP. In order to achieve this, **redistribute local-svi** or **redistribute local-mac** commands must be enabled under the EVPN context. When running VSX on a pair of switches, only one device gets the packet on the VTEP. IGMP/MLD snooping should be enabled on all devices in the fabric, otherwise all multicast traffic is flooded.



If the VTEP does not have any IGMP/MLD configurations, VXLAN encapsulated packets are copied to the CPU even though there is no IGMP/MLD configuration; the packets are forwarded by the software to the other ports.

In a VXLAN-enabled topology where there are tunnel endpoints configured on different platforms, the scale supported are the lowest value among the different platforms. This is because the joins are synced across the Tunnel Endpoints.

PIM-SM

In a VXLAN deployment, when PIM is configured on the tenant VRF, PIM is automatically enabled on the L3VNI interface on that VRF. This interface is used to route multicast traffic across tunnels in a symmetric IRB network. PIM neighbors are learned on this interface and the remote VTEP neighbors are listed under this interface. Multicast traffic is forwarded through the same L3VNI interface to reach

other VTEP clients. PIM neighbors formed across L3VNI can be seen using **show ip pim neighbor** or **show ipv6 pim6 neighbor**. For a L3VNI neighbor, the neighbor IP is the underlay VTEP IP in the Default VRF and all tenant VRFs. **show ip mroute** or **show ipv6 mroute** displays the multicast routes ingressing and egressing on L3VNI interfaces.

PIM uses the VXLAN source IP as the DR priority and it overrides the default DR priority. It is recommended not to configure DR priorities. However, if you must configure the priority, the DR priority should be unique in each of the leaf nodes. For a VSX VTEP, the VSX peers should have the same DR priority.



- PIM-DM with VXLAN is not currently supported.
- PIM-SM VxLAN with the MSDP is not supported.
- Non-Anycast RP can be configured on extended L3-Router or on VxLAN VTEPs including VSX devices.
- MTrace in a PIM-SM VxLAN deployment is not currently supported.
- PIM active-active is not applicable for Multicast over VXLAN.

For IPv6, PIM auto-generates overlay IPv6 address from the underlay IPv4 tunnel source IP address. This Auto-generated IP is used to form neighborship between L3VNI interfaces. Similarly, show commands for mroute displays the multicast routes ingressing/egressing on L3VNI interfaces. The auto generated IP is a link local IP. For example, if the tunnel source IP address is configured as 10.122.189.11, then the auto-generated overlay IPv6 address would be fe80::10:122:189:11.

PIM-SSM

PIM-SSM over VXLAN supports the groups within SSM range addresses.The SSM range addresses can be a default SSM group address range or can be defined using SSM range ACL.

PIM-SSM supports the legacy IGMPv1/IGMPv2/MLD1 clients using SSM-Map. PIM-SSM over VxLAN is supported for IPv4 group address ranges.

PIM-SSM with Multifabric is supported for IPv4 address ranges. PIM-SSM with Multifabric supports the legacy clients (i.e IGMPv1/IGMPv2/MLDv1) using SSM-Map. Any changes in PIM-SSM configurations clear all internal states and Mroutes associated with L3VNI interface. This results in a short period of traffic loss until PIM rebuilds the states.

Refer to Protocol Independent Multicast - Source-Specific Multicast for more information and related commands.

Recommendations for PIM-SSM over VXLAN

Enable the PIM-SSM on the PIM-DR devices and client connected devices.

Configure PIM-SSM Map on PIM-DR, client connected VTEPs, or all devices where L2 VNI is extended.

Limitations

PIM-SSM is not supported with IPv6 underlay for PIM-SSM over VXLAN.

PIM-SSM is not supported with IPv6 mutlicast address ranges on Overlay.

Mroute output for SSM over VXLAN

All multicast route entries that carry PIM-SSM in the Multicast Routing Protocol field rerpresent an SSM mroute.

This example shows an SSM mroute with incoming interface as L3VNI:

```
leaf1# show ip mroute 232.0.0.1 100.1.1.10 vrf red
IP Multicast Route Entries
VRF : red
Group Address                 : 232.0.0.1
Source Address                : 100.1.1.10
Neighbor                      : 3.3.3.3
Incoming interface            : vni10000
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 00:00:11
Downstream Interface
Interface       State
-----------     ----------
vlan20          forwarding
```

This example shows an SSM mroute with incoming interface as L2VNI:

```
leaf1# show ip mroute 232.1.2.1 11.10.11.2 vrf red
IP Multicast Route Entries
VRF : red
Group Address                 : 232.1.2.1
Source Address                : 11.10.11.2
Neighbor                      : 11.4.11.1
Incoming interface            : vlan21
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:23:26
Downstream Interface
Interface       State
-----------     ----------
vlan11          forwarding
```

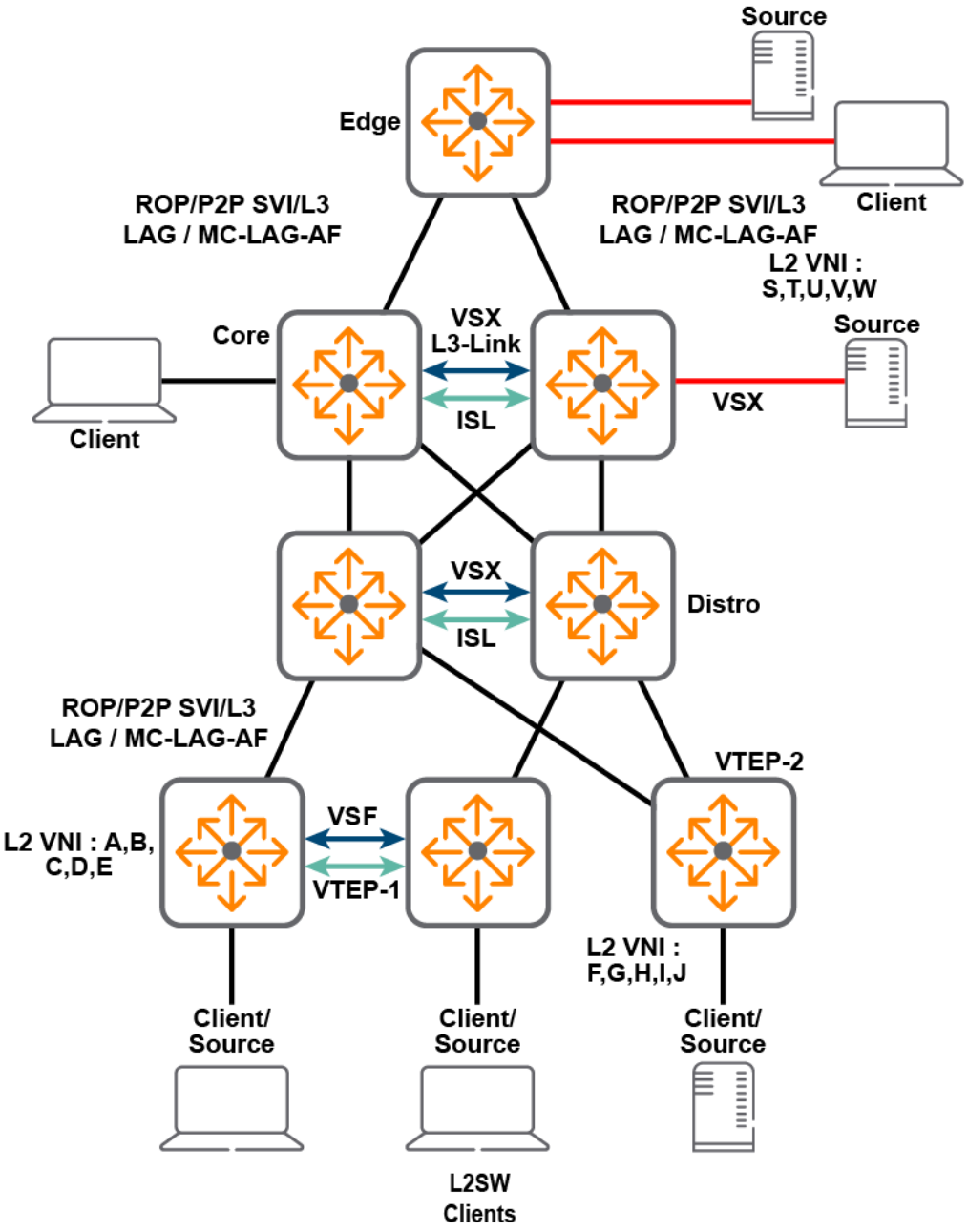
PIM-SSM Scenario

Configuration and verification details for a PIM-SSM scenario with configurations for PIM-SSM over VXLAN with Symmetric IRB routing in a single fabric are provided in the following sections:

Core VSX primary

Figure 1 *PIM-SSM topology*

1) Source is connected to Edge and Core VSX VTEP secondary
2) Clients are present on all VNIs
3) All L2 VNIs are local to VTEP i.e., they are not extended across VTEPs



Core VSX primary

```
hostname Core-vsx-primary
no ip icmp redirect
vrf KA
vrf VRF_1
        rd 192.168.0.110:10001
        route-target export 65535:10001 evpn
        route-target import 65535:10001 evpn
vrf VRF_2
        rd 192.168.0.110:10002
```

```
        route-target export 65535:10002 evpn
        route-target import 65535:10002 evpn
!
object-group ip address multicast-group
        vsx-sync
        !
        10 233.1.2.1
        20 233.1.2.2
object-group ip address sources-group
        vsx-sync
        !
        10 192.168.172.10
        20 192.168.172.20
object-group ip address sources-group-vrf-1
        vsx-sync
        !
        10 192.168.171.10
        20 192.168.171.20
access-list ip pim_ssm_group_range_acl_vrf_2
        vsx-sync
        !
        10 permit any any 227.0.0.0/255.0.0.0
        20 permit any any 233.0.0.0/255.0.0.0
access-list ip ssm-map-acl-vrf-1
        vsx-sync
        !
        10 permit igmp sources-group-vrf-1 232.2.3.5
access-list ip ssm-map-acl-vrf-2
        vsx-sync
        !
        10 permit any 192.168.172.20 227.1.1.1
        20 permit igmp sources-group 227.1.1.2
        30 permit any 192.168.172.10 227.2.3.5
        40 permit any 192.168.172.10 multicast-group
vlan 51
        ip igmp snooping enable
vlan 53
        ip igmp snooping enable
vlan 56
        ip igmp snooping enable
vlan 58
        ip igmp snooping enable
vlan 65-66,70,4001-4002
virtual-mac 00:11:11:00:00:aa
evpn
        redistribute local-svi
        vlan 51
                rd 192.168.0.100:16051
                route-target export 65535:16051
                route-target import 65535:16051
        vlan 53
                rd 192.168.0.100:16053
                route-target export 65535:16053
                route-target import 65535:16053
        vlan 56
                rd 192.168.0.100:16056
                route-target export 65535:16056
                route-target import 65535:16056
        vlan 58
                rd 192.168.0.100:16058
                route-target export 65535:16058
                route-target import 65535:16058
```

```
spanning-tree
interface mgmt
        no shutdown
        ip dhcp
interface lag 10 multi-chassis
                description MC-LAG to Edge
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 4001-4002
        lacp mode active
        5lacp rate fast
interface lag 255
        description ISL
        no shutdown
        no routing
        vlan trunk native 1 tag
        vlan trunk allowed all
        lacp mode active
interface 1/3/13
        description Keepalive
        no shutdown
        routing
        vrf attach KA
        ip address 192.168.255.6/30
interface 1/3/25
        description Clients on Oprhan port
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51,53,56,58
interface 1/4/49
        description ISL
        no shutdown
        lag 255
interface 1/12/1
        description Core-vsx-primary to Distro-vsx-primary
        no shutdown
        routing
        ip address 192.168.0.21/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/12/2
        description Core-vsx-primary to Distro-vsx-secondary
        no shutdown
        routing
        ip address 192.168.0.23/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/12/8
                description MC-LAG to Edge
        no shutdown
        lag 10
interface 1/12/9
        description ISL
        no shutdown
        lag 255
interface loopback 0
        description VTEP source ip
        ip address 192.168.0.110/32
interface loopback 1
        ip address 192.168.1.110/32
```

```
interface vlan 51
        vsx-sync active-gateways mgmd pim
        vrf attach VRF_1
        ip address 192.168.151.2/24
        active-gateway ip mac 00:11:11:00:00:aa
        active-gateway ip 192.168.151.1
        ip igmp enable
        ip igmp apply ssm-map access-list ssm-map-acl-vrf-1
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 53
        vsx-sync active-gateways mgmd pim
        vrf attach VRF_1
        ip address 192.168.153.2/24
        active-gateway ip mac 00:11:11:00:00:aa
        active-gateway ip 192.168.153.1
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 56
        vsx-sync active-gateways mgmd pim
        vrf attach VRF_2
        ip address 192.168.156.2/24
        active-gateway ip mac 00:11:11:00:00:aa
        active-gateway ip 192.168.156.1
        ip igmp enable
        ip igmp apply ssm-map access-list ssm-map-acl-vrf-2
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 58
        vsx-sync active-gateways mgmd pim
        vrf attach VRF_2
        ip address 192.168.158.2/24
        active-gateway ip mac 00:11:11:00:00:aa
        active-gateway ip 192.168.158.1
        ip igmp enable
        ip igmp apply ssm-map access-list ssm-map-acl-vrf-2
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 65
                description Transit_between_vsx_peers_VRF_1
        vrf attach VRF_1
        ip address 192.168.165.1/30
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 66
                description Transit_between_vsx_peers_VRF_2
        vrf attach VRF_2
        ip address 192.168.166.2/30
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 70
                description Transit_between_vsx_peers_default_VRF
        ip address 192.168.0.41/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface vlan 4001
        vrf attach VRF_1
```

```
        vsx active-forwarding
        ip address 192.168.161.1/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 4002
        vrf attach VRF_2
        vsx active-forwarding
        ip address 192.168.162.1/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vxlan 1
        source ip 192.168.0.110
        no shutdown
        vni 10001
                vrf VRF_1
                routing
        vni 10002
                vrf VRF_2
                routing
        vni 16051
                vlan 51
        vni 16053
                vlan 53
        vni 16056
                vlan 56
        vni 16058
                vlan 58
vsx
        inter-switch-link lag 255
        role primary
        keepalive peer 192.168.255.5 source 192.168.255.6 vrf KA
        vsx-sync evpn mclag-interfaces mgmd-global neighbor pim vsx-global
!
!
!
!
!
router ospf 1 vrf VRF_1
        router-id 192.168.161.1
        distance 210
        redistribute bgp
        redistribute connected
        area 0.0.0.0
router ospf 1 vrf VRF_2
        router-id 192.168.162.1
        distance 210
        redistribute bgp
        redistribute connected
        area 0.0.0.0
router ospf 1
        router-id 192.168.0.23
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65535
        bgp router-id 192.168.1.110
        neighbor RR-client peer-group
        neighbor RR-client remote-as 65535
        neighbor RR-client update-source loopback 1
        neighbor 192.168.1.101 peer-group RR-client
```

```
        neighbor 192.168.1.102 peer-group RR-client
        address-family l2vpn evpn
                neighbor RR-client route-reflector-client
                neighbor RR-client send-community extended
                neighbor 192.168.1.101 activate
                neighbor 192.168.1.102 activate
        exit-address-family
!
        vrf VRF_1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
        vrf VRF_2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
router pim vrf VRF_1
        enable
        pim-ssm
router pim vrf VRF_2
        enable
        pim-ssm
        pim-ssm range-access-list pim_ssm_group_range_acl_vrf_2
https-server vrf default
https-server vrf mgmt
```

Core VSX secondary

```
hostname Core-vsx-secondary
no ip icmp redirect
profile default
vrf KA
vrf VRF_1
        rd 192.168.0.100:10001
        route-target export 65535:10001 evpn
        route-target import 65535:10001 evpn
vrf VRF_2
        rd 192.168.0.100:10002
        route-target export 65535:10002 evpn
        route-target import 65535:10002 evpn
!
object-group ip address multicast-group
        vsx-sync
        !
        10 233.1.2.1
        20 233.1.2.2
object-group ip address sources-group
        vsx-sync
        !
        10 192.168.172.10
        20 192.168.172.20
object-group ip address sources-group-vrf-1
        vsx-sync
        !
        10 192.168.171.10
```

```
        20 192.168.171.20
access-list ip pim_ssm_group_range_acl_vrf_2
        vsx-sync
        !
        10 permit any any 227.0.0.0/255.0.0.0
        20 permit any any 233.0.0.0/255.0.0.0
access-list ip ssm-map-acl-vrf-1
        vsx-sync
        !
        10 permit igmp sources-group-vrf-1 232.2.3.5
access-list ip ssm-map-acl-vrf-2
        vsx-sync
        !
        10 permit any 192.168.172.20 227.1.1.1
        20 permit igmp sources-group 227.1.1.2
        30 permit any 192.168.172.10 227.2.3.5
        40 permit any 192.168.172.10 multicast-group
vlan 51
        ip igmp snooping enable
vlan 53
        ip igmp snooping enable
vlan 56
        ip igmp snooping enable
vlan 58
        ip igmp snooping enable
vlan 65-66,70,4001-4002
virtual-mac 00:11:11:00:00:aa
evpn
        redistribute local-svi
        vlan 51
                rd 192.168.0.100:16051
                route-target export 65535:16051
                route-target import 65535:16051
        vlan 53
                rd 192.168.0.100:16053
                route-target export 65535:16053
                route-target import 65535:16053
        vlan 56
                rd 192.168.0.100:16056
                route-target export 65535:16056
                route-target import 65535:16056
        vlan 58
                rd 192.168.0.100:16058
                route-target export 65535:16058
                route-target import 65535:16058
interface lag 10 multi-chassis
                description MC-LAG to Edge
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 4001-4002
        lacp mode active
        lacp rate fast
interface lag 255
        description ISL
        no shutdown
        no routing
        vlan trunk native 1 tag
        vlan trunk allowed all
        lacp mode active
interface 1/5/8
        description MC-LAG to Edge
```

```
        no shutdown
        lag 10
interface 1/5/9
        description ISL
        no shutdown
        lag 255
interface 1/5/15
        description Core-vsx-secondary to Distro-vsx-secondary
        no shutdown
        routing
        ip address 192.168.0.33/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/5/16
        description Core-vsx-secondary to Distro-vsx-primary
        no shutdown
        routing
        ip address 192.168.0.31/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/12/1
                description Clients on Orphan port
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51,53,56,58
interface 1/12/9
        description Keepalive
        no shutdown
        routing
        vrf attach KA
        ip address 192.168.255.5/30
interface 1/12/25
        description ISL
        no shutdown
        lag 255
interface loopback 0
        description VTEP source ip
        ip address 192.168.0.110/32
interface loopback 1
        ip address 192.168.1.109/32
interface vlan 51
        vsx-sync active-gateways mgmd pim
        vrf attach VRF_1
        ip address 192.168.151.3/24
        active-gateway ip mac 00:11:11:00:00:aa
        active-gateway ip 192.168.151.1
        ip igmp enable
        ip igmp apply ssm-map access-list ssm-map-acl-vrf-1
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 53
        vsx-sync active-gateways mgmd pim
        vrf attach VRF_1
        ip address 192.168.153.3/24
        active-gateway ip mac 00:11:11:00:00:aa
        active-gateway ip 192.168.153.1
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 56
        vsx-sync active-gateways mgmd pim
```

```
        vrf attach VRF_2
        ip address 192.168.156.3/24
        active-gateway ip mac 00:11:11:00:00:aa
        active-gateway ip 192.168.156.1
        ip igmp enable
        ip igmp apply ssm-map access-list ssm-map-acl-vrf-2
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 58
        vsx-sync active-gateways mgmd pim
        vrf attach VRF_2
        ip address 192.168.158.3/24
        active-gateway ip mac 00:11:11:00:00:aa
        active-gateway ip 192.168.158.1
        ip igmp enable
        ip igmp apply ssm-map access-list ssm-map-acl-vrf-2
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 65
        vrf attach VRF_1
        ip address 192.168.165.2/30
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 66
        vrf attach VRF_2
        ip address 192.168.166.1/30
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 70
        ip address 192.168.0.40/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
        ip ospf authentication message-digest
        ip ospf message-digest-key 1 md5 ciphertext
        AQBapRbQm2fncJxEP/zanD4wHNmrXBSR0QJB+aEe9pedqn4qCQAAAIowr2ITT/N2vA==
interface vlan 4001
        vrf attach VRF_1
        vsx active-forwarding
        ip address 192.168.161.2/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 4002
        vrf attach VRF_2
        vsx active-forwarding
        ip address 192.168.162.2/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vxlan 1
        source ip 192.168.0.110
        no shutdown
        vni 10001
                vrf VRF_1
                routing
        vni 10002
                vrf VRF_2
                routing
```

```
        vni 16051
                vlan 51
        vni 16053
                vlan 53
        vni 16056
                vlan 56
        vni 16058
                vlan 58
        vni 16059
        vni 16060
vsx
        inter-switch-link lag 255
        role secondary
        keepalive peer 192.168.255.6 source 192.168.255.5 vrf KA
        vsx-sync evpn mclag-interfaces mgmd-global neighbor pim vsx-global
!
!
!
!
!
router ospf 1 vrf VRF_1
        router-id 192.168.163.1
        distance 210
        redistribute bgp
        redistribute connected
        area 0.0.0.0
router ospf 1 vrf VRF_2
        router-id 192.168.164.1
        distance 210
        redistribute bgp
        redistribute connected
        area 0.0.0.0
router ospf 1
        router-id 192.168.0.33
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65535
        bgp router-id 192.168.1.109
        neighbor RR-client peer-group
        neighbor RR-client remote-as 65535
        neighbor RR-client update-source loopback 1
        neighbor 192.168.1.101 peer-group RR-client
        neighbor 192.168.1.102 peer-group RR-client
        neighbor 192.168.1.103 peer-group RR-client
        address-family l2vpn evpn
                neighbor RR-client route-reflector-client
                neighbor RR-client send-community extended
                neighbor 192.168.1.101 activate
                neighbor 192.168.1.102 activate
                neighbor 192.168.1.103 activate
        exit-address-family
!
        vrf VRF_1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
        vrf VRF_2
                address-family ipv4 unicast
```

```
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
router pim vrf VRF_1
        enable
        pim-ssm
router pim vrf VRF_2
        enable
        pim-ssm
        pim-ssm range-access-list pim_ssm_group_range_acl_vrf_2
https-server vrf default
https-server vrf mgmt
```

Distro VSX primary

```
hostname Distro-vsx-primary
vrf KA
!
interface lag 255
        description ISL
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
interface 1/1/1
        description Keepalive
        no shutdown
        vrf attach KA
        ip address 192.168.255.2/30
interface 1/1/7
        description Distro-vsx-primary to Core-vsx-primary
        no shutdown
        ip address 192.168.0.20/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/11
        description Distro-vsx-primary to VTEP1
        no shutdown
        ip address 192.168.0.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/13
        description Distro-vsx-primary to Core-vsx-secondary
        no shutdown
        ip address 192.168.0.30/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/22
        description Distro-vsx-primary to VTEP2
        no shutdown
        ip address 192.168.0.3/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/47
        description ISL
        no shutdown
        lag 255
interface 1/1/48
```

```
        description ISL
        no shutdown
        lag 255
interface loopback 0
        ip address 192.168.0.106/32
        ip ospf 1 area 0.0.0.0
vsx
        inter-switch-link lag 255
        role primary
        keepalive peer 192.168.255.1 source 192.168.255.2 vrf KA
        vsx-sync mclag-interfaces vsx-global
!
router ospf 1
        router-id 192.168.0.106
        area 0.0.0.0
https-server vrf mgmt
```

Distro VSX secondary

```
hostname Distro-vsx-secondary
vrf KA
!
interface lag 255
        description ISL
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
interface 1/1/1
        description Keepalive
        no shutdown
        vrf attach KA
        ip address 192.168.255.1/30
interface 1/1/7
        description Distro-vsx-secondary to Core-vsx-primary
        no shutdown
        ip address 192.168.0.22/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/9
        description Distro-vsx-secondary to Core-vsx-secondary
        no shutdown
        ip address 192.168.0.32/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/11
        description Distro-vsx-secondary to VTEP1
        no shutdown
        ip address 192.168.0.11/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/22
        description Distro-vsx-secondary to VTEP2
        no shutdown
        ip address 192.168.0.13/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/47
        no shutdown
        lag 255
```

```
interface 1/1/48
        no shutdown
        lag 255
interface loopback 0
        ip address 192.168.0.105/32
        ip ospf 1 area 0.0.0.0
vsx
        inter-switch-link lag 255
        role secondary
        keepalive peer 192.168.255.2 source 192.168.255.1 vrf KA
        vsx-sync mclag-interfaces vsx-global
!
router ospf 1
        router-id 192.168.0.105
        area 0.0.0.0
https-server vrf mgmt
```

Edge

```
hostname Edge
vrf VRF_1
vrf VRF_2
!
!
!
!
!
access-list ip pim_ssm_group_range_acl_vrf_2
        30 permit any any 233.0.0.0/255.0.0.0
        50 permit any any 227.1.1.0/255.255.255.0
vlan 1,71-72,4001-4002
interface lag 1
                description Edge_to_Core_vsx
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 4001-4002
        lacp mode active
        lacp rate fast
interface 1/1/10
        description Edge_to_Sources
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 71-72
interface 1/1/13
        description Edge_to_Sources
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 71-72
interface 1/1/31
        description Edge_to_Core_vsx_secondary
        no shutdown
        lag 1
interface 1/1/33
        description Edge_to_Core_vsx_primary
        no shutdown
        lag 1
interface loopback 1
        vrf attach VRF_1
```

```
        ip address 192.168.167.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 2
        vrf attach VRF_2
        ip address 192.168.168.1/32
        ip ospf 1 area 0.0.0.0
interface vlan 71
        vrf attach VRF_1
        ip address 192.168.171.1/24
        ip ospf 1 area 0.0.0.0
        ip ospf passive
        ip igmp enable
        ip pim-sparse enable
interface vlan 72
        vrf attach VRF_2
        ip address 192.168.172.1/24
        ip ospf 1 area 0.0.0.0
        ip ospf passive
        ip igmp enable
        ip pim-sparse enable
interface vlan 4001
        vrf attach VRF_1
        ip address 192.168.161.3/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 4002
        vrf attach VRF_2
        ip address 192.168.162.3/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
!
!
!
!
!
router ospf 1 vrf VRF_1
                router-id 192.168.167.1
        area 0.0.0.0
router ospf 1 vrf VRF_2
                router-id 192.168.168.1
        area 0.0.0.0
router pim vrf VRF_1
        enable
        pim-ssm
router pim vrf VRF_2
        enable
        pim-ssm
        pim-ssm range-access-list pim_ssm_group_range_acl_vrf_2
https-server vrf mgmt
```

VTEP 1

```
hostname VTEP1
vrf VRF_1
        rd 192.168.0.101:10001
        route-target export 65535:10001 evpn
        route-target import 65535:10001 evpn
vrf VRF_2
        rd 192.168.0.101:10002
        route-target export 65535:10002 evpn
        route-target import 65535:10002 evpn
```

```
!
vsf secondary-member 2
vsf member 1
        type jl668a
        link 1 1/1/25
        link 2 1/1/26
vsf member 2
        type jl668a
        link 1 2/1/25
        link 2 2/1/26
vsf member 3
        type jl667a
        link 1 3/1/49
        link 2 3/1/50
vsf member 4
        type jl668a
        link 1 4/1/25
        link 2 4/1/26
object-group ip address multicast-group
        10 233.1.2.1
        20 233.1.2.2
object-group ip address sources-group
        10 192.168.172.10
        20 192.168.172.20
access-list ip pim_ssm_group_range_acl_vrf_2
        10 permit any any 227.0.0.0/255.0.0.0
        20 permit any any 233.0.0.0/255.0.0.0
        30 permit any any 231.0.0.0/255.0.0.0
access-list ip ssm-map-acl-vrf-2
        10 permit any 192.168.172.20 227.1.1.1
        20 permit igmp sources-group 227.1.1.2
        40 permit any 192.168.172.10 multicast-group
vlan 11
        ip igmp snooping enable
vlan 13
        ip igmp snooping enable
vlan 16
        ip igmp snooping enable
vlan 18
        ip igmp snooping enable
virtual-mac 00:11:11:00:00:11
evpn
        redistribute local-svi
        vlan 11
                rd 192.168.0.101:16011
                route-target export 65535:16011
                route-target import 65535:16011
        vlan 13
                rd 192.168.0.101:16013
                route-target export 65535:16013
                route-target import 65535:16013
        vlan 16
                rd 192.168.0.101:16016
                route-target export 65535:16016
                route-target import 65535:16016
        vlan 18
                rd 192.168.0.101:16018
                route-target export 65535:16018
        route-target import 65535:16018
interface 1/1/24
                description Clients
        no shutdown
```

```
        no routing
        vlan trunk native 1
        vlan trunk allowed 11,13,16,18
interface 1/1/25
                description VSF-link
        no shutdown
interface 1/1/26
                description VSF-link
        no shutdown
interface 1/1/28
        description VTEP1 to Distro-P
        no shutdown
        routing
        ip address 192.168.0.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 2/1/13
                description Clients
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 11,13,16,18
interface 2/1/25
                description VSF-link
        no shutdown
interface 2/1/26
                description VSF-link
        no shutdown
interface 2/1/27
                description VTEP1 to Distro-S
        no shutdown
        routing
        ip address 192.168.0.10/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 3/1/49
                description VSF-link
        no shutdown
interface 3/1/50
                description VSF-link
        no shutdown
interface 4/1/1
                description Clients
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 11,13,16,18
interface 4/1/25
                description VSF-link
        no shutdown
interface 4/1/26
                description VSF-link
        no shutdown
interface loopback 0
        description vtep source ip
        ip address 192.168.0.101/32
interface loopback 1
        ip address 192.168.1.101/32
interface vlan 11
        vrf attach VRF_1
        ip address 192.168.111.2/24
        active-gateway ip mac 00:11:11:00:00:11
```

```
        active-gateway ip 192.168.111.1
        ip igmp enable
        ip pim-sparse enable
interface vlan 13
        vrf attach VRF_1
        ip address 192.168.113.2/24
        active-gateway ip mac 00:11:11:00:00:11
        active-gateway ip 192.168.113.1
        ip igmp enable
        ip pim-sparse enable
interface vlan 16
        vrf attach VRF_2
        ip address 192.168.116.2/24
        active-gateway ip mac 00:11:11:00:00:11
        active-gateway ip 192.168.116.1
        ip igmp enable
        ip igmp apply ssm-map access-list ssm-map-acl-vrf-2
        ip pim-sparse enable
interface vlan 18
        vrf attach VRF_2
        ip address 192.168.118.2/24
        active-gateway ip mac 00:11:11:00:00:11
        active-gateway ip 192.168.118.1
        ip igmp enable
        ip igmp apply ssm-map access-list ssm-map-acl-vrf-2
        ip pim-sparse enable
interface vxlan 1
        source ip 192.168.0.101
        no shutdown
        vni 10001
                vrf VRF_1
                routing
        vni 10002
                vrf VRF_2
                routing
        vni 16011
                vlan 11
                vni 16013
        vlan 13
                vni 16016
                vlan 16
        vni 16018
                vlan 18
!
!
!
!
!
router ospf 1
        router-id 192.168.0.0
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65535
        bgp router-id 192.168.1.101
        neighbor RR peer-group
        neighbor RR remote-as 65535
        neighbor RR update-source loopback 1
        neighbor 192.168.1.109 peer-group RR
        neighbor 192.168.1.110 peer-group RR
        address-family l2vpn evpn
                neighbor RR route-reflector-client
```

```
                neighbor RR send-community extended
                neighbor 192.168.1.109 activate
                neighbor 192.168.1.110 activate
        exit-address-family
!
        vrf VRF_1
                address-family ipv4 unicast
                        redistribute connected
                exit-address-family
!
        vrf VRF_2
                address-family ipv4 unicast
                        redistribute connected
                exit-address-family
!
router pim vrf VRF_1
        enable
        pim-ssm
router pim vrf VRF_2
        enable
        pim-ssm
        pim-ssm range-access-list pim_ssm_group_range_acl_vrf_2
https-server vrf default
https-server vrf mgmt
```

VTEP 2

```
hostname VTEP2
vrf VRF_1
        rd 192.168.0.102:10001
        route-target export 65535:10001 evpn
        route-target import 65535:10001 evpn
vrf VRF_2
        rd 192.168.0.102:10002
        route-target export 65535:10002 evpn
        route-target import 65535:10002 evpn
!
vsf member 1
        type jl668a
object-group ip address multicast-group
        10 233.1.2.1
        20 233.1.2.2
object-group ip address sources-group
        10 192.168.172.10
        20 192.168.172.20
access-list ip pim_ssm_group_range_acl_vrf_2
        10 permit any any 227.0.0.0/255.0.0.0
        20 permit any any 233.0.0.0/255.0.0.0
        30 permit any any 231.0.0.0/255.0.0.0
access-list ip ssm-map-acl-vrf-2
        10 permit any 192.168.172.20 227.1.1.1
        20 permit igmp sources-group 227.1.1.2
        40 permit any 192.168.172.10 multicast-group
vlan 21
        ip igmp snooping enable
vlan 23
        ip igmp snooping enable
vlan 26
        ip igmp snooping enable
vlan 28
        ip igmp snooping enable
```

```
virtual-mac 00:11:11:00:00:22
evpn
        redistribute local-svi
        vlan 21
                rd 192.168.0.102:16021
                route-target export 65535:16021
                route-target import 65535:16021
        vlan 23
                rd 192.168.0.102:16023
                route-target export 65535:16023
                route-target import 65535:16023
        vlan 26
                rd 192.168.0.102:16026
                route-target export 65535:16026
                route-target import 65535:16026
        vlan 28
                rd 192.168.0.102:16028
                route-target export 65535:16028
        route-target import 65535:16028
interface 1/1/3
                description Clients
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 21,23,26,28
interface 1/1/8
                description Clients
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 21,23,26,28
interface 1/1/26
        description VTEP2 to Distro-S
        no shutdown
        routing
        ip address 192.168.0.12/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/28
        description VTEP2 to Distro-P
        no shutdown
        routing
        ip address 192.168.0.2/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface loopback 0
        description VTEP source ip
        ip address 192.168.0.102/32
interface loopback 1
        ip address 192.168.1.102/32
interface vlan 21
        vrf attach VRF_1
        ip address 192.168.121.2/24
        active-gateway ip mac 00:11:11:00:00:22
        active-gateway ip 192.168.121.1
        ip igmp enable
        ip pim-sparse enable
interface vlan 23
        vrf attach VRF_1
        ip address 192.168.123.2/24
        active-gateway ip mac 00:11:11:00:00:22
        active-gateway ip 192.168.123.1
```

```
        ip igmp enable
        ip pim-sparse enable
interface vlan 26
        vrf attach VRF_2
        ip address 192.168.126.2/24
        active-gateway ip mac 00:11:11:00:00:22
        active-gateway ip 192.168.126.1
        ip igmp enable
        ip igmp apply ssm-map access-list ssm-map-acl-vrf-2
        ip pim-sparse enable
interface vlan 28
        vrf attach VRF_2
        ip address 192.168.128.2/24
        active-gateway ip mac 00:11:11:00:00:22
        active-gateway ip 192.168.128.1
        ip igmp enable
        ip igmp apply ssm-map access-list ssm-map-acl-vrf-2
        ip pim-sparse enable
interface vxlan 1
        source ip 192.168.0.102
        no shutdown
        vni 10001
                vrf VRF_1
                routing
        vni 10002
                vrf VRF_2
                routing
        vni 16021
                vlan 21
        vni 16023
                vlan 23
        vni 16026
                vlan 26
        vni 16028
                vlan 28
!
!
!
!
!
router ospf 1
        router-id 192.168.0.2
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65535
        bgp router-id 192.168.1.102
        neighbor RR peer-group
        neighbor RR remote-as 65535
        neighbor RR update-source loopback 1
        neighbor 192.168.1.109 peer-group RR
        neighbor 192.168.1.110 peer-group RR
        address-family l2vpn evpn
                neighbor RR route-reflector-client
                neighbor RR send-community extended
                neighbor 192.168.1.109 activate
                neighbor 192.168.1.110 activate
        exit-address-family
!
        vrf VRF_1
                address-family ipv4 unicast
                redistribute connected
```

```
        exit-address-family
!
        vrf VRF_2
                address-family ipv4 unicast
                redistribute connected
        exit-address-family
!
router pim vrf VRF_1
        enable
        pim-ssm
router pim vrf VRF_2
        enable
        pim-ssm
        pim-ssm range-access-list pim_ssm_group_range_acl_vrf_2
https-server vrf default
https-server vrf mgmt
```

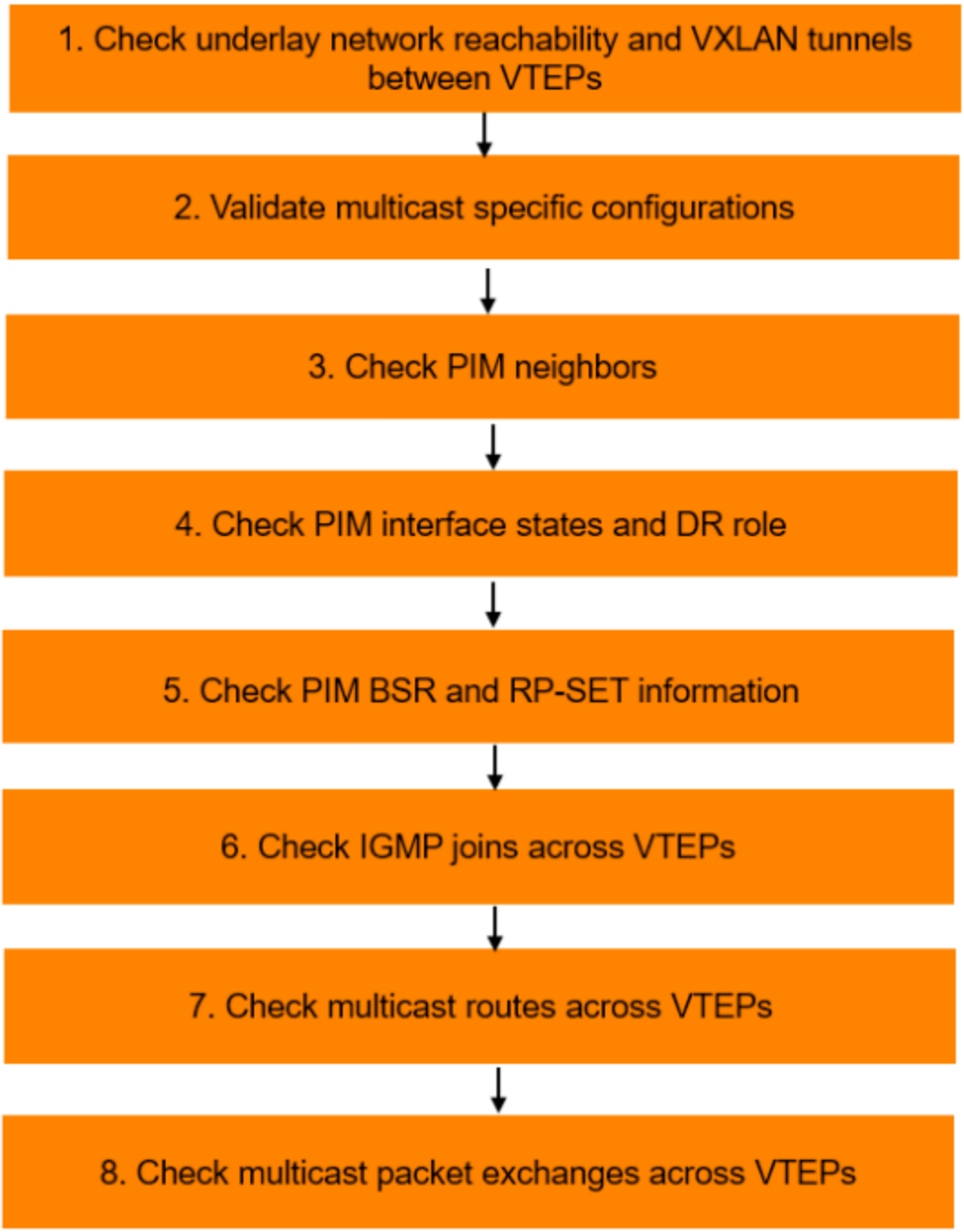
Debugging and troubleshooting

The recommended multicast VXLAN troubleshooting flow for overlay IPv4 and IPv6 is provided in Figure 1, Recommended multicast VXLAN troubleshooting flow. Additional tips and guidance for each step are provided below.



In cases of IPv6 overlay, use the IPv6 version of the commands. Examples in this section show the IPv4 version of commands.

Figure 1 *Recommended multicast VXLAN troubleshooting flow*



The recommended IPv4 multicast VXLAN troubleshooting procedure includes the following sequence of steps:

Step 1: Check underlay network reachability and VXLAN tunnels between VTEPs.

a. Ensure tunnel source/destination loopback IPs are correctly advertised in the underlay network.
b. Use extended pings on VTEPs to confirm network connectivity between tunnel source/destination loopback IPs.
c. Fix underlay connectivity issues if discovered.
d. If there are no underlay network issues, validate VXLAN tunnels, ensure they are operational.

```
VTEP1# sh int vx vtep
Source         Destination      Origin   Status          VNI       Routing   VLAN  VRF
-------------- ---------------- -------- --------------- --------- --------- ----- ---
192.168.2.6    192.168.2.5      evpn     operational     100001    enabled   --
VRF1
192.168.2.6    192.168.2.5      evpn     operational     100111    disabled  111    --
192.168.2.6    192.168.11.3     evpn     operational     100001    enabled   --
VRF1
192.168.2.6    192.168.11.3     evpn     operational     100002    enabled   --
VRF2
```

e. If EVPN tunnel is down, ensure correct EVPN configs are used.

Step 2: Validate multicast specific configurations.

a. In a distributed L3 gateway deployment, `virtual-mac` configuration is needed on all the VTEPs. Make sure `virtual-mac` is configured and it is unique per VTEP, a VSX VTEP peer would share 1 virtual-mac:

```
VTEP1# show run | i virtual-mac
virtual-mac 00:00:22:00:00:21
```

b. On VSX VTEPs, `ip pim-sparse vsx-virtual-neighbor` is required on all SVIs where PIM is enabled.

```
interface vlan40
 no shutdown
 vrf attach red
 ip address 40.40.40.1/24
 ip pim-sparse enable
 ip pim-sparse vsx-virtual-neighbor
```

c. If IGMP or MLD is enabled on any VLAN, the `redistribute local-svi` or `redistribute local-mac` command must be enabled under the evpn context. This is needed for proper querier information propagation.

d. Validate unicast reachability to the multicast sources/DR/RP/BSR addresses across all the VTEPs. Use `show ip route` command to validate the routes. For example:

```
VTEP1# show ip route 80.1.1.1 vrf red

VRF: red

   Prefix           : 80.1.1.0/24                VRF(egress)        : -
   Nexthop          : 11.1.1.1                   Interface          : -
   Origin           : bgp                        Type               : bgp_evpn
   Distance         : 200                        Metric             : 0
   Age              : 02h:08m:19s                Tag                : 0
   Encap Type       : vxlan                      Encap Details      : l3vni 2
```

Step 3: Check PIM neighbors.

a. Ensure that PIM neighbors are formed between L3 VNI interfaces. For a L3 VNI neighbor, neighbor IP will be the underlay VTEP IP in the default VRF and this will be same for all the tenant

VRFs.

b. If the same VLAN is extended across VTEPs, ensure that the PIM neighbors are formed on the extended VLANs across the VTEPs.

```
VTEP1# show ip pim neighbor all-vrfs
PIM Neighbor

VRF : red
Total number of neighbors : 2
IP Address : 1.1.1.1
Interface : vni2
Up Time (HH:MM:SS) : 00:33:30
Expire Time (HH:MM:SS) : 00:03:01
DR Priority : 1
Hold Time (HH:MM:SS) : 00:03:30

IP Address : 100.100.1.3
Interface : vlan10
Up Time (HH:MM:SS) : 00:33:29
Expire Time (HH:MM:SS) : 00:01:17
DR Priority : 16843009
Hold Time (HH:MM:SS) : 00:01:45
```

c. If PIM neighbors are not formed, validate the configurations and ensure `ip pim-sparse` is enabled on the interface and `router pim` is enabled on the corresponding VRF.

d. If the configurations are correct, validate PIM Hello packets are exchanged between the VTEPs. See Step 8: Check multicast packet exchanges between VTEPs for instructions.

e. Validate PIM-SSM configurations are correct on LHR, PIM DR of client VLAN, transit routers, and FHR.

Step 4: Check PIM interface states and DR role.

a. Validate PIM Interface configurations using the `show ip pim interface` command. Ensure that the DR election is successful and updated in the show command.

b. If the VLAN is extended across VTEPs. ensure only one VTEP is elected as DR on the VLAN. If the VTEP is a pair of VSX switches, both VSX peers will be elected as DR. Only one VSX peer will route the data.

```
VTEP1# show ip pim interface vlan 10
PIM Interfaces
VRF: red
Interface : vlan10
Neighbor count : 1
IP Address : 100.100.1.3/24
Mode : sparse
Designated Router : 100.100.1.4
Proxy DR : false
Hello Interval (sec) : 30
Hello Delay (sec) : 5
Override Interval (msec) : 2500 Lan Prune Delay : Yes
Propagation Delay (msec) : 500 Configured DR Priority : 1
Operational DR Priority : 16843009
Neighbor Timeout : 93
```

Step 5: Check PIM BSR and RP-SET information.

This step is not required for PIM-SSM groups when PIM-SSM is enabled.

a. If BSR is configured, ensure that E-BSR is learnt on all the VTEPs.

```
VTEP1# show ip pim bsr
Status and Counters- PIM-SM Bootstrap Router Information

VRF                       : default
E-BSR Address             : 172.1.1.1
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 49 secs
Next Bootstrap Message    : 21 secs

C-BSR Admin Status        : This system is a Candidate-BSR
C-BSR Address             : 172.1.1.1
C-BSR Priority            : 0
C-BSR Hash Mask Length    : 30
C-BSR Message Interval    : 60
C-BSR Source IP Interface : loopback1

C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : 172.1.1.1
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 192
C-RP Source IP Interface  : loopback1

Group Address    Group Mask
---------------  ---------------
224.0.0.0        240.0.0.0
```

b. Ensure RP-set is learned on all the VTEPs. If the RP is a static-RP, make sure all the VTEPs have the static RP configured.

```
VTEP1# show ip pim rp-set all-vrfs
VRF: red
Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
---------------  ---------------  ---------------  ---------  -----------
224.0.0.0        240.0.0.0        172.1.1.1        150        94
```

c. If the BSR or RP-set is not learned, make sure of the unicast reachability to BSR/RP IP address. The **show ip route** command should display unicast routes to reach BSR/RP address.

d. Ensure that PIM is enabled on the next-hop pointed by the unicast route. If PIM is not enabled, E-BSR/RP-Set information will not be updated correctly.

e. If the unicast routes are present and PIM is enabled on the nexthop interface, check packet captures to validate that BSR bootstrap packets and candidate RP advertisement messages are exchanged across VTEPs.

Step 6: Check IGMP or MLD joins across VTEPs.

a. Ensure IGMP or MLD joins are present on the DR in the client VLAN.

```
VTEP1# show ip igmp interface vlan 10
VRF Name   : red
Interface  : vlan10
IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Querier
Querier IP [this switch]   : 100.100.1.2
Querier Uptime             : 2m 29s
Querier Expiration Time    : 0m 41s
IGMP Snoop Enabled on VLAN : False

Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
239.1.1.1              2         0m 17s    4m 3s
```

b. If IGMP or MLD snooping is enabled, ensure that the joins are learned on the correct VTEP/port.

```
VTEP1# show ip igmp snooping vlan 10 group 239.1.1.1

IGMP ports and group information for group 239.1.1.1

VLAN ID   : 10
VLAN Name : VLAN10

Group Address : 239.1.1.1
Last Reporter : 200.200.1.1
Group Type    : Filter

                                                          V1        V2
Sources   Sources
Port                      Vers Mode Uptime    Expires   Timer     Timer
Forwarded Blocked
------------------------ ---- ---- --------- --------- --------- --------- -
-------- --------
vxlan1(1.1.1.1)           2    EXC  5h 24m    3m 38s              3m 38s    0
        0
```

c. If joins are not shown, make sure that the querier is elected successfully in the interface and the periodic AHQ packet reaches the clients.

d. Ensure joins are refreshed periodically and are not removed. Check uptime in **show ip igmp** or **show ipv6 mld** and **show ip igmp snooping** and **show ipv6 mld snooping** outputs to ensure joins are stable.

e. On a VSX VTEP, IGMP or MLD joins are synchronized amongst the VSX switches. If IGMP or MLD snooping is enabled, make sure that the joined VTEP is the same in both VSX peers. Similarly querier port should be the same across both VSX peers. If they are different, ensure that the **redistribute local-svi** or **redistribute local-mac** command is configured on all VTEPS.

f. Make sure there are no COPP drops for IGMP or MLD class.

```
VTEP1# show copp-policy statistics class igmp
Statistics for CoPP policy 'default':
Class: igmp
Description: Internet Group Management Protocol.
```

```
priority : 4
rate (pps) : 1600
burst size (pkts) : 450
packets passed : 294267766 packets dropped : 0
```

Step 6a: Check IGMP joins across VTEPs with PIM-SSM

a. Ensure IGMP joins are present on the DR in the client VLAN.

```
VTEP1# show ip igmp interface vlan 10
VRF Name : VRF_1
Interface : vlan11
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier State : Querier
Querier IP [this switch] : 100.100.1.2
Querier Uptime : 2m 29s
Querier Expiration Time : 0m 41s
IGMP Snoop Enabled on VLAN : False

Active Group Address   Vers  Mode  Uptime    Expires
---------------------- ----  ----  --------- --------
232.1.1.1              3           0m 17s    4m 3s
```

b. Ensure IGMP joins are present on the DR in the client VLAN.

```
VTEP1# show ip igmp snooping vlan 141 group 232.15.0.1

IGMP ports and group information for group 232.15.0.1

VLAN ID   : 141
VLAN Name : VLAN141

Group Address : 232.15.0.1
Last Reporter : 11.1.41.50
Group Type    : Filter


V1        V2        Sources   Sources
Port            Vers Mode Uptime   Expires  Timer    Timer Forwarded Blocked
----------------------- --------  -------- -------- ----- --------- -------
vxlan1(4.4.4.4) 3    INC  53m 25s  3m 34s   1        0



Group Address  : 232.15.0.1
Source Address : 60.1.25.100
Source Type    : Filter

Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
vxlan1(4.4.4.4)          INC  53m 25s   3m 34s    Auto
```

c. If joins are not shown, make sure that the querier is elected successfully in the interface and the periodic AHQ packet reaches the clients.

d. In order for PIM traffic to correctly flow down the multicast tree for SSM groups, IGMPv3 joins should be seen on LHR and PIM DR for the client vlan. Verify that source sent in IGMPv3 joins matches with the actual source IP.
e. Ensure IGMP PIM-SSM Map ACL is applied on interface for multicast groups where joins are sent by legacy IGMPv1/IGMPv2 clients. Ensure configuration are applied on all VTEPs where L2VNI is extended. Ensure IGMP SSM Map ACL range does not include multicast groups with IGMPv3 joins.

f. Ensure joins are refreshed periodically and are not removed. Check uptime in **show ip igmp** or **show ip igmp snooping** outputs to ensure joins are stable.
g. On a VSX VTEP, IGMP joins are synchronized amongst the VSX switches. If IGMP snooping is enabled, make sure that the joined VTEP is the same in both VSX peers. Similarly querier port should be the same across both VSX peers. If they are different, ensure that the redistribute local-SVI or redistribute local-mac command is configured on all VTEPS.
h. Ensure there are no COPP drops for IGMP class.

```
VTEP1# show copp-policy statistics class igmp
Statistics for CoPP policy 'default':
Class: igmp
Description: Internet Group Management Protocol.
priority : 4
rate (pps) : 1600
burst size (pkts) : 450
packets passed : 294267766 packets dropped : 0
```

Step 7: Check multicast routes across VTEPs.

a. Ensure multicast routes are formed correctly across VTEPS. Make sure L3 VNI interface is added correctly in the incoming/outgoing interface list in a distributed L3 gateway use case.
   - Mroutes on Source DR (routing to L3 VNI Interface):

```
VTEP1# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : red
Total number of entries : 1

Group Address           : 225.1.1.1
Source Address          : 73.1.1.11
Neighbor                : 100.100.1.3
Incoming interface      : vlan10
Outgoing Interface List :
Interface       State
-----------     ----------
vni2               forwarding
```

   - Mroutes on last hop router (routing from L3 VNI interface to receiver SVI):

```
VTEP2# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : red
Total number of entries : 1
```

```
Group Address           : 225.1.1.1
Source Address          : 73.1.1.11
Neighbor                : 5.5.5.5
Incoming interface      : vni2
Outgoing Interface List :
Interface       State
-----------     ----------
vlan20          forwarding
```

b. In the centralized L3 gateway use case, ensure multicast routes are formed correctly on the routers. In this case the multicast routes will have SVI/ROP/L3 LAG as incoming/outgoing interfaces.

c. If the outgoing interface is SVI and it contains VTEPs, multicast data traffic will be encapsulated and transmitted to the VTEP.

```
L3VTEP# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : red
Total number of entries : 1

Group Address           : 239.1.1.1
Source Address          : 80.1.1.11
Neighbor                :
Incoming interface      : vlan20
Outgoing Interface List :
Interface       State
-----------     ----------
vlan30               forwarding
```

d. If the multicast routes are not formed as expected, there will be traffic loss. If the interface is missing in multicast routes or the mroute is in bridge state (no outgoing interfaces):
   - On the client VLAN, ensure IGMP or MLD joins are present on the DR.
   - Validate unicast reachability to RP and multicast source on the last hop router (LHR).
   - Validate IGMP or MLD joins are processed by PIM using the **show ip pim pending**or **show ipv6 pim6 pending** command. If the multicast data is seen by the router, there are not any pending entries.
   - If the joins are seen, check the packet captures between LHR to ensure PIM *,G joins are sent towards RP.
   - If RP has received the *,G join, check the packet captures between RP and Source DR to ensure (S,G) joins are sent towards the source.
   - Once LHR receives the data via RPT, ensure that the LHR is sending (S,G) joins towards source via packet captures.

e. If the multicast routes is not present in **show ip mroute** in the source DR:
   - Ensure that the flow is active.
   - If the flow is active, but mroutes are not shown, it indicates an issue in the PIM registration path.
   - Make sure Source DR can reach RP and RP can reach back to the source DR.
   - Check that the virtual-mac is configured correctly, this is needed for Register/Register-Stop packets to be processed correctly.

f. If the clients are seeing duplicate traffic:
   - Ensure the **vsx-virtual-neighbor** command is enabled on all the VSX routers.
   - In a VSX setup, only one of the routers is responsible for routing the traffic. Ensure this by monitoring interface statistics/packet captures.

Step 7a: Check multicast routes across VTEPs with PIM-SSM.

a. Ensure multicast routes are formed correctly across VTEPS. Make sure L3 VNI interface is added correctly in the incoming/outgoing interface list in a distributed L3 gateway use case.
Mroutes on Source DR (routing to L3 VNI Interface):

```
VTEP2# show ip mroute all-vrfs
IP Multicast Route Entries
VRF : VRF_1
Total number of entries : 1

Group Address           : 232.1.1.1
Source Address          : 192.168.171.10
SSM Mroute              : True
Neighbor                : 192.168.161.3
Uptime                  : 01:10:19
State                   : route
Incoming interface      : vlan4001
Outgoing Interface List :
Interface       State
-----------     ----------
vni10001        forwarding
```

Mroutes on last hop router (routing from L3 VNI interface to receiver SVI):

```
leaf1# show ip mroute 232.6.0.1 all-vrfs
IP Multicast Route Entries
VRF : VRF_1
Total number of entries : 1


Group Address           : 232.1.1.1
Source Address          : 192.168.171.10
SSM Mroute              : True
Neighbor                : 192.168.0.110
Uptime                  : 01:21:35
State                   : route
Incoming interface      : vni10001
Outgoing Interface List :
Interface       State
-----------     ----------
vlan21          forwarding
```

b. In the centralized L3 gateway use case, ensure multicast routes are formed correctly on the routers. In this case the multicast routes have SVI/ROP/L3 LAG as incoming/outgoing interfaces.
c. If the outgoing interface is SVI and it contains VTEPs, multicast data traffic is encapsulated and transmitted to the VTEP.

```
L3VTEP# show ip mroute all-vrfs
IP Multicast Route Entries

VRF : VRF_1
Total number of entries : 1

Group Address           : 232.2.3.5
Source Address          : 192.168.171.10
SSM Mroute              : True
Neighbor                : 192.168.161.3
Uptime                  : 00:16:30
State                   : route
Incoming interface      : vlan4001
Outgoing Interface List :
Interface       State
-----------     ----------
vlan51          forwarding
```

d. If the multicast routes are not formed as expected, there is traffic loss. If the interface is missing in multicast routes or the mroute is in bridge state (no outgoing interfaces):
   - On the client VLAN, ensure IGMP joins are present on the DR.
   - Validate unicast reachability to multicast source on the last hop router (LHR).
   - Validate IGMP joins are processed by PIM using the `show ip pim pending` command. If the multicast data is seen by the router, there are not any pending entries.
   - If the joins are seen, check the packet captures between LHR and upstream device to ensure PIM S,G joins are sent towards source.
   - Check the packet captures to ensure (S,G) joins are received on source.

e. If the multicast routes is not present in **show ip mroute** in the source DR:
   - Ensure that the flow is active.
   - Make sure Source DR can reach client DR.

f. If the clients are seeing duplicate traffic:
   - Ensure the **vsx-virtual-neighbor** command is enabled on all the VSX routers.
   - In a VSX setup, only one of the routers is responsible for routing the traffic. Ensure this by monitoring interface statistics/packet captures.

Step 8: Check multicast packet exchanges between VTEPs.

- All the multicast packets (IGMP/MLD/PIM/PIM6 control packets, multicast data frames) exchanged across the VTEPS are encapsulated with VXLAN.
- The packets exchanged over VTEPs can be inspected by configuring a mirror session on non-VTEP core/spine switches. The mirror destination should be a port where a packet capture is running.

```
l2:/home/admin# tcpdump -i 1
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on MirrorRxNet, link-type EN10MB (Ethernet), capture size 262144 bytes
08:58:51.562444 IP 1.1.1.1.35569 > 3.3.3.3.4789: VXLAN, flags [I] (0x08), vni 30 -
-> Encapsulated PIM Hello packet
IP 1.1.1.1 > 224.0.0.13: PIMv2, Hello, length 34
```

Debugging and troubleshooting of anycast RP

The recommended anycast RP troubleshooting procedure includes the following sequence of steps:

Step 1: Verify whether the peer state is up. For that the peer must be enabled and there must be a unicast path to peer IP.

```
switch# show ip msdp peer all-vrfs

VRF: default

MSDP Peer: 11.0.0.13
Connection status
State: up  Resets: 0  Connection Source: 1/1/1(10.1.1.2)
Uptime(Downtime): 0m 25s    SA Messages sent: 0
SA's learned from this peer: 0
Peer Keepalive interval: 70
Peer Hold time: 90
Peer Connection Retry interval: 40
SA Filtering
Input (S,G) filter: msdp_sa_filter1  (S,G) entries dropped: 0
Output (S,G) filter: msdp_sa_filter2  (S,G) entries dropped: 30
Mesh group: AnyRpMesh
SA Limit: 1000
```

Step 2: Verify SA-Cache to check if the flow is listed, Except for the RP near to the multicast source, all other RP learn the source information via SA message exchange and stored in the SA-Cache.

```
switch# show ip msdp sa-cache all-vrfs

VRF: default
Total entries: 2

(60.1.1.2, 227.1.1.1)  RP: 11.0.0.1  Peer: 11.0.0.13
(60.1.1.2, 228.1.1.1)  RP: 11.0.0.1  Peer: 11.0.0.13
```

Step 3: Verify the active multicast flows that are registered by source DR to this RP. The anycast RP that is near to the multicast source will have this entry updated and the remaining RP will have the SA-Cache updated.

```
switch# show ip pim rp-registered-sources all-vrfs

Multicast flows registered with this RP
VRF : default
Total number of entries : 2
Source Address           Group Address           RP Address
--------------------     --------------------    --------------------
60.1.1.2                 227.1.1.1               11.0.0.1
60.1.1.2                 228.1.1.1               11.0.0.1
```

FAQ

1. Can I enable multicast on both the overlay (leaf/access VTEP) and underlay (core/spine non-VTEP)?

No, it should not be done and is not recommended. The solution will not work if PIM or IGMP is enabled on the core/spine switches connected to VTEPs.

2. Does the solution require EVPN control plane?

Yes, the solution requires EVPN based control plane both for L2 and L3 multicast. Remote VTEPs are learned via EVPN type 3. In addition, remote hosts and routes are learned via EVPN type 2 and EVPN type 5. IGMP and PIM protocols rely on this information to forward packets.

3. Is PIM-SM used in underlay for BUM traffic replication?

No, the solution does not use PIM-SM at underlay to replicate BUM traffic. The solution uses Head End Replication to send multicast traffic to remote VTEPs, this means that each broadcast/multicast is encapsulated and replicated to all VTEPs from the source VTEP. The list of VTEPs to be replicated can be learned via EVPN type 3 or through multicast protocols running in the overlay.

4. Are there are any platform differences to be aware of?

- For the VSX VTEPs on the Aruba 8325, 8400, 9300, and 10000 Switch Series, when a packet is routed from a SVI/L3VNI to a L3VNI/L2VNI, only the primary VSX VTEP forwards. This prevents duplication of packets.
- For the VSX VTEPs on the Aruba 6400, 8100, and 8360 Switch Series , whichever device gets data directly (not via ISL) will forward. This is done because these platforms have a predicate rule programmed that any packet over ISL will not be sent over tunnel. This means there will never be a case when packets go over the VSX ISL and into a VXLAN tunnel.

5. Is the Active-Active command required on VSX VTEPs?

The Active-Active command is optional for VSX VTEPs. This is because VSX peers act as logical VTEPs and work in Active-Active mode natively. There is no need to explicitly enable Active-Active on VSX VTEPS.

6. Why is the VSX virtual neighbor command required?

- The VSX virtual neighbor command needs to be enabled on all PIM enabled SVI interfaces with VSX-LAGs and L2 VNI mapped interfaces, the command once enabled does multiple things.
- If the VLAN is the first hop connected router, then both the VSX VTEPs will become DR and will forward PIM joins for every IGMP join that received.
- If the VLAN is the not the first-hop connected router, then both the VSX VTEPs will ignore the prime neighbor check and will forward PIM joins upstream.

7. Does PIM need to be enabled on the L3 VNI?

No, PIM-SM does not need to be enabled on the L3 VNI. It will be automatically enabled when PIM-SM is enabled on the tenant VRF. A VTEP forms PIM neighbors with the other remote VTEPs over L3VNI. AOS-CX forms automatic PIM-SM neighbors with peer VTEPs over L3VNI as soon as PIM-SM is enabled on the tenant VRF.

8. Does the solution work for all types of underlay interfaces?

The solution work with all types of underlay interfaces that are currently supported in AOS-CX.

9. If I change the DR priority of my DR on an SVI with multicast VXLAN, will it work?

In a logical VSX VTEP, DR priority is automatically derived from the VTEP address. This ensures that the VSX VTEPs have identical priorities with both of them functioning as DRs or as non DRs. In case DR priority is changed, one of the VSX peer will start behaving differently from the other. To conclude, do not change DR priority on SVIs of VSX VTEPs.

10. In a VSX VTEP, are VSX keepalive links mandatory for multicast VXLAN?

The VSX keepalive is not mandatory as private IP is used between VSX peers is used to sync joins received over L3 VNIs

11. Why do I require an additional L3 link between VSX border VTEPs when there is ROP/P2P SVI extension?

The additional connectivity is required from the VSX border VTEP to provide an additional link in case the main uplink connectivity from the primary VSX peer goes down. In general the rule that is programmed is that only VSX primary VTEP will forward. If uplink connectivity from the primary VTEP goes down then PIM joins from primary are sent to the secondary and the traffic is pulled from secondary towards the primary.

12. How do I identify an IPv6 PIM neighbor learned on a L3 VNI interface?

PIM auto-generates an overlay IPv6 address from the underlay IPv4 tunnel source IP address. This Auto-generated IP is used to form neighborship between L3VNI interfaces. The auto generated IP is a link local IP. For instance, if the VXLAN tunnel source IP is configured as 10.122.189.11, then the auto-generatedIPv6 overlay address is fe80::10:122:189:11. In other words, fe80::10:122:189:11 represents a VTEP neighbor with a VXLAN tunnel source IP of 10.122.189.11.

References

- *VXLAN Guide*
- AOS-CX VXLAN EVPN Symmetric IRB Distributed L3 Gateways
- AOS-CX Switch Simulator

The Multicast VXLAN for multi-fabric solution allows the total number of VTEPs to scale beyond single-fabric capabilities. Refer to Single fabric Multicast VXLAN (V4 and V6) for more information on single-fabric capabilities. This solution can also be used if there are multiple sites which require multicast VXLAN connectivity. The multi-fabric solution focuses on interconnecting multiple campuses.

Figure 1, Multi-fabric EVPN VXLAN shows an example of multi-fabric EVPN VXLAN.

Figure 1 *Multi-fabric EVPN VXLAN*

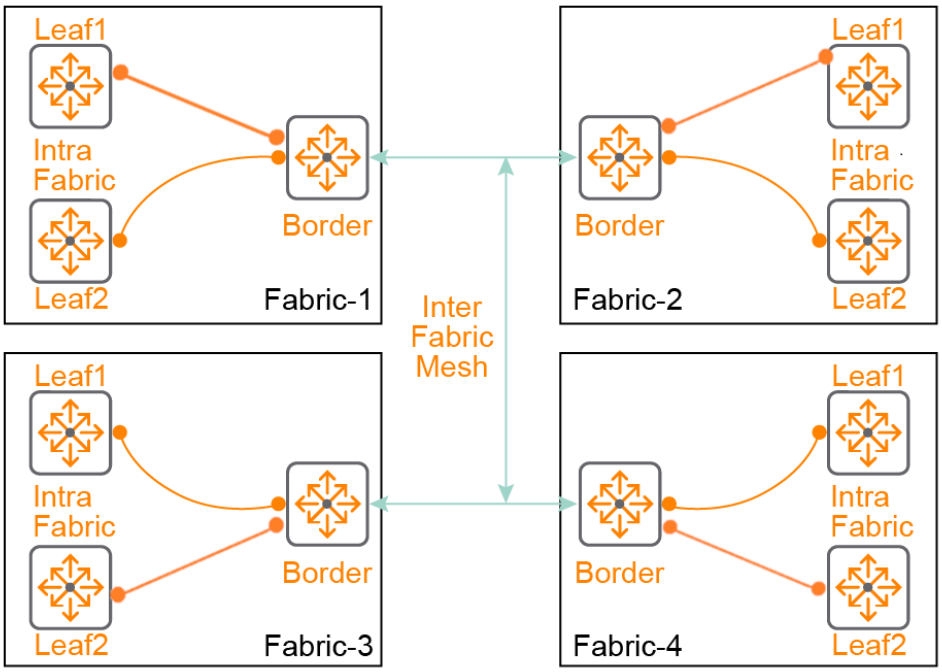
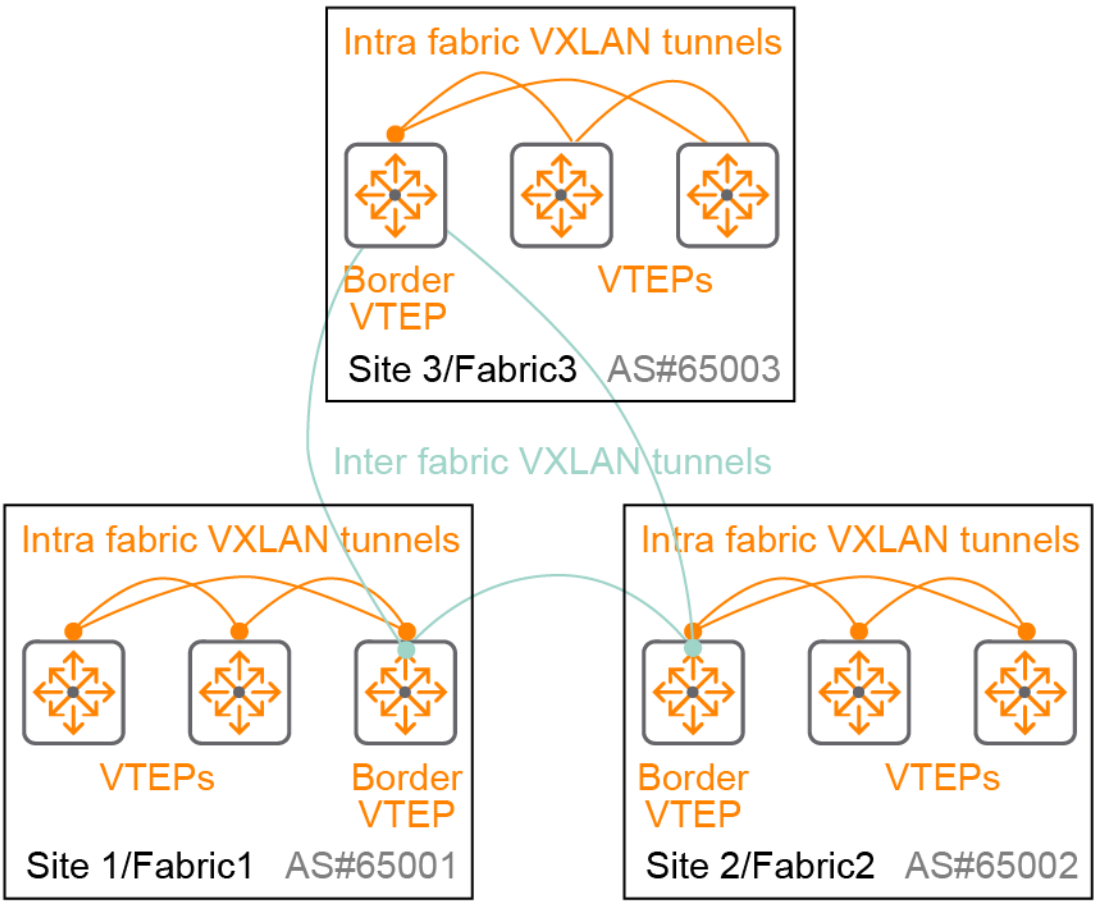


Figure 2, One Fabric per site shows an example of one fabric per site, where the border VTEP has intra-fabric VXLAN tunnels to all VTEPs within a fabric and inter-fabric VXLAN tunnels towards other fabric border VTEPs.

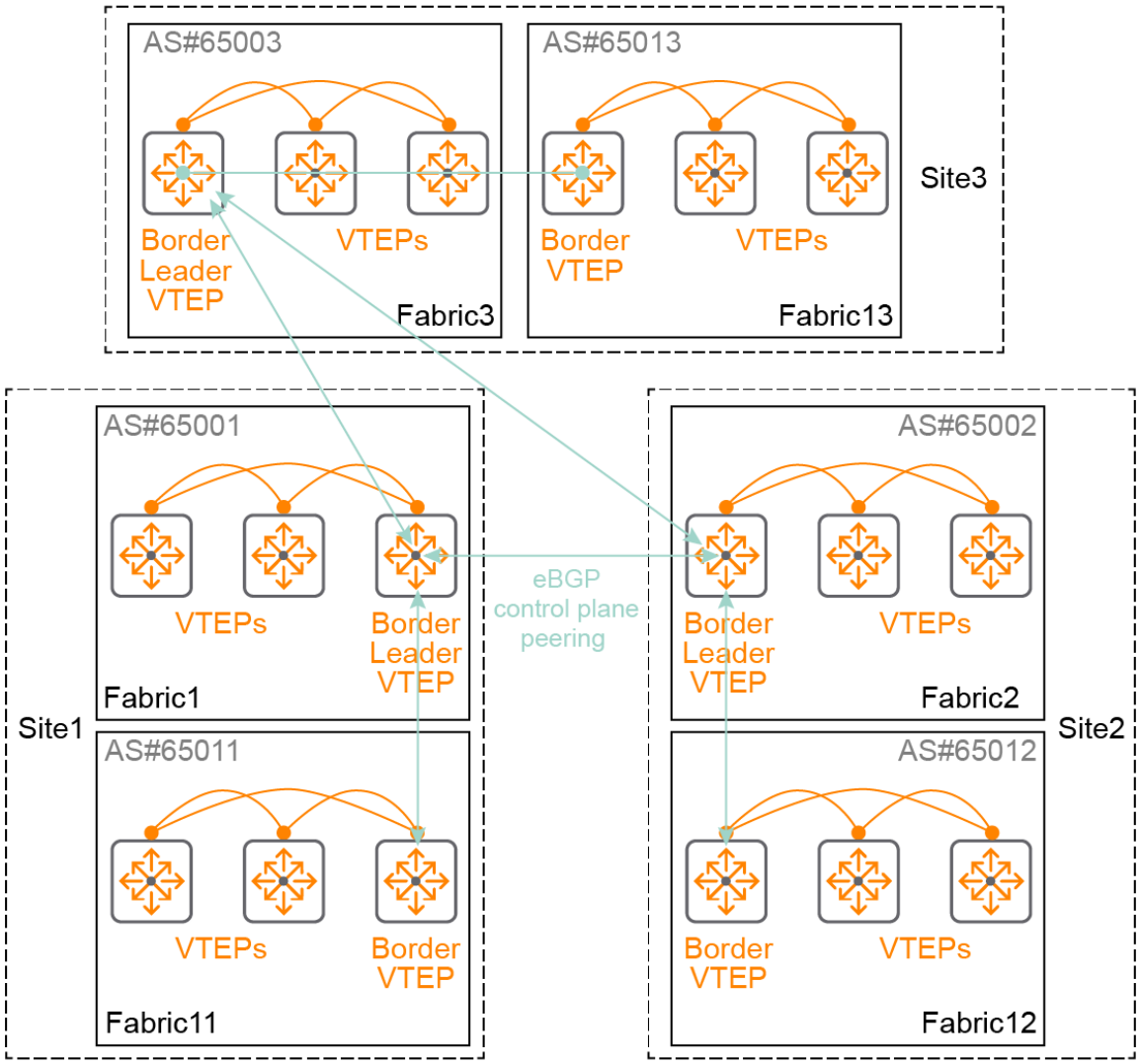
Figure 2 *One Fabric per site*



In some deployments, splitting a site into multiple fabrics to support the required VTEP scale is necessary.

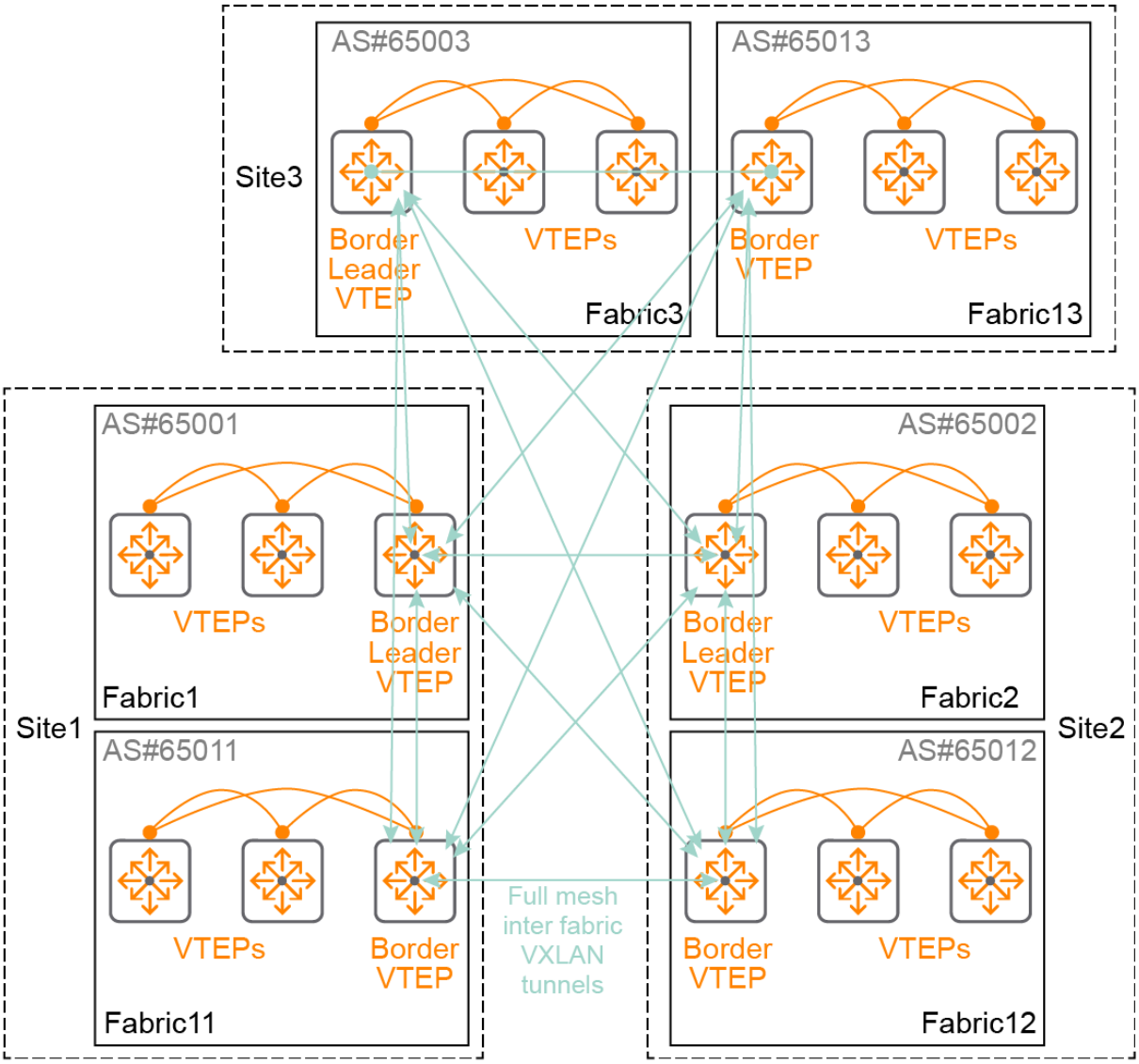
Figure 3, Multiple fabrics per site shows an example of multiple fabrics per site, where one fabric per site is configured to a border leader VTEP. This helps to minimize full mesh eBGP peering to other sites. Border VTEPs in other fabrics within a site only eBGP peer to the border leader VTEP.

Figure 3 *Multiple fabrics per site*



With eBGP EVPN peering established, full multi-fabric EVPN VXLAN tunnels are dynamically formed, as shown in Figure 4, Dynamically formed full miulti-fabric EVPN VXLAN tunnels.

Figure 4 *Dynamically formed full miulti-fabric EVPN VXLAN tunnels*



Protocol and feature details

A campus/ DC network can be divided into multiple fabrics for the following scenarios:

- Campuses are geographically distributed
- VTEPs may scale poorly after a certain limit

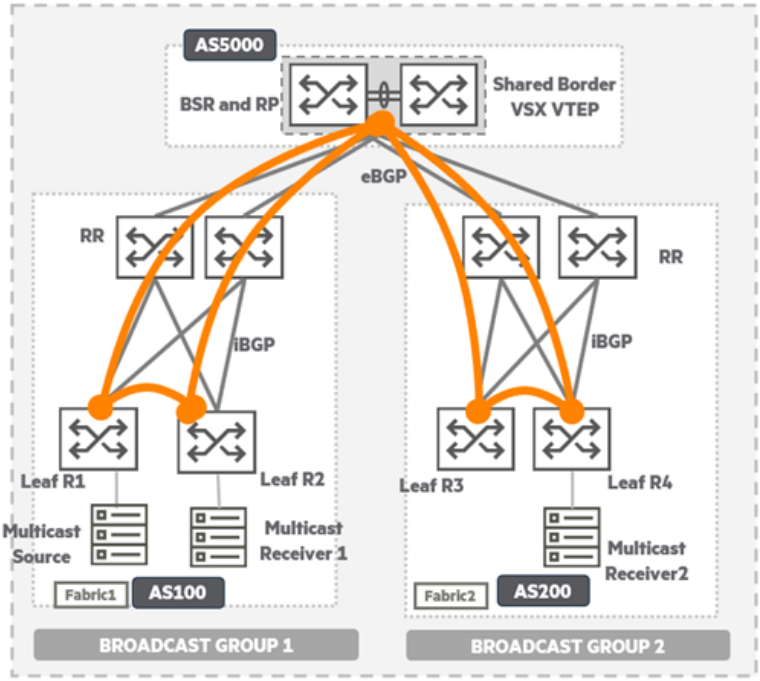
Refer to Protocol and feature details for single fabric multicast VXLAN for more information for protocol and feature details for Multi-fabric Multicast VXLAN.

Multi-fabric Shared Border

Campus deployments typically have multiple branch offices (fabrics) within their sites, and there may be multiple similar sites, too. With shared border support the core router can aggregate different branch offices (more than one fabric) and act as the gateway to other sites.

In Figure 1, Shared border multi-fabric, Border Router BR1 at SiteA acts as the Shared Border, functioning as the gateway that serves both fabric 1 and fabric 2.

Figure 1 *Shared border multi-fabric*



Unlike in the regular leaf, the Shared Border routers are attached to multiple fabrics. Each individual fabric forms a set of VTEPS. Split horizon rules are enabled on VTEPs and then disabled between the individual fabrics to allow them to communicate across fabrics. In regular border router, the tunnels are classified based on EVPN peering: iBgp or eBgp. PIM differentiate the iBgp and eBgp neighbors and split horizon rules are applied. The same rules are applicable to individual fabrics attached within the Shared Border. The same rules apply to the shared border as with individual fabrics. For example, Figure 1, Shared border multi-fabric shows packets unable to reforward back to the originating VTEPs when routing one fabric to another in the shared border router. As shown above, the source attaches to R1 and because BR1 acts as the RP, it receives both R2 and R3. When R1 traffic reaches BR1, it cannot forward the traffic back to Fabric 1 due to R1 directly serving R2 via direct mesh. Traffic can only be forwarded to Fabric 2. In the absence R2 will see duplicate traffic.

Multicast routing on a Shared Border requires a unique local-broadcast-group ID route-map configuration applied for each fabric. This configuration is mandatory within Multicast for both L3VNI and L2VNI across fabrics, unlike in the case of unicast where it is only required for L2VNI subnet stretch.

Routemap Configuration with local Broadcast Group ID

A unique, local-broadcast-group ID route-map configuration is required for multicast routing on shared borders for both L3VNI and L2VNI fabrics. The following example shows the required configuration at a shared broder with two fabrics. In this example, broadcast group ID 2 and 4 represent each fabric.

```
route-map rmap1 permit seq 10
        set local-broadcast-group 2
route-map rmap2 permit seq 10
        set local-broadcast-group 4
...
router bgp 5000
    ...
```

```
    address-family l2vpn evpn
        neighbor 1.1.1.1 route-map rmap1 in
        neighbor 3.3.3.3 route-map rmap2 in
   exit-address-family
```

Multi-fabric Border

```
ip multicast multi-fabric border
```

This command is used to enable PIM's border router functionality. This configuration must be enabled on the border router when iBGP-eBGP is not used. This configuration is global and is applicable to all tenant's VRF's configured in that router.

Multi-fabric Identifier

```
ip multicast multi-fabric identifier-value <IDENTIFIER VALUE> <cr>
```

With MFID configuration, multicast protocol can override the default LEAF to Fabric association which is based on the BGP AS number with MFID values. When the individual fabrics are placed on different AS, the default setting suffices. The default setting allows multicast to use BGP's AS number to differentiate the fabric a leaf router belongs to. Occasionally, when two or more fabrics share the same AS number, a manual overriding of MFID is required.

Supported platforms and standards

The EVPN VXLAN multi-fabric solution is supported only with the 8325 and 10000 Switch Series as a border-leader VTEP. Border VTEPs (with the exception of non-border-leaders) that support this solution include the 8325, 8360, 6400 and 10000 Switch Series. Non-border VTEPs that support this solution include the 6300, 8100, 6400, 8325, 8360 and 10000 Switch Series. Shared border is supported by the 8325 and 8360 Switch Series.



For the 10000 Switch series, a firewall policy is not supported when the switch is acting as a border-VTEP or border-leader.

L3VNI and L2VNI are supported between the fabrics. L3VNI is supported between the fabrics in Shared Border only. Centralized L3 gateway is not supported between fabrics.

The multicast multi-fabric EVPN VXLAN implementation is currently proprietary to AOS-CX.

Scale

Table 1: *Scale for IPv4 Multi-fabric (PIM-SM and PIM-SSM)*

	6400	8325	8360	10000
VLANs/L2 VNIs (Multicast support)	128	128	128	128
L3 VNI/VRF (Each VRF requires 1 x L3 VNI)	32	32	32	32
PIM interfaces (SVIs)	64	64	64	64
IGMP groups	2000	2000	2000	2000
Mroutes	2000	3500	3500	3500
Intra-Fabric VTEPs	32	32	32	32
Inter-Fabric VTEPs	32	32	32	32

Table 2: *Scale for IPv4 Shared Border (PIM-SM)*

	8325	8360
Number of Fabrics	4	32
Number of VTEPs	32 (4 fabric x 8 VTEPs)	32 (32 fabric x 1 VTEP)
IGMP groups	2000	2000
Mroutes	3500	3500
PIM interfaces (L3 VNIs)	64	64
L3 VNI/VRF (Each VRF requires 1 x L3 VNI)	32	32

Border VTEP extensions

Border VTEPs are capable of terminating the fabric and extending to other L2/L3 routers. PIM enabled VXLAN VTEPs can be extended to other routers which can be connected to sources/clients. The following types of L3/L2 extensions are supported:

- L2 VSX LAG: Upstream or Downstream routers are connected via L2 VSX LAG links.
- L3 VSX LAG: Upstream or Downstream routers are connected via L3 VSX LAG links.
- ROP extension: L3 extension for Sources/Clients via Route Only Ports is supported.
- Point to Point SVI extension: L3 extension for Sources/Clients via Point to Point SVIs is supported.

If the source is connected via Route only Port or via Point to Point SVI, it is recommended to have an additional L3 Link per VRF between the VSX devices for upstream redundancy. If the L3 link is a SVI, it is recommended to not add ISL port in that VLAN.

Packet forwarding rules at the border router

PIM Hellos are periodically sent to both intra-fabric and inter-fabric VTEP tunnels when the Hello timer expires on the L3VNI and L2VNI interfaces. Because the border routers are connected to both inter and intra tunnels, Hellos from the local VTEPs as well from the remote border VTEPs are received. The border VTEP learns both intra-fabric VTEP and the remote border leaf VTEP under the L3VNI and L2VNI interfaces.

The border VTEP does not re-forward the PIM hellos from one fabric to another.

Multicast Routing Across Fabrics

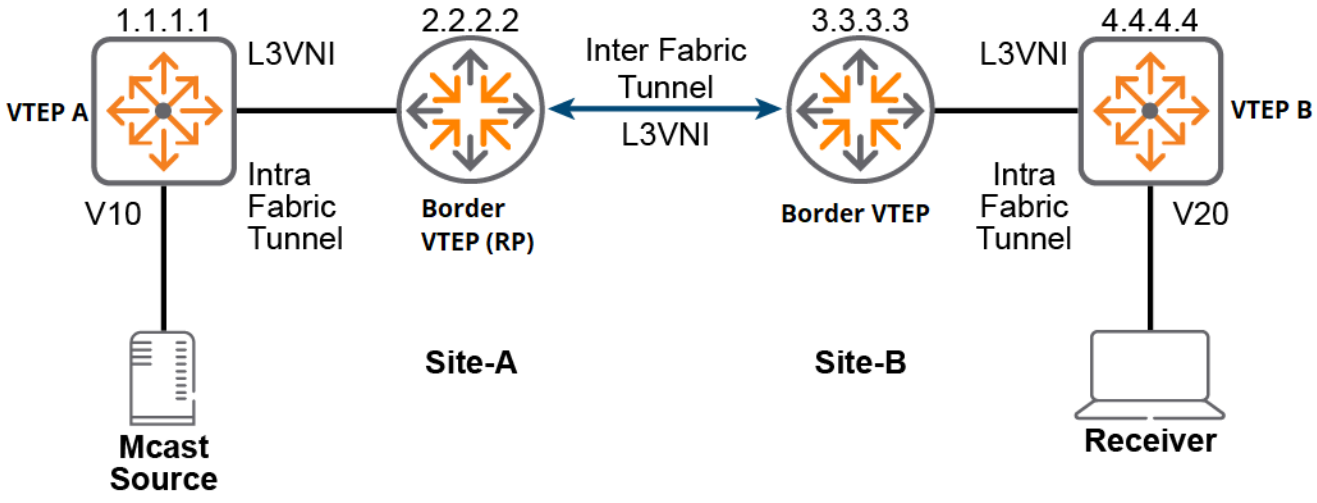
The typical deployment for multi-fabric will have receiver and source distributed at different sites (see Figure 1, Receiver and source at different sites).

In Figure 1, Receiver and source at different sites, a receiver request from site B for multicast group is processed by the VTEP B router where the receiver is present. RP is configured on the border router at site A. VTEP B determines that the Border VTEP is the Nexthop to reach the RP. Site A's border VTEP, which is the RP, processes the PIM join and then initiates S, G PIM join towards Site A's VTEP router, where the source is connected. Traffic then flows from Site A's border VTEP to Site A's border VTEP, then from there to Site B's Border VTEP, then finally towards Site B's border VTEP to the client.

All four VTEPs in this path install the Mroutes. The border VTEPs on both sites route traffic from one tunnel to another. The VTEP A border VTEPs from the source interface to the tunnel and the VTEP B border VTEPs from the tunnel to the receiver's interface.

At the Border VTEP, the list of outgoing VTEPs are updated in the Intra-Inter Forwarded VTEP(s) section of the Mroute table. This field contains the combined set of inter and intra tunnels where the packet needs to be forwarded. If the packet is ingressing from the intra-fabric tunnel, it is forwarded only to the list of inter-fabric tunnels listed in this field. If the packet is ingressing from the inter-fabric tunnel, it is forwarded only to the list of intra-fabric tunnels listed in this field.

Figure 1 *Receiver and source at different sites*



PIM-SSM

PIM-SSM over multi-fabric is supported and inherits the functionality of PIM-SM over multi-fabric. The PIM-SSM over multi-fabric supports only IPv4 address ranges. PIM-SSM with Multifabric supports the legacy clients (IGMPv1/IGMPv2) using SSM-Map.

Distributed Anycast Gateway

Distributed anycast gateway functionality is supported across the fabrics and within the fabric. It is possible to enable anycast gateway within the same fabric and serve the attached multicast source and clients.

When multicast sources are attached to these anycast interfaces, the **register-source** configuration must be provisioned.

Caveats

The following are the caveats of multicast vxlan for multi-fabric:

- Multicast Boundary feature (ip multicast boundary) is not supported for single and multifabric.
- PIM Dense Mode is not supported for single and multifabric.
- PVLAN is not supported for single and multifabric.
- Centralized L3 gateway is not supported across fabrics.
- Shared border functionality is not supported on the 6300, 6400, 8100, 8400, and 10000 platforms.
- Mtrace is not supported for single and multifabric.
- Interop with fabrics running any solution other than CX Overlay is not supported.
- Static multicast route entries are not supported for single and multifabric.
- Multifabric with underlay IP type IPv6 is not supported.
- PIM-SSM over multifabric is not supported for IPv6 overlay.
- Shared border L2VNI subnet stretch is not supported.

Considerations and Best Practices

Refer to Considerations and best practices for Single fabric Multicast VXLAN for more information for protocol and feature details.

- AOS-CX supports MCLAG, ROP, and P2P SVI extensions between the Border VTEP and External router (non-VXLAN). The MCLAG extension is preferred.
- Check configuration of the following: BGP, VPN, and VXLAN interface.
- Check the status of the Multicast configuration (IGMP, IGMP Snooping, and PIM).RP and Source must be reachable from other fabrics.

RP Replacement

Refer to the following considerations and best practices specific to RP Replacement:

- RPs do not need to be present at every site. In multi-fabric topology, the RP can be placed at one site centrally or can be configured at multiple sites to mitigate site failures.
- A Border router or Leaf router can be configured as RP. Both dynamic and static RPs are supported.
- The general recommendation is to place the RP at the site where the majority of multicast sources are present.
- An RP located outside the fabric is also supported, provided that the unicast and multicast reachability is there to the external RP.
- Anycast RP is supported in single-fabric, multi-fabric and shared border setups. For more information, see Anycast RP support for VXLANs

Multi-fabric L3VNI and L2VNI Stretch

Refer to the following considerations and best practices specific to Multi-fabric L3VNI and L2VNI stretch:

- Preferred Border Router should be C-RP, C-BSR.
- Command **dyn-vxlan-tunnel-bridging-mode ibgp-ebgp** under evpn must be set on the Border Router.

Shared Border

Refer to the following considerations and best practices specific to Shared Border:

- Preferred Shared Border Router should be C-RP, C-BSR.
- Command **ip multicast multi-fabric border** must be set on the Shared Border to determine it is a Multicast shared Border Router.
- By default, if there is no need to configure the MFID, it will automatically bet set to the local AS Number.
- Ensure that the Shared Border peering in Route Reflector is set to "next-hop-unchanged".
- Remove the inter-vxlan-briging mode before; it is not allowed to create a new route map for the broadcast group.
- Confirm the correct Broadcast group is assigned to the appropriate BGP peer within the EVPN address Family.
- Broadcast Groups must be configured even if L2 Unicast extension is not required between fabrics.

Use Cases

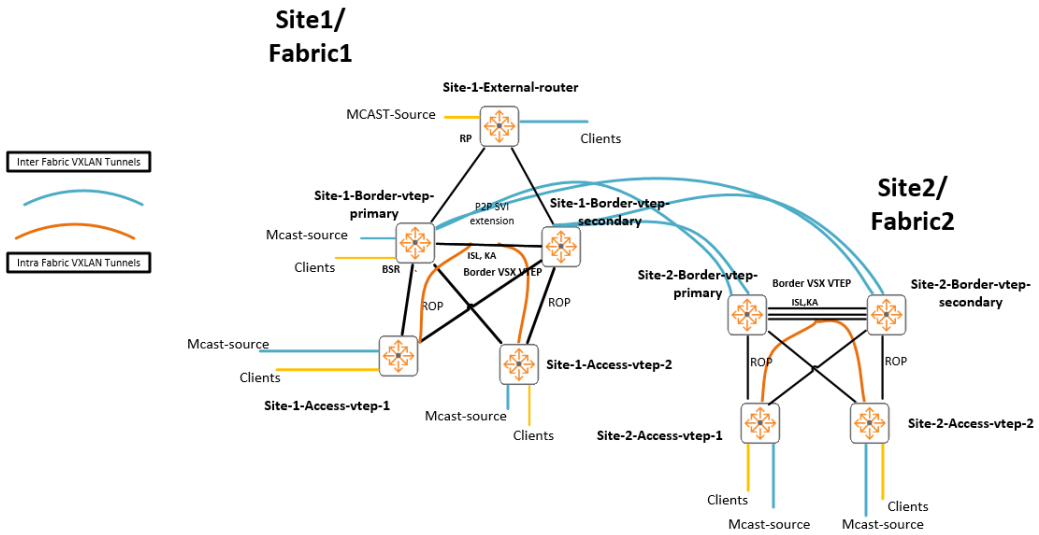
The use cases provide examples of multi-fabric multicast VXLAN.

Anycast RP with MSDP is also supported on multi-fabric and shared borders. Sample configurations are provided in this section.

Use case 1: one fabric per site (PIM-SM)

L2VNI subnet stretch across fabrics is supported on 10.13 onward.

Figure 1 *Use case 1: one fabric per site (PIM-SM)*



Configuration and verification details for the devices in this use case are provided in the following sections:

[Site-1-Access-vtep-1]

[Site-1-Access-vtep-2]

[Site-1-Border-vtep-primary]

[Site-1-Border-vtep-secondary]

[Site-1-External-router]

[Site-2-Access-vtep-1]

[Site-2-Access-vtep-2]

[Site-2-Border-vtep-primary]

[Site-2-Border-vtep-secondary]

[Anycast RP configured between Site-1 border VSX VTEP and Site-2 border VSX VTEP]

Site-1-Access-vtep-1

```
Current configuration:
!
!export-password: default
hostname Site-1-Access-vtep-1
vrf vrf1
        rd 31:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 32:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
```

```
ssh server vrf mgmt
vlan 1
vlan 101
        ip igmp snooping enable
vlan 111
        ip igmp snooping enable
virtual-mac 00:01:20:11:56:20
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
        vlan 101
                rd auto
                route-target export 101:101
                route-target import 101:101
                redistribute host-route
        vlan 111
                rd auto
                route-target export 111:111
                route-target import 111:111
                redistribute host-route
interface 1/1/5
        description port_Site-1-Border-vtep-primary
        no shutdown
        ip address 30.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/6
        description port_Site-1-Border-vtep-secondary
        no shutdown
        ip address 31.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/7
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 101,111
interface loopback 1
        ip address 192.168.1.5/32
        ip ospf 1 area 0.0.0.0
interface vlan 101
        vrf attach vrf1
        ip address 11.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.1.10
        ip igmp enable
        ip pim-sparse enable
interface vlan 111
        vrf attach vrf2
        ip address 11.1.11.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.11.10
        ip igmp enable
        ip pim-sparse enable
interface vxlan 1
        source ip 192.168.1.5
        no shutdown
        vni 2000
                vlan 101
```

```
        vni 2010
                vlan 111
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
!
!
!
!
!
router ospf 1
        router-id 111.13.1.3
        redistribute local loopback
        area 0.0.0.0
router bgp 65535
        bgp router-id 111.13.1.3
        neighbor 192.168.1.1 remote-as 65535
        neighbor 192.168.1.1 update-source loopback 1
        neighbor 192.168.1.2 remote-as 65535
        neighbor 192.168.1.2 update-source loopback 1
        address-family l2vpn evpn
                neighbor 192.168.1.1 send-community extended
                neighbor 192.168.1.1 activate
                neighbor 192.168.1.2 send-community extended
                neighbor 192.168.1.2 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute ospf
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute ospf
                exit-address-family
!
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================
Site-1-Access-vtep-1# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------------
111.11.1.3       n/a       FULL              30.1.1.1           1/1/5
111.12.1.3       n/a       FULL              31.1.1.1           1/1/6

Site-1-Access-vtep-1#  show bgp all-vrf all summary
```

```
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.13.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
192.168.1.1   65535       241     206     02h:47m:06s  Established   Up
192.168.1.2   65535       248     206     02h:47m:05s  Established   Up

Codes: * Dynamic Neighbor

VRF : vrf1

BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 11.1.1.10
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 11.1.11.10
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60

Site-1-Access-vtep-1# show interface vxlan vteps
Source        Destination   Origin    Status        VNI      Routing   VLAN  VRF
-------------------------------------------------------------------------------
192.168.1.5   2.2.2.2       evpn      operational   2000     disabled  101    --
192.168.1.5   2.2.2.2       evpn      operational   2010     disabled  111    --
192.168.1.5   5.5.5.50      evpn      operational   2000     disabled  101    --
192.168.1.5   5.5.5.50      evpn      operational   2010     disabled  111    --
192.168.1.5   5.5.5.50      evpn      operational   9002     enabled   --     vrf2
192.168.1.5   5.5.5.50      evpn      operational   16777214 enabled   --     vrf1

Site-1-Access-vtep-1# show interface vxlan vteps
Source        Destination   Origin    Status        VNI      Routing   VLAN  VRF
```

```
--------------------------------------------------------------------------------
192.168.1.5   2.2.2.2       evpn      operational   2000     disabled  101    --
192.168.1.5   2.2.2.2       evpn      operational   2010     disabled  111    --
192.168.1.5   5.5.5.50      evpn      operational   2000     disabled  101    --
192.168.1.5   5.5.5.50      evpn      operational   2010     disabled  111    --
192.168.1.5   5.5.5.50      evpn      operational   9002     enabled   --     vrf2
192.168.1.5   5.5.5.50      evpn      operational   16777214 enabled   --     vrf1

Site-1-Access-vtep-1# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information

VRF                       : vrf1

E-BSR Address             : 222.22.1.2
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 2 hour 47 mins 56 secs
Next Bootstrap Message    : 1 mins 11 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

VRF                       : vrf2
E-BSR Address             : 101.101.101.101
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 2 hour 47 mins 56 secs
Next Bootstrap Message    : 1 mins 17 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

Site-1-Access-vtep-1# show ip pim rp-set all-vrfs
VRF: vrf1
Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        110.100.100.100  150        149          192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.101.101.101  150        95           192

Site-1-Access-vtep-1# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 2
--------------------------------------------------------------------------------
Interface   Neighbor   Uptime     Expires    DR        Hold Time  Secondary
Address
           (IPV4)     (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  (IPV4)
--------------------------------------------------------------------------------
vni16777214 5.5.5.50   02:48:06   00:03:06   1         00:03:30
```

```
vlan101     11.1.1.10  02:47:57   00:01:23   839189765 00:01:45   Nil
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 2
--------------------------------------------------------------------------------
-
vni9002     5.5.5.50   02:48:06   00:03:05   1          00:03:30
vlan111     11.1.11.10 02:47:57   00:01:22   839189765  00:01:45  Nil
--------------------------------------------------------------------------------
-

Site-1-Access-vtep-1#  show ip mroute  225.5.0.1 all-vrfs detail

IP Multicast Route Entries

VRF : vrf1

Total number of entries : 1
Group Address                  : 225.5.0.1
Source Address                 : 60.1.25.100
Neighbor                       :
Incoming interface             : vlan101
Multicast Routing Protocol     : PIM-SM
Unicast Routing Protocol       : BGP
Metric                         : 0
Metric  Pref                   : 200
Uptime (HH:MM:SS)              : 00:48:35

Site-1-Access-vtep-1#  show ip mroute  225.6.0.2 all-vrfs detail
IP Multicast Route Entries
VRF : vrf2
Total number of entries : 1
Group Address                  : 225.6.0.2
Source Address                 : 11.1.51.100
Neighbor                       :
Incoming interface             : vlan111
Multicast Routing Protocol     : PIM-SM
Unicast Routing Protocol       : BGP
Metric                         : 0
Metric  Pref                   : 200
Uptime (HH:MM:SS)              : 00:48:42
```

Site-1-Access-vtep-2

```
Current configuration:
!
!export-password: default
hostname Site-1-Access-vtep-2
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vlan 1
vlan 101
        ip igmp snooping enable
```

```
vlan 111
        ip igmp snooping enable
virtual-mac 00:01:20:11:56:25
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
        vlan 101
                rd auto
                route-target export 101:101
                route-target import 101:101
                redistribute host-route
        vlan 111
                rd auto
                route-target export 111:111
                route-target import 111:111
                redistribute host-route
interface 1/1/25
        description port_Site-1-Border-vtep-primary
        no shutdown
        ip address 30.1.2.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/26
        description port_Site-1-Border-vtep-secondary
        no shutdown
        ip address 31.1.2.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/27
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 101,111
interface loopback 1
        ip address 2.2.2.2/32
        ip ospf 1 area 0.0.0.0
interface vxlan 1
        source ip 2.2.2.2
        no shutdown
        vni 2000
                vlan 101
        vni 2010
                vlan 111
!
!
!
!
!
router ospf 1
        router-id 111.14.1.3
        redistribute local loopback
        area 0.0.0.0
router bgp 65535
        bgp router-id 111.14.1.3
        neighbor 192.168.1.1 remote-as 65535
        neighbor 192.168.1.1 update-source loopback 1
        neighbor 192.168.1.2 remote-as 65535
        neighbor 192.168.1.2 update-source loopback 1
        address-family l2vpn evpn
```

```
                neighbor 192.168.1.1 send-community extended
                neighbor 192.168.1.1 activate
                neighbor 192.168.1.2 send-community extended
                neighbor 192.168.1.2 activate
        exit-address-family
!
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================

Site-1-Access-vtep-2# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.11.1.3       n/a       FULL              30.1.2.1           1/1/25
111.12.1.3       n/a       FULL              31.1.2.1           1/1/26

Site-1-Access-vtep-2# show bgp all-vrf all summary

Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.14.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------

Neighbor        Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
192.168.1.1     65535       249     205     02h:50m:28s  Established   Up
192.168.1.2     65535       257     203     02h:50m:25s  Established   Up

Site-1-Access-vtep-2#  show interface vxlan vteps

Source    Destination   Origin   Status       VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
2.2.2.2   192.168.1.5   evpn     operational  2000      disabled  101    --
2.2.2.2   192.168.1.5   evpn     operational  2010      disabled  111    --
2.2.2.2   5.5.5.50      evpn     operational  2000      disabled  101    --
2.2.2.2   5.5.5.50      evpn     operational  2010      disabled  111    --
```

Site-1-Border-vtep-primary

```
Current configuration:
!
!export-password: default
```

```
hostname Site-1-Border-vtep-primary
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 1:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 2:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vlan 1
vlan 101
        ip igmp snooping enable
vlan 111
        ip igmp snooping enable
vlan 1015-1016
vlan 1045
        ip igmp snooping enable
vlan 1046
        ip igmp snooping enable
vlan 751, 3015-3016
virtual-mac 00:01:20:11:56:10
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 101
                rd auto
                route-target export 101:101
                route-target import 101:101
                redistribute host-route
        vlan 111
                rd auto
                route-target export 111:111
                route-target import 111:111
                redistribute host-route
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1,101,111,751,3015-3016
        lacp mode active
        lacp rate fast
interface 1/5/1
        description port_Site1-External-Router
        no shutdown
        no routing
        vlan trunk native 1
```

```
        vlan trunk allowed 1015-1016
interface 1/5/3
        description port_Site-1-Access-vtep-1
        no shutdown
        routing
        ip address 30.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/5/4
        description port_Site-1-Access-vtep-2
        no shutdown
        routing
        ip address 30.1.2.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/5/7
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1045-1046
interface 1/6/5
        description port_Site-2-Border-vtep-primary
        no shutdown
        routing
        ip address 40.1.1.1/29
interface 1/6/6
        description port_Site-2-Border-vtep-secondary
        no shutdown
        routing
        ip address 40.1.2.1/29
interface 1/3/1
        description port_ka
        no shutdown
        ip address 46.1.1.1/29
interface 1/3/2
        description port_isl
        no shutdown
        lag 120
interface loopback 1
        ip address 192.168.1.1/32
interface loopback 100
        ip address 192.168.1.255/32
interface loopback 101
        vrf attach vrf1
        ip address 222.22.1.2/32
        ip pim-sparse enable
interface loopback 102
        vrf attach vrf2
        ip address 101.101.101.101/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 112
        ip address 5.5.5.50/32
interface loopback 113
        ip address 193.170.1.255/32
interface vlan 101
        vrf attach vrf1
        ip address 11.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.1.10
        ip igmp enable
```

```
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 111
        vrf attach vrf2
        ip address 11.1.11.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.11.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 751
        no shutdown
        ip address 171.1.1.1/30
        ip ospf 1 area 0.0.0.0
interface vlan 1015
        vrf attach vrf1
        ip address 60.1.15.5/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1016
        vrf attach vrf2
        ip address 60.1.16.5/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1045
        vrf attach vrf1
        ip address 60.1.45.1/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
interface vlan 1046
        vrf attach vrf2
        ip address 60.1.46.1/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
interface vlan 3015
        vrf attach vrf1
        ip address 60.3.15.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 3016
        vrf attach vrf2
        ip address 60.3.16.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vxlan 1
        source ip 5.5.5.50
        no shutdown
        vni 2000
                vlan 101
        vni 2010
                vlan 111
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
```

```
        inter-switch-link lag 120
        role primary
        keepalive peer 46.1.1.2 source 46.1.1.1
!
route-map tag_bgp_ospf permit seq 10
        set tag 110
route-map tag_ospf_bgp deny seq 10
        match tag 110
route-map tag_ospf_bgp deny seq 20
        match tag 120
route-map tag_ospf_bgp permit seq 30
!
!
!
!
router ospf 1
        router-id 111.11.1.3
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 111.11.1.5
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 111.11.2.5
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router bgp 65535
        bgp router-id 111.11.1.3
        neighbor 2.2.2.2 remote-as 65535
        neighbor 2.2.2.2 update-source loopback 1
        neighbor 40.1.1.2 remote-as 65536
        neighbor 40.1.2.2 remote-as 65536
        neighbor 192.168.1.5 remote-as 65535
        neighbor 192.168.1.5 update-source loopback 1
        neighbor 195.170.1.255 remote-as 65536
        neighbor 195.170.1.255 ebgp-multihop 5
        neighbor 195.170.1.255 update-source loopback 113
        neighbor 196.170.1.255 remote-as 65536
        neighbor 196.170.1.255 ebgp-multihop 5
        neighbor 196.170.1.255 update-source loopback 113
        address-family ipv4 unicast
                neighbor 40.1.1.2 activate
                neighbor 40.1.2.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 2.2.2.2 next-hop-self
                neighbor 2.2.2.2 route-reflector-client
                neighbor 2.2.2.2 send-community extended
                neighbor 2.2.2.2 activate
                neighbor 192.168.1.5 next-hop-self
```

```
                neighbor 192.168.1.5 route-reflector-client
                neighbor 192.168.1.5 send-community extended
                neighbor 192.168.1.5 activate
                neighbor 195.170.1.255 send-community extended
                neighbor 195.170.1.255 activate
                neighbor 196.170.1.255 send-community extended
                neighbor 196.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf vrf1
        enable
bsr-candidate source-ip-interface loopback101
router pim vrf vrf2
        enable
bsr-candidate source-ip-interface loopback102
https-server vrf default
https-server vrf mgmt

=======================================
Show command outputs for  validation
=======================================

Site-1-Border-vtep-primary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.13.1.3       n/a       FULL              30.1.1.0           1/5/3
111.14.1.3       n/a       FULL              30.1.2.0           1/5/4

VRF : vrf1                             Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.1.5       1         FULL/DR           60.1.15.2          vlan1015
111.12.1.5       1         FULL/DR           60.3.15.2          vlan3015

VRF : vrf2                             Process : 1
================================================

Total Number of Neighbors : 2
```

```
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.2.5       1         FULL/DR           60.1.16.2          vlan1016
111.12.2.5       1         FULL/DR           60.3.16.2          vlan3016

Site-1-Border-vtep-primary# show bgp all-vrf all summary

Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.11.1.3
Peers                  : 6            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
40.1.1.2      65536       192     190     02h:40m:47s  Established   Up
40.1.2.2      65536       190     186     02h:39m:32s  Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
2.2.2.2       65535       195     240     02h:42m:33s  Established   Up
192.168.1.5   65535       202     236     02h:43m:29s  Established   Up
195.170.1.255   65536       237     217     02h:40m:47s  Established   Up
196.170.1.255   65536       227     221     02h:39m:32s  Established   Up

Site-1-Border-vtep-primary# show interface vxlan vteps
Source    Destination     Origin     Status         VNI       Routing   VLAN   VRF
------------------------------------------- ----------------------------------
-
5.5.5.50  80.80.80.80     evpn       operational    9002      enabled   --
vrf2
5.5.5.50  80.80.80.80     evpn       operational    16777214  enabled   --
vrf1
5.5.5.50  192.168.1.5     evpn       operational    2000      disabled  101    --
5.5.5.50  192.168.1.5     evpn       operational    2010      disabled  111    --
5.5.5.50  192.168.1.5     evpn       operational    9002      enabled   --
vrf2
5.5.5.50  192.168.1.5     evpn       operational    16777214  enabled   --
vrf1
5.5.5.50  2.2.2.2         evpn       operational    2000      disabled  101    --
5.5.5.50  2.2.2.2         evpn       operational    2010      disabled  111    --

Site-1-Border-vtep-primary# show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : vrf1                            Total number of neighbors : 5
-------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires    DR        Hold Time  Secondary
           (IPV4)       (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  Address (IPV4)
-------------------------------------------------------------------------------
```

```
vlan101     11.1.1.10    02:33:53   00:01:29   839189765 00:01:45   Nil
vlan1015    60.1.15.2    02:37:26   00:01:23   1         00:01:45   Nil
vlan3015    60.3.15.2    00:03:07   00:01:41   839189765 00:01:45   Nil
vni16777214 80.80.80.80  02:28:23   00:03:19   1         00:03:30
vni16777214 192.168.1.5  02:30:59   00:03:04   1         00:03:30
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 5
--------------------------------------------------------------------------------
-
vlan111     11.1.11.10   02:32:21   00:01:30   839189765 00:01:45   Nil
vlan1016    60.1.16.2    02:37:24   00:01:22   1         00:01:45   Nil
vlan3016    60.3.16.2    00:03:06   00:01:39   839189765 00:01:45   Nil
vni9002     80.80.80.80  02:28:23   00:03:18   1         00:03:30
vni9002     192.168.1.5  02:30:59   00:03:07   1         00:03:30
--------------------------------------------------------------------------------
-
Site-1-Border-vtep-primary# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 5
--------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires    DR        Hold Time  Secondary
           (IPV4)       (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  Address (IPV4)
--------------------------------------------------------------------------------
vlan101     11.1.1.10    02:34:03   00:01:19   839189765 00:01:45   Nil
vlan1015    60.1.15.2    02:37:36   00:01:43   1         00:01:45   Nil
vlan3015    60.3.15.2    00:03:17   00:01:31   839189765 00:01:45   Nil
vni16777214 80.80.80.80  02:28:33   00:03:09   1         00:03:30
vni16777214 192.168.1.5  02:31:09   00:03:24   1         00:03:30
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 5
--------------------------------------------------------------------------------
-
vlan111     11.1.11.10   02:32:31   00:01:20   839189765 00:01:45   Nil
vlan1016    60.1.16.2    02:37:34   00:01:42   1         00:01:45   Nil
vlan3016    60.3.16.2    00:03:17   00:01:28   839189765 00:01:45   Nil
vni9002     80.80.80.80  02:28:34   00:03:07   1         00:03:30
vni9002     192.168.1.5  02:31:10   00:03:26   1         00:03:30
--------------------------------------------------------------------------------
-
Site-1-Border-vtep-primary# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information
VRF                         : vrf1
E-BSR Address               : 222.22.1.2
E-BSR Priority              : 0
E-BSR Hash Mask Length      : 30
E-BSR Up Time               : 2 hour 37 mins 46 secs
Next Bootstrap Message      : 35 secs

C-BSR Admin Status          : This system is a Candidate-BSR

C-BSR Address               : 222.22.1.2
C-BSR Priority              : 0
C-BSR Hash Mask Length      : 30
C-BSR Message Interval      : 60
C-BSR Source IP Interface   : loopback101

C-RP Admin Status           : This system is not a Candidate-RP

VRF                         : vrf2
```

```
E-BSR Address             : 101.101.101.101
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 2 hour 37 mins 29 secs
Next Bootstrap Message    : 41 secs

C-BSR Admin Status        : This system is a Candidate-BSR

C-BSR Address             : 101.101.101.101
C-BSR Priority            : 0
C-BSR Hash Mask Length    : 30
C-BSR Message Interval    : 60
C-BSR Source IP Interface : loopback102

C-RP Admin Status         : This system is not a Candidate-RP

Site-1-Border-vtep-primary# show ip pim rp-set all-vrfs
VRF: vrf1

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        110.100.100.100  150        113          192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.101.101.101  150        119          192

Site-1-Border-vtep-primary# show ip mroute  225.5.0.1 all-vrfs detail
IP Multicast Route Entries
VRF : vrf1
Total number of entries : 1
Group Address                 : 225.5.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.2
Incoming interface            : vlan1015
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:31:44
Downstream Interface
Interface       State
-----------     ----------
vlan101         forwarding

Site-1-Border-vtep-primary# show ip mroute 226.5.0.1 all-vrfs  detail
IP Multicast Route Entries
VRF : vrf1
Total number of entries : 1
Group Address                 : 226.5.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.2
Incoming interface            : vlan1015
```

```
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:41:38
Downstream Interface
Interface       State          Vteps
-----------     ----------     -----
vni16777214     forwarding     80.80.80.80
```

Site-1-Border-vtep-secondary

```
Current configuration:
!
!export-password: default
hostname Site-1-Border-vtep-secondary
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 1:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 2:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vlan 1
vlan 101
        ip igmp snooping enable
vlan 111
        ip igmp snooping enable
vlan 751, 2015-2016,3015-3016
virtual-mac 00:01:20:11:56:10
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 101
                rd auto
                route-target export 101:101
                route-target import 101:101
                redistribute host-route
        vlan 111
                rd auto
                route-target export 111:111
                route-target import 111:111
                redistribute host-route
```

```
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1,101,111,751,3015-3016
        lacp mode active
        lacp rate fast
interface 1/3/1
        description port_Site1-External-router
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 2015-2016
interface 1/3/2
        description port_isl
        no shutdown
        lag 120
interface 1/3/3
        description port_ka
        no shutdown
                routing
        ip address 46.1.1.2/29
interface 1/5/45
        description port_Site-1-Access-vtep-1
        no shutdown
        routing
        ip address 31.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/5/46
        description port_Site-1-Access-vtep-2
        no shutdown
        routing
        ip address 31.1.2.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/7/47
        description port_Site-2-Border-vtep-primary
        no shutdown
        routing
        ip address 40.1.3.1/29
interface 1/7/48
        description port_Site-2-Border-vtep-secondary
        no shutdown
        routing
        ip address 40.1.4.1/29
interface loopback 1
        ip address 192.168.1.2/32
interface loopback 100
        ip address 192.168.1.255/32
interface loopback 101
        vrf attach vrf1
        ip address 150.150.150.150/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 102
        vrf attach vrf2
        ip address 151.151.151.151/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 103
        ip address 192.169.1.255/32
```

```
interface loopback 112
        ip address 5.5.5.50/32
interface loopback 113
        ip address 194.170.1.255/32
interface vlan 101
        vrf attach vrf1
ip address 11.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 111
        vrf attach vrf2
        ip address 11.1.11.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.11.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 751
        ip address 171.1.1.2/30
        no shutdown
        ip ospf 1 area 0.0.0.0
interface vlan 2015
        vrf attach vrf1
        ip address 60.2.15.1/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 2016
        vrf attach vrf2
        ip address 60.2.16.1/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 3015
        vrf attach vrf1
        ip address 60.3.15.2/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 3016
        vrf attach vrf2
        ip address 60.3.16.2/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vxlan 1
        source ip 5.5.5.50
        no shutdown
        vni 2000
                vlan 101
        vni 2010
                vlan 111
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
        inter-switch-link lag 120
        role secondary
```

```
        keepalive peer 46.1.1.1 source 46.1.1.2
!
!
route-map tag_bgp_ospf permit seq 10
        set tag 120
route-map tag_ospf_bgp deny seq 10
        match tag 110
route-map tag_ospf_bgp deny seq 20
        match tag 120
route-map tag_ospf_bgp permit seq 30
!
router ospf 1
        router-id 111.12.1.3
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 111.12.1.5
        distance 250
        redistribute bgp route-map tag_bgp_ospf
        redistribute connected
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 111.12.2.5
        distance 250
        redistribute bgp route-map tag_bgp_ospf
        redistribute connected
        area 0.0.0.0
router bgp 65535
        bgp router-id 111.12.1.3
        neighbor 2.2.2.2 remote-as 65535
        neighbor 2.2.2.2 update-source loopback 1
        neighbor 40.1.3.2 remote-as 65536
        neighbor 40.1.4.2 remote-as 65536
        neighbor 192.168.1.5 remote-as 65535
        neighbor 192.168.1.5 update-source loopback 1
        neighbor 195.170.1.255 remote-as 65536
        neighbor 195.170.1.255 ebgp-multihop 5
        neighbor 195.170.1.255 update-source loopback 113
        neighbor 196.170.1.255 remote-as 65536
        neighbor 196.170.1.255 ebgp-multihop 5
        neighbor 196.170.1.255 update-source loopback 113
        address-family ipv4 unicast
                neighbor 40.1.3.2 activate
                neighbor 40.1.4.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 2.2.2.2 next-hop-self
                neighbor 2.2.2.2 route-reflector-client
                neighbor 2.2.2.2 send-community extended
                neighbor 2.2.2.2 activate
                neighbor 192.168.1.5 next-hop-self
                neighbor 192.168.1.5 route-reflector-client
                neighbor 192.168.1.5 send-community extended
                neighbor 192.168.1.5 activate
                neighbor 195.170.1.255 send-community extended
                neighbor 195.170.1.255 activate
                neighbor 196.170.1.255 send-community extended
```

```
                neighbor 196.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================
Site-1-Border-vtep-secondary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.13.1.3       n/a       FULL              31.1.1.0           1/5/45
111.14.1.3       n/a       FULL              31.1.2.0           1/5/46

VRF : vrf1                             Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.1.5       1         FULL/DR           60.2.15.2          vlan2015
111.11.1.5       1         FULL/BDR          60.3.15.1          vlan3015

VRF : vrf2                             Process : 1
================================================
Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.2.5       1         FULL/DR           60.2.16.2          vlan2016
111.11.2.5       1         FULL/BDR          60.3.16.1          vlan3016

Site-1-Border-vtep-secondary#  show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.12.1.3
Peers                  : 6            Log Neighbor Changes   : No
```

```
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
40.1.3.2      65536       192     192     02h:42m:12s  Established   Up
40.1.4.2      65536       191     189     02h:40m:57s  Established   Up
Address-family : IPv6 Unicast
------------------------------
Address-family : VPNv4 Unicast
------------------------------
Address-family : L2VPN EVPN
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
2.2.2.2       65535       195     250     02h:43m:57s  Established   Up
192.168.1.5   65535       203     245     02h:44m:55s  Established   Up
195.170.1.255 65536       228     226     02h:42m:11s  Established   Up
196.170.1.255 65536       224     221     02h:40m:56s  Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 150.150.150.150
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Site-1-Border-vtep-secondary# show interface vxlan vteps
Source    Destination   Origin       Status        VNI       Routing   VLAN  VRF
------------------------------------------- ----------------------------------
-
5.5.5.50  80.80.80.80   evpn         operational   9002      enabled   --    vrf2
5.5.5.50  80.80.80.80   evpn         operational   16777214  enabled   --     vrf1
5.5.5.50  192.168.1.5   evpn         operational   2000      disabled  101    --
5.5.5.50  192.168.1.5   evpn         operational   2010      disabled  111    --
5.5.5.50  192.168.1.5   evpn         operational   9002      enabled   --     vrf2
5.5.5.50  192.168.1.5   evpn         operational   16777214  enabled   --     vrf1
5.5.5.50  2.2.2.2       evpn         operational   2000      disabled  101    --
5.5.5.50  2.2.2.2       evpn         operational   2010      disabled  111    --

Site-1-Border-vtep-secondary# show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 5
-------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires    DR        Hold Time  Secondary
           (IPV4)       (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  Address (IPV4)
-------------------------------------------------------------------------------
vlan101     11.1.1.10    02:40:16   00:01:33   839189765 00:01:45   Nil
vlan2015    60.2.15.2    02:40:48   00:01:33   1         00:01:45   Nil
vlan3015    60.3.15.1    00:11:03   00:01:44   839189765 00:01:45   Nil
vni16777214 80.80.80.80  02:36:19   00:03:23   1         00:03:30
vni16777214 192.168.1.5  02:38:55   00:03:08   1         00:03:30
-------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 5
-------------------------------------------------------------------------------
-
vlan111     11.1.11.10   02:40:17   00:01:34   839189765 00:01:45   Nil
vlan2016    60.2.16.2    02:40:45   00:01:35   1         00:01:45   Nil
```

```
vlan3016    60.3.16.1    00:11:04   00:01:16   839189765 00:01:45   Nil
vni9002     80.80.80.80  02:36:20   00:03:21   1         00:03:30
vni9002     192.168.1.5  02:38:56   00:03:10   1         00:03:30
--------------------------------------------------------------------------------
-

Site-1-Border-vtep-secondary# show ip pim bsr all-vrfs

Status and Counters- PIM-SM Bootstrap Router Information

VRF                       : vrf1

E-BSR Address             : 222.22.1.2
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 2 hour 40 mins 57 secs
Next Bootstrap Message    : 2 mins 3 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

VRF                       : vrf2
E-BSR Address             : 101.101.101.101
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 2 hour 40 mins 54 secs
Next Bootstrap Message    : 2 mins 9 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

Site-1-Border-vtep-secondary#   show ip pim rp-set all-vrfs

VRF: vrf1

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        110.100.100.100  150        100          192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.101.101.101  150        106          192

Site-1-Border-vtep-secondary# show ip mroute  225.5.0.1 all-vrfs detail
IP Multicast Route Entries

VRF : vrf1

Total number of entries : 2
Group Address                 : 225.5.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.2.15.2
```

```
Incoming interface            : vlan101
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:41:59
Group Address                 : 225.5.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.2.15.2
Incoming interface            : vlan2015
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:42:00
Downstream Interface
Interface       State
-----------     ----------
vlan101         forwarding

Site-1-Border-vtep-secondary# show ip mroute 226.5.0.1 all-vrfs  detail
IP Multicast Route Entries

VRF : vrf1

Total number of entries : 1
Group Address                 : 226.5.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.2.15.2
Incoming interface            : vlan2015
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:42:04
Downstream Interface
Interface       State          Vteps
-----------     ----------     -----
vni16777214     forwarding     80.80.80.80
```

Site-1-External-router

```
Current configuration:
!
!export-password: default
hostname Site-1-External-router
vrf vrf1
vrf vrf2
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
```

```
vlan 1,1015-1016
vlan 1025
        ip igmp snooping enable
vlan 1026
        ip igmp snooping enable
vlan 2015-2016
interface 1/1/10
        description port_Site-1-Border-vtep-primary
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1015-1016
interface 1/1/11
        description port_Site-1-Border-vtep-secondary
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 2015-2016
interface 1/1/12
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1025-1026
interface loopback 101
        vrf attach vrf1
        ip address 110.100.100.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 102
        vrf attach vrf2
        ip address 111.101.101.101/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1015
        vrf attach vrf1
        ip address 60.1.15.2/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1016
        vrf attach vrf2
        ip address 60.1.16.2/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1025
        vrf attach vrf1
        ip address 60.1.25.2/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
interface vlan 1026
        vrf attach vrf2
        ip address 60.1.26.2/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
interface vlan 2015
        vrf attach vrf1
        ip address 60.2.15.2/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 2016
```

```
        vrf attach vrf2
        ip address 60.2.16.2/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
!
!
!
!
!
router ospf 1 vrf vrf1
        router-id 111.10.1.5
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 111.10.2.5
        area 0.0.0.0
router pim vrf vrf1
        enable
        rp-candidate source-ip-interface loopback101 group-prefix 224.0.0.0/4
router pim vrf vrf2
        enable
        rp-candidate source-ip-interface loopback102 group-prefix 224.0.0.0/4
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================

Site1-External-router# show ip ospf neighbors all-vrfs

VRF : vrf1                              Process : 1
=================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.11.1.5       1         FULL/BDR          60.1.15.5          vlan1015
111.12.1.5       1         FULL/BDR          60.2.15.1          vlan2015

VRF : vrf2                              Process : 1
=================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.11.2.5       1         FULL/BDR          60.1.16.5          vlan1016
111.12.2.5       1         FULL/BDR          60.2.16.1          vlan2016

Site1-External-router# show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 2
-------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires    DR        Hold Time  Secondary
           (IPV4)       (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  Address (IPV4)
-------------------------------------------------------------------------------
vlan1015    60.1.15.5    02:26:07   00:01:39   839189765 00:01:45   Nil
vlan2015    60.2.15.1    02:22:50   00:01:43   839189765 00:01:45   Nil
-------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 2
```

```
--------------------------------------------------------------------------------
-
vlan1016    60.1.16.5    02:26:09   00:01:44   839189765 00:01:45   Nil
vlan2016    60.2.16.1    02:22:51   00:01:20   839189765 00:01:45   Nil
--------------------------------------------------------------------------------
-
Site1-External-router# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information
VRF                       : vrf1
E-BSR Address             : 222.22.1.2
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 2 hour 26 mins 12 secs
Next Bootstrap Message    : 2 mins 9 secs
C-BSR Admin Status        : This system is not a Candidate-BSR
C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : 110.100.100.100
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 192
C-RP Source IP Interface  : loopback101
Group Address    Group Mask
---------------  ---------------
224.0.0.0        240.0.0.0
VRF                       : vrf2
E-BSR Address             : 101.101.101.101
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 2 hour 26 mins 6 secs
Next Bootstrap Message    : 1 mins 14 secs
C-BSR Admin Status        : This system is not a Candidate-BSR
C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : 111.101.101.101
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 192
C-RP Source IP Interface  : loopback102
Group Address    Group Mask
---------------  ---------------
224.0.0.0        240.0.0.0

Site1-External-router#  show ip pim rp-set all-vrfs

VRF: vrf1

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        110.100.100.100  150        146          192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.101.101.101  150        92           192

Site1-External-router# show ip mroute 225.5.0.1 all-vrfs detail
```

```
IP Multicast Route Entries

VRF : vrf1

Total number of entries : 1
Group Address                  : 225.5.0.1
Source Address                 : 60.1.25.100
Neighbor                       :
Incoming interface             : vlan1025
Multicast Routing Protocol     : PIM-SM
Unicast Routing Protocol       : connected
Metric                         : 0
Metric  Pref                   : 0
Uptime (HH:MM:SS)              : 00:20:41
Downstream Interface
Interface       State
-----------     ----------
vlan1015        forwarding
vlan2015        forwarding

Site1-External-router# show ip mroute 225.1.0.2 all-vrfs detail
IP Multicast Route Entries
VRF : vrf2
Total number of entries : 1
Group Address                  : 225.1.0.2
Source Address                 : 11.1.51.100
Neighbor                       : 60.2.16.1
Incoming interface             : vlan2016
Multicast Routing Protocol     : PIM-SM
Unicast Routing Protocol       : OSPF
Metric                         : 25
Metric  Pref                   : 110
Uptime (HH:MM:SS)              : 00:20:50
Downstream Interface
Interface       State
-----------     ----------
vlan1026        forwarding
```

Site-2-Access-vtep-1

```
Current configuration:
!
!export-password: default
hostname Site-2-Access-vtep-1
vrf vrf1
        rd 104:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 105:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
```

```
vlan 1,6
vlan 141
        ip igmp snooping enable
vlan 151
        ip igmp snooping enable
virtual-mac 00:07:08:09:09:00
evpn
        redistribute local-mac
        redistribute local-svi
        vlan 141
                rd autoroute-target export 141:141
                route-target import 141:141
                redistribute host-route
        vlan 151
                rd auto
                route-target export 151:151
                route-target import 151:151
                redistribute host-route
interface 1/1/34
        description port_Site-2-Border-vtep-primary
        no shutdown
        ip address 60.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/35
        description port_Site-2-Border-vtep-secondary
        no shutdown
        ip address 60.1.3.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/46
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 141,151
interface loopback 1
        ip address 85.85.85.85/32
interface vlan 141
        vrf attach vrf1
        ip address 11.1.41.3/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.41.10
        ip igmp enable
        ip pim-sparse enable
interface vlan 151
        vrf attach vrf2
        ip address 11.1.51.3/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.51.10
        ip igmp enable
        ip pim-sparse enable
interface vxlan 1
        source ip 85.85.85.85
        no shutdown
        vni 2040
                vlan 141
        vni 2050
                vlan 151
        vni 9002
                vrf vrf2
                routing
```

```
        vni 16777214
                vrf vrf1
                routing
!
!
!
!
!
router ospf 1
        router-id 112.13.1.3
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65536
        bgp router-id 112.13.1.3
        neighbor 192.168.1.3 remote-as 65536
        neighbor 192.168.1.3 update-source loopback 1
        neighbor 192.168.1.4 remote-as 65536
        neighbor 192.168.1.4 update-source loopback 1
        address-family ipv4 unicast
                redistribute connected
                redistribute ospf
        exit-address-family
        address-family l2vpn evpn
                neighbor 192.168.1.3 send-community extended
                neighbor 192.168.1.3 activate
                neighbor 192.168.1.4 send-community extended
                neighbor 192.168.1.4 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute ospf
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute ospf
                exit-address-family
!
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================

Site-2-Access-vtep-1#show ip ospf neighbors all-vrfs

VRF : default                          Process : 1
==================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.1.3       n/a       FULL              60.1.1.1           1/1/34
```

```
112.12.1.3       n/a       FULL              60.1.3.1          1/1/35

Site-2-Access-vtep-1# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 112.13.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
192.168.1.3   65536       254     224     03h:03m:42s  Established   Up
192.168.1.4   65536       255     224     03h:03m:46s  Established   Up
Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 11.1.41.3
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 11.1.51.3
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Site-2-Access-vtep-1# show interface vxlan vteps
Source      Destination     Origin      Status       VNI       Routing   VLAN  VRF
------------------------------------------- ----------------------------------
-
85.85.85.85  4.4.4.4        evpn        operational  2040      disabled  141   --
```

```
85.85.85.85  4.4.4.4        evpn        operational  2050      disabled  151   --
85.85.85.85  80.80.80.80    evpn        operational  2040      disabled  141   --
85.85.85.85  80.80.80.80    evpn        operational  2050      disabled  151   --
85.85.85.85  80.80.80.80    evpn        operational  9002      enabled   --
vrf2
85.85.85.85  80.80.80.80    evpn        operational  16777214  enabled   --
vrf1

Site-2-Access-vtep-1#
Site-2-Access-vtep-1# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information
VRF                       : vrf1
E-BSR Address             : 222.22.1.2
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 3 hour 4 mins 16 secs
Next Bootstrap Message    : 1 mins 39 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

VRF                       : vrf2
E-BSR Address             : 101.101.101.101
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 3 hour 4 mins 17 secs
Next Bootstrap Message    : 1 mins 45 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

Site-2-Access-vtep-1#  show ip pim rp-set all-vrfs
VRF: vrf1
Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        110.100.100.100  150        117          192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.101.101.101  150        123          192

Site-2-Access-vtep-1# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 3
--------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR         Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority  (HH:MM:SS)  Address (IPV4)
--------------------------------------------------------------------------------
vlan141     11.1.41.1   03:04:14   00:01:35   1347440720 00:01:45   11.1.41.10
vlan141     11.1.41.2   03:04:14   00:01:36   1347440720 00:01:45   Nil
vni16777214 80.80.80.80 03:04:23   00:03:15   1          00:03:30
```

```
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 3
--------------------------------------------------------------------------------
-
vlan151     11.1.51.1    03:04:15   00:01:33   1347440720  00:01:45  11.1.51.10
vlan151     11.1.51.2    03:04:15   00:01:34   1347440720  00:01:45  Nil
vni9002     80.80.80.80  03:04:22   00:03:14   1           00:03:30
--------------------------------------------------------------------------------
-
Site-2-Access-vtep-1# show ip mroute 226.6.0.1 all-vrfs detail
IP Multicast Route Entries
VRF : vrf1
Group Address                 : 226.6.0.1
Source Address                : 60.1.25.100
Neighbor                      : 80.80.80.80
Incoming interface            : vni16777214
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:09:41
Downstream Interface
Interface       State
-----------     ----------
vlan141         forwarding
Site-2-Access-vtep-1# show ip mroute 226.5.0.2 all-vrfs detail
IP Multicast Route Entries
VRF : vrf2
Total number of entries : 2
Group Address                 : 226.5.0.2
Source Address                : 11.1.51.100
Neighbor                      :
Incoming interface            : vlan151
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 01:09:48
Group Address                 : 226.5.0.2
Source Address                : 11.1.51.100
Neighbor                      :
Incoming interface            : vni9002
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 01:09:48
```

Site-2-Access-vtep-2

```
Current configuration:
!
!export-password: default
hostname Site-2-Access-vtep-2
cli-session
        timeout 0
!
!
!
!
```

```
!
!
ssh server vrf default
ssh server vrf mgmt
vlan 1
vlan 141
        ip igmp snooping enable
vlan 151
        ip igmp snooping enable
virtual-mac 00:07:08:09:09:01
evpn
        redistribute local-mac
        redistribute local-svi
        vlan 141
                rd auto
                route-target export 141:141
                route-target import 141:141
                redistribute host-route
        vlan 151
                rd auto
                route-target export 151:151
                route-target import 151:151
                redistribute host-route
interface 1/1/34
        description port_Site-2-Border-vtep-primary
        no shutdown
        ip address 60.1.2.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/35
        description port_Site-2-Border-vtep-secondary
        no shutdown
        ip address 60.1.4.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/46
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 141,151
interface loopback 1
        ip address 4.4.4.4/32
interface vlan 1
interface vxlan 1
        source ip 4.4.4.4
        no shutdown
        vni 2040
                vlan 141
        vni 2050
                vlan 151
!
!
!
!
!
router ospf 1
        router-id 112.14.1.3
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
        router bgp 65536
```

```
        bgp router-id 112.14.1.3
        neighbor 192.168.1.3 remote-as 65536
        neighbor 192.168.1.3 update-source loopback 1
        neighbor 192.168.1.4 remote-as 65536
        neighbor 192.168.1.4 update-source loopback 1
        address-family ipv4 unicast
                redistribute connected
                redistribute ospf
        exit-address-family
        address-family l2vpn evpn
                neighbor 192.168.1.3 send-community extended
                neighbor 192.168.1.3 activate
                neighbor 192.168.1.4 send-community extended
                neighbor 192.168.1.4 activate
        exit-address-family
!
https-server vrf default
https-server vrf mgmt

=======================================
Show command outputs for  validation
=======================================

Site-2-Access-vtep-2# show ip ospf neighbors all-vrfs

VRF : default                           Process : 1
==================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.1.3       n/a       FULL              60.1.2.1           1/1/34
112.12.1.3       n/a       FULL              60.1.4.1           1/1/35

Site-2-Access-vtep-2# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 112.14.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------
Address-family : VPNv4 Unicast
------------------------------
Address-family : L2VPN EVPN
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
192.168.1.3   65536       258     221     03h:05m:17s  Established   Up
192.168.1.4   65536       259     219     03h:05m:09s  Established   Up

Site-2-Access-vtep-2# show interface vxlan vteps
Source    Destination      Origin    Status       VNI      Routing   VLAN  VRF
------------------------------------------- ----------------------------------
-
4.4.4.4   80.80.80.80      evpn      operational  2040     disabled  141    --
4.4.4.4   80.80.80.80      evpn      operational  2050     disabled  151    --
```

```
4.4.4.4   85.85.85.85      evpn      operational  2040     disabled  141    --
4.4.4.4   85.85.85.85      evpn      operational  2050     disabled  151    --
```

Site-2-Border-vtep-primary

```
Current configuration:
!
!export-password: default
hostname Site-2-Border-vtep-primary
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 5:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 6:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 141
        ip igmp snooping enable
vlan 151
        ip igmp snooping enable
vlan 752,1039-1040
virtual-mac 00:11:00:00:00:11
evpn
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 141
                rd auto
                route-target export 141:141
                route-target import 141:141
                redistribute host-route
        vlan 151
                rd auto
                route-target export 151:151
                route-target import 151:151
                redistribute host-route
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface 1/1/1
        description port_Site-1-Border-vtep-primary
        no shutdown
        ip address 40.1.1.2/29
```

```
interface 1/1/2
        description port_Site-1-Border-vtep-secondary
        no shutdown
        ip address 40.1.3.2/29
interface 1/1/34
        description port_ka
        no shutdown
        ip address 45.1.1.1/24
interface 1/1/35
        description port_isl
        no shutdown
        lag 120
interface 1/1/46
        description port_Site-2-Access-vtep-1
        no shutdown
        ip address 60.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/47
        description port_Site-2-Access-vtep-2
        no shutdown
        ip address 60.1.2.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface loopback 1
        ip address 80.80.80.80/32
interface loopback 105
        vrf attach vrf1
        ip address 104.104.104.104/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 106
        vrf attach vrf2
        ip address 105.105.105.105/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 113
        ip address 195.170.1.255/32
interface loopback 114
        ip address 192.168.1.3/32
interface vlan 141
        vrf attach vrf1
        ip address 11.1.41.1/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.41.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 151
        vrf attach vrf2
        ip address 11.1.51.1/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.51.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 752
        no shutdown
        ip address 172.1.1.1/30
        ip ospf 1 area 0.0.0.0
interface vlan 1039
        vrf attach vrf1
```

```
        ip address 60.1.39.2/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 1040
        vrf attach vrf2
        ip address 60.1.40.2/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vxlan 1
        source ip 80.80.80.80
        no shutdown
        vni 2040
                vlan 141
        vni 2050
                vlan 151
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
        inter-switch-link lag 120
        role primary
        keepalive peer 45.1.1.2 source 45.1.1.1
!
!
route-map tag_bgp_ospf permit seq 10
        set tag 210
route-map tag_ospf_bgp deny seq 10
        match tag 210
route-map tag_ospf_bgp deny seq 20
        match tag 220
route-map tag_ospf_bgp permit seq 30
!
!
!
router ospf 1
        router-id 112.11.1.3
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 112.11.1.5
        distance 250
        redistribute bgp route-map tag_bgp_ospf
        redistribute connected
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 112.11.2.5
        distance 250
        redistribute bgp route-map tag_bgp_ospf
        redistribute connected
        area 0.0.0.0
router bgp 65536
        bgp router-id 112.11.1.3
```

```
        neighbor 4.4.4.4 remote-as 65536
        neighbor 4.4.4.4 update-source loopback 114
        neighbor 40.1.1.1 remote-as 65535
        neighbor 40.1.3.1 remote-as 65535
        neighbor 45.1.1.2 remote-as 65536
        neighbor 85.85.85.85 remote-as 65536
        neighbor 85.85.85.85 update-source loopback 114
        neighbor 193.170.1.255 remote-as 65535
        neighbor 193.170.1.255 ebgp-multihop 5
        neighbor 193.170.1.255 update-source loopback 113
        neighbor 194.170.1.255 remote-as 65535
        neighbor 194.170.1.255 ebgp-multihop 5
        neighbor 194.170.1.255 update-source loopback 113
        address-family ipv4 unicast
                neighbor 40.1.1.1 activate
                neighbor 40.1.3.1 activate
                neighbor 45.1.1.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 4.4.4.4 next-hop-self
                neighbor 4.4.4.4 route-reflector-client
                neighbor 4.4.4.4 send-community extended
                neighbor 4.4.4.4 activate
                neighbor 85.85.85.85 next-hop-self
                neighbor 85.85.85.85 route-reflector-client
                neighbor 85.85.85.85 send-community extended
                neighbor 85.85.85.85 activate
                neighbor 193.170.1.255 send-community extended
                neighbor 193.170.1.255 activate
                neighbor 194.170.1.255 send-community extended
                neighbor 194.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================

Site-2-Border-vtep-primary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================
```

```
Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.13.1.3       n/a       FULL              60.1.1.0           1/1/46
112.14.1.3       n/a       FULL              60.1.2.0           1/1/47

VRF : vrf1                               Process : 1
=================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.12.1.5       1         FULL/DR           60.1.39.3          vlan1039

VRF : vrf2                               Process : 1
=================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.12.2.5       1         FULL/DR           60.1.40.3          vlan1040

Site-2-Border-vtep-primary# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 112.11.1.3
Peers                  : 7            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
40.1.1.1      65535       204     206     02h:53m:15s  Established   Up
40.1.3.1      65535       205     205     02h:53m:12s  Established   Up
45.1.1.2      65536       208     207     02h:51m:54s  Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
4.4.4.4       65536       203     240     02h:49m:51s  Established   Up
85.85.85.85   65536       209     239     02h:50m:36s  Established   Up
193.170.1.255 65535       238     259     02h:53m:16s  Established   Up
194.170.1.255 65535       245     246     02h:53m:12s  Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
```

```
Local AS               : 65536        BGP Router Identifier  : 104.104.104.104
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------
Codes: * Dynamic Neighbor

Site-2-Border-vtep-primary# show interface vxlan vteps
Source        Destination   Origin   Status         VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
-
80.80.80.80   4.4.4.4       evpn     operational    2040      disabled  141    --
80.80.80.80   4.4.4.4       evpn     operational    2050      disabled  151    --
80.80.80.80   5.5.5.50      evpn     operational    9002      enabled   --
vrf2
80.80.80.80   5.5.5.50      evpn     operational    16777214  enabled   --
vrf1
80.80.80.80   85.85.85.85   evpn     operational    2040      disabled  141    --
80.80.80.80   85.85.85.85   evpn     operational    2050      disabled  151    --
80.80.80.80   85.85.85.85   evpn     operational    9002      enabled   --
vrf2
80.80.80.80   85.85.85.85   evpn     operational    16777214  enabled   --
vrf1

Site-2-Border-vtep-primary# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information
VRF                        : vrf1
E-BSR Address              : 222.22.1.2
E-BSR Priority             : 0
E-BSR Hash Mask Length     : 30
E-BSR Up Time              : 2 hour 53 mins 15 secs
Next Bootstrap Message     : 1 mins 56 secs

C-BSR Admin Status         : This system is not a Candidate-BSR

C-RP Admin Status          : This system is not a Candidate-RP

VRF                        : vrf2
E-BSR Address              : 101.101.101.101
E-BSR Priority             : 0
E-BSR Hash Mask Length     : 30
E-BSR Up Time              : 2 hour 53 mins 9 secs
Next Bootstrap Message     : 2 mins 2 secs

C-BSR Admin Status         : This system is not a Candidate-BSR

C-RP Admin Status          : This system is not a Candidate-RP

Site-2-Border-vtep-primary# show ip pim rp-set all-vrfs
VRF: vrf1
Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        110.100.100.100  150        128          192
VRF: vrf2
```

```
Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.101.101.101  150        134          192

Site-2-Border-vtep-primary# show ip mroute  226.5.0.1 all-vrfs detail
IP Multicast Route Entries
VRF : vrf1
Total number of entries : 2
Group Address                  : 226.5.0.1
Source Address                 : 60.1.25.100
Neighbor                       : 60.1.39.3
Incoming interface             : vlan1039
Intra-Inter Forwarded VTEP(s)  :
Multicast Routing Protocol     : PIM-SM
Unicast Routing Protocol       : BGP
Metric                         : 0
Metric  Pref                   : 20
Uptime (HH:MM:SS)              : 00:00:32
Downstream Interface
Interface       State          Vteps
-----------     ----------     -----
vni16777214     forwarding     85.85.85.85
Group Address                  : 226.5.0.1
Source Address                 : 60.1.25.100
Neighbor                       : 5.5.5.50
Incoming interface             : vlan141
Intra-Inter Forwarded VTEP(s)  :
Multicast Routing Protocol     : PIM-SM
Unicast Routing Protocol       : BGP
Metric                         : 0
Metric  Pref                   : 20
Uptime (HH:MM:SS)              : 00:00:32

Site-2-Border-vtep-primary# show ip mroute  225.6.0.2 all-vrfs detail
IP Multicast Route Entries
VRF : vrf2
Total number of entries : 1
Group Address                  : 225.6.0.2
Source Address                 : 11.1.51.100
Neighbor                       :
Incoming interface             : vlan151
Intra-Inter Forwarded VTEP(s)  :
Multicast Routing Protocol     : PIM-SM
Unicast Routing Protocol       : BGP
Metric                         : 0
Metric  Pref                   : 200
Uptime (HH:MM:SS)              : 00:00:51
Downstream Interface
Interface       State          Vteps
-----------     ----------     -----
vni9002         forwarding     5.5.5.50
```

Site-2-Border-vtep-secondary

```
Current configuration:
!
!export-password: default
hostname Site-2-Border-vtep-secondary
```

```
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 5:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 6:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 141
        ip igmp snooping enable
vlan 151
        ip igmp snooping enable
vlan 752,1039-1040
virtual-mac 00:11:00:00:00:11
evpn
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 141
                rd auto
                route-target export 141:141
                route-target import 141:141
                redistribute host-route
        vlan 151
                rd auto
                route-target export 151:151
                route-target import 151:151
                redistribute host-route
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface 1/1/1
        description port_Site-1-Border-vtep-primary
        no shutdown
        ip address 40.1.2.2/29
interface 1/1/2
        description port_Site-1-Border-vtep-secondary
        no shutdown
        ip address 40.1.4.2/29
interface 1/1/34
        description port_ka
        no shutdown
        ip address 45.1.1.2/24
interface 1/1/35
        description port_isl
```

```
        no shutdown
        lag 120
interface 1/1/47
        description port_Site-2-Access-vtep-1
        no shutdown
        ip address 60.1.3.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/48
        description port_Site-2-Access-vtep-2
        no shutdown
        ip address 60.1.4.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface loopback 1
        ip address 80.80.80.80/32
interface loopback 2
        vrf attach vrf1
        ip address 121.121.121.121/32
        ip pim-sparse enable
interface loopback 113
        ip address 196.170.1.255/32
interface loopback 114
        ip address 192.168.1.4/32
interface vlan 141
        vrf attach vrf1
        ip address 11.1.41.2/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.41.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 151
        vrf attach vrf2
        ip address 11.1.51.2/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.51.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 752
        no shutdown
        ip address 172.1.1.2/30
        ip ospf 1 area 0.0.0.0
interface vlan 1039
        vrf attach vrf1
        ip address 60.1.39.3/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 1040
        vrf attach vrf2
        ip address 60.1.40.3/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vxlan 1
        source ip 80.80.80.80
        no shutdown
        vni 2040
```

```
                vlan 141
        vni 2050
                vlan 151
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
        inter-switch-link lag 120
        role secondary
        keepalive peer 45.1.1.1 source 45.1.1.2
!
route-map tag_bgp_ospf permit seq 10
        set tag 220
route-map tag_ospf_bgp deny seq 10
        match tag 210
route-map tag_ospf_bgp deny seq 20
        match tag 220
route-map tag_ospf_bgp permit seq 30
!
!
!
router ospf 1
        router-id 112.12.1.3
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 112.12.1.5
        distance 250
        redistribute bgp route-map tag_bgp_ospf
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 112.12.2.5
        distance 250
        redistribute bgp route-map tag_bgp_ospf
        redistribute connected
        area 0.0.0.0
router bgp 65536
        bgp router-id 112.12.1.3
        neighbor 4.4.4.4 remote-as 65536
        neighbor 40.1.2.1 remote-as 65535
        neighbor 40.1.4.1 remote-as 65535
        neighbor 45.1.1.1 remote-as 65536
        neighbor 85.85.85.85 remote-as 65536
        neighbor 85.85.85.85 update-source loopback 114
        neighbor 193.170.1.255 remote-as 65535
        neighbor 193.170.1.255 ebgp-multihop 5
        neighbor 193.170.1.255 update-source loopback 113
        neighbor 194.170.1.255 remote-as 65535
        neighbor 194.170.1.255 ebgp-multihop 5
        neighbor 194.170.1.255 update-source loopback 113
        address-family ipv4 unicast
                neighbor 40.1.2.1 activate
                neighbor 40.1.4.1 activate
                neighbor 45.1.1.1 activate
```

```
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 4.4.4.4 next-hop-self
                neighbor 4.4.4.4 route-reflector-client
                neighbor 4.4.4.4 send-community extended
                neighbor 4.4.4.4 activate
                neighbor 85.85.85.85 next-hop-self
                neighbor 85.85.85.85 route-reflector-client
                neighbor 85.85.85.85 send-community extended
                neighbor 85.85.85.85 activate
                neighbor 193.170.1.255 send-community extended
                neighbor 193.170.1.255 activate
                neighbor 194.170.1.255 send-community extended
                neighbor 194.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================

Site-2-Border-vtep-secondary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
=================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.13.1.3       n/a       FULL              60.1.3.0           1/1/47
112.14.1.3       n/a       FULL              60.1.4.0           1/1/48

VRF : vrf1                             Process : 1
=================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.1.5       1         FULL/BDR          60.1.39.2          vlan1039
VRF : vrf2                             Process : 1
=================================================
```

```
Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.2.5       1         FULL/BDR          60.1.40.2          vlan1040

Site-2-Border-vtep-secondary# show bgp all-vrf all sum
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 112.12.1.3
Peers                  : 7            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
40.1.2.1      65535       211     217     03h:01m:43s  Established   Up
40.1.4.1      65535       213     217     03h:01m:39s  Established   Up
45.1.1.1      65536       218     219     03h:01m:37s  Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
4.4.4.4       65536       213     253     02h:59m:26s  Established   Up
85.85.85.85   65536       220     251     03h:00m:23s  Established   Up
193.170.1.255 65535       253     260     03h:01m:44s  Established   Up
194.170.1.255 65535       252     255     03h:01m:40s  Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 121.121.121.121
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------
Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 60.1.40.3
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
```

```
-----------------------------

Site-2-Border-vtep-secondary# show int vxlan vteps
Source       Destination   Origin      Status       VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
-
80.80.80.80  4.4.4.4       evpn        operational  2040      disabled  141    --
80.80.80.80  4.4.4.4       evpn        operational  2050      disabled  151    --
80.80.80.80  5.5.5.50      evpn        operational  9002      enabled   --
vrf2
80.80.80.80  5.5.5.50      evpn        operational  16777214  enabled   --
vrf1
80.80.80.80  85.85.85.85   evpn        operational  2040      disabled  141    --
80.80.80.80  85.85.85.85   evpn        operational  2050      disabled  151    --
80.80.80.80  85.85.85.85   evpn        operational  9002      enabled   --
vrf2
80.80.80.80  85.85.85.85   evpn        operational  16777214  enabled   --
vrf1
Site-2-Border-vtep-secondary#
Site-2-Border-vtep-secondary#
Site-2-Border-vtep-secondary#
Site-2-Border-vtep-secondary# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information
VRF                       : vrf1
E-BSR Address             : 222.22.1.2
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 3 hour 2 mins 9 secs
Next Bootstrap Message    : 2 mins 8 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

VRF                       : vrf2
E-BSR Address             : 101.101.101.101
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 3 hour 2 mins 8 secs
Next Bootstrap Message    : 1 mins 14 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

Site-2-Border-vtep-secondary# show ip pim rp-set all-vrfs

VRF: vrf1
Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        110.100.100.100  150        127          192
VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.101.101.101  150        133          192
```

```
Site-2-Border-vtep-secondary# show ip pim rp-set all-vrfs
VRF: vrf1

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        110.100.100.100  150        116          192
VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.101.101.101  150        122          192

Site-2-Border-vtep-secondary#
Site-2-Border-vtep-secondary#
Site-2-Border-vtep-secondary# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 5
--------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR         Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority  (HH:MM:SS)  Address (IPV4)
--------------------------------------------------------------------------------
vni16777214 5.5.5.50    03:02:30   00:03:04   1          00:03:30
vlan141     11.1.41.1   03:02:38   00:01:31   1347440720 00:01:45  11.1.41.10
vlan141     11.1.41.3   03:01:18   00:01:33   1431655765 00:01:45  Nil
vlan1039    60.1.39.2   00:13:03   00:01:44   1347440720 00:01:45  Nil
vni16777214 85.85.85.85 03:01:25   00:03:06   1          00:03:30
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 5
--------------------------------------------------------------------------------
------------------------------------------------------------
vni9002     5.5.5.50    03:02:29   00:03:03   1          00:03:30
vlan151     11.1.51.1   03:02:37   00:01:29   1347440720 00:01:45  11.1.51.10
vlan151     11.1.51.3   03:01:19   00:01:30   1431655765 00:01:45  Nil
vlan1040    60.1.40.2   00:13:01   00:01:44   1347440720 00:01:45  Nil
vni9002     85.85.85.85 03:01:26   00:03:05   1          00:03:30
--------------------------------------------------------------------------------
-

Site-2-Border-vtep-secondary# show ip show ip mroute  226.5.0.1 all-vrfs detail
Invalid input: show

Site-2-Border-vtep-secondary# show ip mroute  226.5.0.1 all-vrfs detail
IP Multicast Route Entries
VRF : vrf1
Group Address                 : 226.5.0.1
Source Address                : 60.1.25.100
Neighbor                      : 5.5.5.50
Incoming interface            : vni16777214
Intra-Inter Forwarded VTEP(s) : 85.85.85.85
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
```

```
Uptime (HH:MM:SS)             : 00:06:39
Downstream Interface
Interface       State
-----------     ----------
vlan1039        forwarding
Group Address                 : 226.5.0.1
Source Address                : 60.1.25.100
Neighbor                      : 5.5.5.50
Incoming interface            : vlan141
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:06:40

Site-2-Border-vtep-secondary# show ip mroute  225.6.0.2 all-vrfs detail
IP Multicast Route Entries
VRF : vrf2
Total number of entries : 1
Group Address                 : 225.6.0.2
Source Address                : 11.1.51.100
Neighbor                      :
Incoming interface            : vlan151
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 00:06:44
Downstream Interface
Interface       State          Vteps
-----------     ----------     -----
vni9002         forwarding     5.5.5.50
```

Anycast RP configured between Site-1 border VSX VTEP and Site-2 border VSX VTEP

Site-1 border VTEP primary

```
interface loopback 10
    vrf attach vrf1
    ip address 11.0.0.1/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface loopback 11
    vrf attach vrf1
    ip address 11.0.0.11/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable

router pim vrf vrf1
    enable
    rp-candidate source-ip-interface loopback10 group-prefix 224.0.0.0/4
    bsr-candidate source-ip-interface loopback11

router msdp vrf vrf1
    enable
    ip msdp peer 11.0.0.12
        connect-source loopback11
        enable
        mesh-group mesh1
```

```
    ip msdp peer 11.0.0.15
        connect-source loopback11
        enable
        mesh-group mesh1
    ip msdp peer 11.0.0.14
        connect-source loopback11
        enable
        mesh-group mesh1
```

Site-1 border VTEP secondary

```
interface loopback 10
    vrf attach vrf1
    ip address 11.0.0.1/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface loopback 11
    vrf attach vrf1
    ip address 11.0.0.12/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable

router pim vrf vrf1
    enable
    rp-candidate source-ip-interface loopback10 group-prefix 224.0.0.0/4
    bsr-candidate source-ip-interface loopback11

router msdp vrf vrf1
    enable
    ip msdp peer 11.0.0.13
        connect-source loopback11
        enable
        mesh-group mesh1
    ip msdp peer 11.0.0.15
        connect-source loopback11
        enable
        mesh-group mesh1
    ip msdp peer 11.0.0.14
        connect-source loopback11
        enable
        mesh-group mesh1
```

Site-2 border VTEP primary

```
interface loopback 10
    vrf attach vrf1
    ip address 11.0.0.1/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface loopback 11
    vrf attach vrf1
    ip address 11.0.0.14/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable

router pim vrf vrf1
    enable
    rp-candidate source-ip-interface loopback10 group-prefix 224.0.0.0/4
    bsr-candidate source-ip-interface loopback11
```

```
router msdp vrf vrf1
    enable
    ip msdp peer 11.0.0.13
        connect-source loopback11
        enable
        mesh-group mesh1
    ip msdp peer 11.0.0.12
        connect-source loopback11
        enable
        mesh-group mesh1
    ip msdp peer 11.0.0.15
        connect-source loopback11
        enable
        mesh-group mesh1
```

Site-2 border VTEP secondary

```
interface loopback 10
    vrf attach vrf1
    ip address 11.0.0.1/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface loopback 11
    vrf attach vrf1
    ip address 11.0.0.15/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable


router pim vrf vrf1
    enable
    rp-candidate source-ip-interface loopback10 group-prefix 224.0.0.0/4
    bsr-candidate source-ip-interface loopback11

router msdp vrf vrf1
    enable
    ip msdp peer 11.0.0.14
        connect-source loopback11
        enable
        mesh-group mesh1
    ip msdp peer 11.0.0.13
        connect-source loopback11
        enable
        mesh-group mesh1
    ip msdp peer 11.0.0.12
        connect-source loopback11
        enable
        mesh-group mesh1
```

Verify MSDP peer information

Verify whether the peer state is up. For that the peer must be enabled and there must be a unicast path to peer IP.

```
Site-1-Border-vtep-primary# show ip msdp peer all-vrfs

VRF: vrf1
```

```
MSDP Peer: 11.0.0.10
Connection status
State: up  Resets: 0  Connection Source: loopback11(11.0.0.11)
Uptime(Downtime): 1h 11m    SA Messages sent: 0
SA's learned from this peer: 365
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1

VRF: vrf1

MSDP Peer: 11.0.0.12
Connection status
State: up  Resets: 0  Connection Source: loopback11(11.0.0.11)
Uptime(Downtime): 1h 10m    SA Messages sent: 0
SA's learned from this peer: 0
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1

VRF: vrf1

MSDP Peer: 11.0.0.13
Connection status
State: up  Resets: 0  Connection Source: loopback11(11.0.0.11)
Uptime(Downtime): 1h 3m     SA Messages sent: 0
SA's learned from this peer: 0
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1

VRF: vrf1

MSDP Peer: 11.0.0.14
Connection status
State: up  Resets: 0  Connection Source: loopback11(11.0.0.11)
Uptime(Downtime): 1h 8m     SA Messages sent: 0
SA's learned from this peer: 0
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1

VRF: vrf1

MSDP Peer: 11.0.0.15
Connection status
State: up  Resets: 0  Connection Source: loopback11(11.0.0.11)
Uptime(Downtime): 1h 7m     SA Messages sent: 0
SA's learned from this peer: 0
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1

VRF: vrf1

MSDP Peer: 11.0.0.16
Connection status
```

```
State: up  Resets: 0  Connection Source: loopback11(11.0.0.11)
Uptime(Downtime): 1h 5m     SA Messages sent: 0
SA's learned from this peer: 0
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1

VRF: vrf1

MSDP Peer: 11.0.0.17
Connection status
State: up  Resets: 0  Connection Source: loopback11(11.0.0.11)
Uptime(Downtime): 1h 5m     SA Messages sent: 0
SA's learned from this peer: 0
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1
```

```
Site-1-Border-vtep-secondary# show ip msdp peer all-vrfs

VRF: vrf1

MSDP Peer: 11.0.0.10
Connection status
State: up  Resets: 0  Connection Source: loopback11(11.0.0.12)
Uptime(Downtime): 1h 12m    SA Messages sent: 0
SA's learned from this peer: 367
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1

VRF: vrf1

MSDP Peer: 11.0.0.11
Connection status
State: up  Resets: 0  Connection Source: loopback11(11.0.0.12)
Uptime(Downtime): 1h 12m    SA Messages sent: 0
SA's learned from this peer: 0
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1

VRF: vrf1

MSDP Peer: 11.0.0.13
Connection status
State: up  Resets: 0  Connection Source: loopback11(11.0.0.12)
Uptime(Downtime): 1h 5m     SA Messages sent: 0
SA's learned from this peer: 0
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1

VRF: vrf1

MSDP Peer: 11.0.0.14
```

```
Connection status
State: up  Resets: 0  Connection Source: loopback11(11.0.0.12)
Uptime(Downtime): 1h 10m    SA Messages sent: 0
SA's learned from this peer: 0
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1

VRF: vrf1

MSDP Peer: 11.0.0.15
Connection status
State: up  Resets: 0  Connection Source: loopback11(11.0.0.12)
Uptime(Downtime): 1h 9m     SA Messages sent: 0
SA's learned from this peer: 0
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1

VRF: vrf1

MSDP Peer: 11.0.0.16
Connection status
State: up  Resets: 0  Connection Source: loopback11(11.0.0.12)
Uptime(Downtime): 1h 7m     SA Messages sent: 0
SA's learned from this peer: 0
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1

VRF: vrf1

MSDP Peer: 11.0.0.17
Connection status
State: up  Resets: 0  Connection Source: loopback11(11.0.0.12)
Uptime(Downtime): 1h 8m     SA Messages sent: 0
SA's learned from this peer: 0
Peer Keepalive interval: 60
Peer Hold time: 75
Peer Connection Retry interval: 30
Mesh group: mesh1
```

Verify MSDP peer summary

```
Site-1-Border-vtep-primary# show ip msdp summary all-vrfs

VRF: vrf1

MSDP Peer Status Summary
Peer address     State    Uptime(Downtime)     Reset Count    SA Count
11.0.0.10        up       1h 11m               0              365

VRF: vrf1

MSDP Peer Status Summary
Peer address     State    Uptime(Downtime)     Reset Count    SA Count
11.0.0.12        up       1h 10m               0              0
```

```
VRF: vrf1

MSDP Peer Status Summary
Peer address    State    Uptime(Downtime)    Reset Count    SA Count
11.0.0.13       up       1h 3m               0              0

VRF: vrf1

MSDP Peer Status Summary
Peer address    State    Uptime(Downtime)    Reset Count    SA Count
11.0.0.14       up       1h 8m               0              0

VRF: vrf1

MSDP Peer Status Summary
Peer address    State    Uptime(Downtime)    Reset Count    SA Count
11.0.0.15       up       1h 7m               0              0

VRF: vrf1

MSDP Peer Status Summary
Peer address    State    Uptime(Downtime)    Reset Count    SA Count
11.0.0.16       up       1h 5m               0              0

VRF: vrf1

MSDP Peer Status Summary
Peer address    State    Uptime(Downtime)    Reset Count    SA Count
11.0.0.17       up       1h 5m               0              0
```

```
Site-1-Border-vtep-secondary# show ip msdp summary all-vrfs

VRF: vrf1

MSDP Peer Status Summary
Peer address    State    Uptime(Downtime)    Reset Count    SA Count
11.0.0.10       up       1h 12m              0              367

VRF: vrf1

MSDP Peer Status Summary
Peer address    State    Uptime(Downtime)    Reset Count    SA Count
11.0.0.11       up       1h 13m              0              0

VRF: vrf1

MSDP Peer Status Summary
Peer address    State    Uptime(Downtime)    Reset Count    SA Count
11.0.0.13       up       1h 5m               0              0

VRF: vrf1

MSDP Peer Status Summary
Peer address    State    Uptime(Downtime)    Reset Count    SA Count
11.0.0.14       up       1h 10m              0              0

VRF: vrf1

MSDP Peer Status Summary
Peer address    State    Uptime(Downtime)    Reset Count    SA Count
11.0.0.15       up       1h 9m               0              0
```

```
VRF: vrf1

MSDP Peer Status Summary
Peer address     State     Uptime(Downtime)     Reset Count     SA Count
11.0.0.16        up        1h 7m                0               0

VRF: vrf1

MSDP Peer Status Summary
Peer address     State     Uptime(Downtime)     Reset Count     SA Count
11.0.0.17        up        1h 8m                0               0
```

Verify MSDP peer count

```
Site-1-Border-vtep-primary# show ip msdp count all-vrfs

VRF: default
MSDP is not configured.

VRF: vrf2
MSDP is not configured.

VRF: vrf1
SA state per Peer counters
<Peer>:<#SA learned>
11.0.0.10: 7
11.0.0.12: 0
11.0.0.13: 0
11.0.0.14: 0
11.0.0.15: 0
11.0.0.16: 0
11.0.0.17: 0

Total entries: 7
```

```
Site-1-Border-vtep-secondary# show ip msdp count all-vrfs

VRF: default
MSDP is not configured.

VRF: vrf2
MSDP is not configured.

VRF: vrf1
SA state per Peer counters
<Peer>:<#SA learned>
11.0.0.10: 7
11.0.0.11: 0
11.0.0.13: 0
11.0.0.14: 0
11.0.0.15: 0
11.0.0.16: 0
11.0.0.17: 0

Total entries: 7
```

Verify MSDP peer SA-Cache information

```
Site-1-Border-vtep-primary# show ip msdp sa-cache all-vrfs

VRF: default
MSDP is not configured.

VRF: vrf2
MSDP is not configured.

VRF: vrf1
Total entries: 7

(60.1.25.20, 225.2.0.1)  RP: 11.0.0.1  Peer: 11.0.0.10
(60.1.25.20, 225.5.0.1)  RP: 11.0.0.1  Peer: 11.0.0.10
(60.1.25.20, 225.10.0.1)  RP: 11.0.0.1  Peer: 11.0.0.10
(60.1.25.20, 225.10.0.2)  RP: 11.0.0.1  Peer: 11.0.0.10
(60.1.25.20, 226.1.0.1)  RP: 11.0.0.1  Peer: 11.0.0.10
(60.1.25.20, 228.1.0.1)  RP: 11.0.0.1  Peer: 11.0.0.10
(60.1.25.20, 229.1.0.1)  RP: 11.0.0.1  Peer: 11.0.0.10
```

```
Site-1-Border-vtep-secondary# show ip msdp sa-cache all-vrfs

VRF: default
MSDP is not configured.

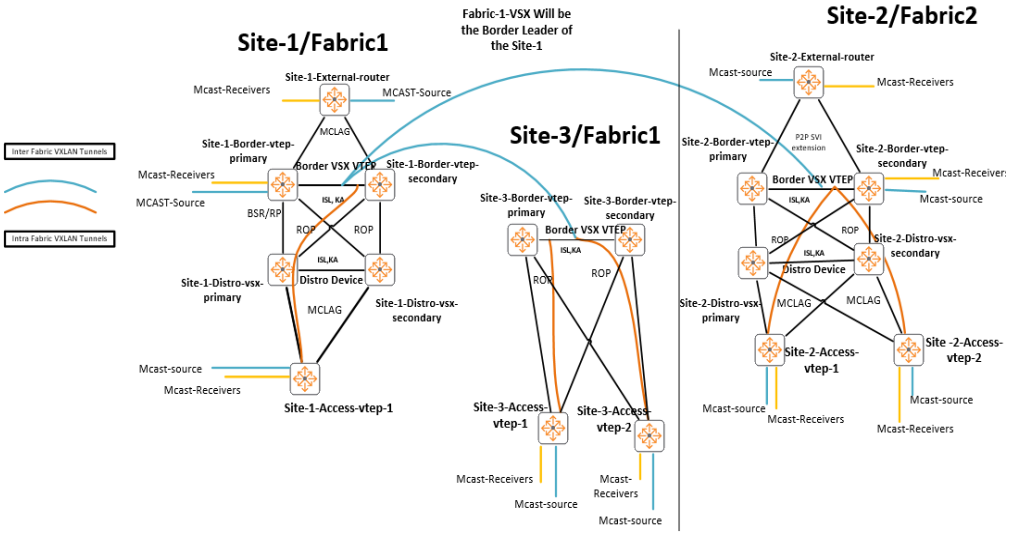
VRF: vrf2
MSDP is not configured.

VRF: vrf1
Total entries: 7

(60.1.25.20, 225.2.0.1)  RP: 11.0.0.1  Peer: 11.0.0.10
(60.1.25.20, 225.5.0.1)  RP: 11.0.0.1  Peer: 11.0.0.10
(60.1.25.20, 225.10.0.1)  RP: 11.0.0.1  Peer: 11.0.0.10
(60.1.25.20, 225.10.0.2)  RP: 11.0.0.1  Peer: 11.0.0.10
(60.1.25.20, 226.1.0.1)  RP: 11.0.0.1  Peer: 11.0.0.10
(60.1.25.20, 228.1.0.1)  RP: 11.0.0.1  Peer: 11.0.0.10
(60.1.25.20, 229.1.0.1)  RP: 11.0.0.1  Peer: 11.0.0.10
```

Use case 2: multiple fabrics per site (PIM-SM)

Figure 1 *Use case 2: multiple fabrics per site (PIM-SM)*



Configuration and verification details for the devices in this use case are provided in the following sections:

Site-1-Access-vtep-1
Site-1-Border-vtep-primary
Site-1-Border-vtep-secondary
Site-1-Distro-vsx-primary
Site-1-Distro-vsx-secondary
Site-1-External-router
Site-2-Access-vtep-1
Site-2-Access-vtep-2
Site-2-Border-vtep-primary
Site-2-Border-vtep-secondary
Site-2-Distro-vsx-primary
Site-2-Distro-vsx-secondary
Site-2-External-router
Site-3-Access-vtep-1
Site-3-Access-vtep-2
Site-3-Border-vtep-primary
Site-3-Border-vtep-secondary

Site-1-Access-vtep-1

```
conf t
!export-password: default
hostname site1-Access-vtep-1
vrf vrf1
        rd 31:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 32:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vsf secondary-member 2
vsf member 1
        type r8s90a
        link 1 1/1/28
vlan 1,4
vlan 101
        ip igmp snooping enable
vlan 102
        ip igmp snooping enable
virtual-mac 00:01:20:11:56:20
```

```
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
        vlan 101
                rd auto
                route-target export 101:141
                route-target import 101:141
                redistribute host-route
        vlan 102
                rd auto
                route-target export 102:142
                route-target import 102:142
                redistribute host-route
spanning-tree
interface mgmt
        no shutdown
        ip dhcp
interface lag 36
        shutdown
        no routing
        vlan access 1
interface lag 37
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 4
        lacp mode active
        lacp rate fast
interface 1/1/1
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 101-102
interface 1/1/49
        description port_Site-1-Distro-vsx-primary
        no shutdown
        lag 37
interface 1/1/50
        description port_Site-1-Distro-vsx-secondary
        no shutdown
        lag 37
interface loopback 1
        ip address 192.168.1.5/32
        ip ospf 1 area 0.0.0.0
interface loopback 15
        ip address 3.3.3.50/32
        ip ospf 1 area 0.0.0.0
interface vlan 1
        ip dhcp
interface vlan 4
        ip address 40.1.1.4/29
        l3-counters
        ip ospf 1 area 0.0.0.0
interface vlan 101
        vrf attach vrf1
        ip address 11.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.1.10
        ip igmp enable
```

```
        ip pim-sparse enable
interface vlan 102
        vrf attach vrf2
        ip address 11.1.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.2.10
        ip igmp enable
        ip pim-sparse enable
interface vxlan 1
        source ip 3.3.3.50
        no shutdown
        vni 2100
                vlan 101
        vni 2101
                vlan 102
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
!
!
!
!
!
router ospf 1
        router-id 111.13.1.3
        redistribute local loopback
        area 0.0.0.0
router bgp 65535
        bgp router-id 111.13.1.3
        neighbor 192.168.1.1 remote-as 65535
        neighbor 192.168.1.1 update-source loopback 1
        neighbor 192.168.1.2 remote-as 65535
        neighbor 192.168.1.2 update-source loopback 1
        address-family l2vpn evpn
                neighbor 192.168.1.1 send-community extended
                neighbor 192.168.1.1 activate
                neighbor 192.168.1.2 send-community extended
                neighbor 192.168.1.2 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                redistribute connected
                redistribute local loopback
                redistribute ospf
        exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                redistribute connected
                redistribute local loopback
                redistribute ospf
        exit-address-family
!
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf default
```

```
https-server vrf mgmt
========================================
Show command outputs for  validation
========================================
Site-1-Access-vtep-1# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 1
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
101.10.10.10     1         FULL/BDR          40.1.1.2           vlan4

Site-1-Access-vtep-1# show bgp all-vrf all s
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.13.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
192.168.1.1   65535       6641    609     08h:35m:30s  Established   Up
192.168.1.2   65535       6757    612     08h:35m:33s  Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 11.1.1.10
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 11.1.2.10
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
```

```
Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------

Site-1-Access-vtep-1# show interface vxlan vteps
Source    Destination   Origin    Status        VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
-
3.3.3.50  2.2.2.2       evpn      operational   9002      enabled   --    vrf2
3.3.3.50  2.2.2.2       evpn      operational   16777214  enabled   --    vrf1
3.3.3.50  4.4.4.50      evpn      operational   2100      disabled  101   --
3.3.3.50  4.4.4.50      evpn      operational   2101      disabled  102   --
3.3.3.50  4.4.4.50      evpn      operational   9002      enabled   --    vrf2
3.3.3.50  4.4.4.50      evpn      operational   16777214  enabled   --    vrf1

Site-1-Access-vtep-1# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information

VRF                       : vrf1
E-BSR Address             : 111.100.101.100
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 19 mins 12 secs
Next Bootstrap Message    : 1 mins 58 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

VRF                       : vrf2
E-BSR Address             : 111.100.102.100
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 20 mins 3 secs
Next Bootstrap Message    : 2 mins 7 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

Site-1-Access-vtep-1# show ip pim rp-set all-vrfs

VRF: vrf1

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.101.100  150        130          192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.102.100  150        139          192

Site-1-Access-vtep-1# show ip pim neighbor brief all-vrfs
```

```
-------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 3
-------------------------------------------------------------------------------
Interface   Neighbor   Uptime     Expires    DR        Hold Time  Secondary
Address
           (IPV4)     (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  (IPV4)
-------------------------------------------------------------------------------
vni16777214 2.2.2.2    08:36:06   00:03:18   1         00:03:30
vni16777214 4.4.4.50   08:36:06   00:03:20   1         00:03:30
vlan101     11.1.1.10  08:35:47   00:01:33   839123972 00:01:45   Nil
-------------------------------------------------------------------------------
-
-------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 3
-------------------------------------------------------------------------------
-
vni9002     2.2.2.2    08:36:05   00:03:02   1         00:03:30
vni9002     4.4.4.50   08:36:05   00:03:30   1         00:03:30
vlan102     11.1.2.10  08:35:42   00:01:37   839123972 00:01:45   Nil
-------------------------------------------------------------------------------
-
Site-1-Access-vtep-1#
Site-1-Access-vtep-1# show ip mroute 225.5.1.1 all-vrfs detail

IP Multicast Route Entries

VRF : vrf1
Total number of entries : 3

Group Address                 : 225.5.1.1
Source Address                : 60.2.1.15
Neighbor                      :
Incoming interface            : vlan101
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 03:32:28
```

Site-1-Border-vtep-primary

```
Current configuration:
!
!export-password: default
hostname Site-1-Border-vtep-primary
router vrrp enable
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 1:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 2:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
```

```
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vlan 1-2
vlan 101
        ip igmp snooping enable
vlan 102
        ip igmp snooping enable
vlan 1001-1002,3001-3002
vlan 1401
        ip igmp snooping enable
vlan 1402
        ip igmp snooping enable
virtual-mac 00:01:20:11:56:10
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 101
                rd auto
                route-target export 101:141
                route-target import 101:141
                redistribute host-route
        vlan 102
                rd auto
                route-target export 102:142
                route-target import 102:142
                redistribute host-route
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1001-1002
        lacp mode active
        lacp rate fast
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1-2,101-102,1001-1002,3001-3002
        lacp mode active
        lacp rate fast
interface 1/1/1
        description port_isl
        no shutdown
        lag 120
interface 1/1/2
        description port_isl
        no shutdown
        lag 120
interface 1/1/3
        description port_ka
        no shutdown
        ip address 46.1.1.1/29
interface 1/1/8
```

```
        description port_Site-1-External-router
        no shutdown
        lag 50
interface 1/1/10
        description port_Site-3-Border-vtep-primary
        no shutdown
        ip address 48.1.1.2/29
interface 1/1/16
        description port_Site-3-Border-vtep-secondary
        no shutdown
        ip address 48.1.3.2/29
interface 1/1/32
        description port_Site-1-Distro-vsx-Secondary
        no shutdown
        ip address 30.1.10.1/31
        ip ospf 1 area 0.0.0.0
interface 1/1/36
        description port_Site-1-Distro-vsx-Primary
        no shutdown
        ip address 30.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/46
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1401-1402
interface 1/1/49
        description port_Site-2-Border-vtep-secondary
        no shutdown
        ip address 40.1.2.1/29
interface 1/1/51
        description port_Site-2-Border-vtep-primary
        no shutdown
        ip address 40.1.1.1/29
interface loopback 1
        ip address 192.168.1.1/32
interface loopback 5
        ip address 5.5.5.50/32
interface loopback 6
        ip address 193.170.1.255/32
interface loopback 15
        ip address 4.4.4.50/32
interface loopback 100
        ip address 192.168.1.255/32
interface loopback 101
        vrf attach vrf1
        ip address 111.100.101.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 102
        vrf attach vrf2
        ip address 111.100.102.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 2
        ip address 20.1.1.1/29
        ip ospf 1 area 0.0.0.0
        ip ospf priority 10
        vrrp 1 address-family ipv4
                address 20.1.1.3 primary
```

```
                address 20.1.1.4 secondary
                no preempt
                preempt delay minimum 10
                priority 120
                no shutdown
                exit
interface vlan 101
        vrf attach vrf1
        ip address 11.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 102
        vrf attach vrf2
        ip address 11.1.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1001
        vrf attach vrf1
        vsx active-forwarding
        ip address 60.0.1.2/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1002
        vrf attach vrf2
        vsx active-forwarding
        ip address 60.0.2.2/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 3001
        vrf attach vrf1
        vsx active-forwarding
        ip address 60.10.1.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 3002
        vrf attach vrf2
        vsx active-forwarding
        ip address 60.10.2.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 1401
        vrf attach vrf1
        ip address 60.4.1.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
        ip igmp enable
        ip pim-sparse enable
interface vlan 1402
        vrf attach vrf2
        ip address 60.4.2.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
```

```
        ip igmp enable
        ip pim-sparse enable
interface vxlan 1
        source ip 4.4.4.50
        no shutdown
        vni 2100
                vlan 101
        vni 2101
                vlan 102
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
        inter-switch-link lag 120
        role primary
        keepalive peer 46.1.1.2 source 46.1.1.1
        vsx-sync mgmd-global pim
ip prefix-list test_1 seq 20 deny 196.170.1.255/32
ip prefix-list test_1 seq 30 deny 195.170.1.255/32
ip prefix-list test_1 seq 40 deny 197.170.1.255/32
ip prefix-list test_1 seq 50 deny 198.170.1.255/32
ip prefix-list test_1 seq 60 permit 80.80.80.80/32
ip prefix-list test_1 seq 70 permit 8.8.8.8/32
!
!
!
!
route-map tag_bgp_ospf permit seq 10
        set tag 110
route-map tag_ospf_bgp deny seq 10
        match tag 110
route-map tag_ospf_bgp deny seq 20
        match tag 120
route-map tag_ospf_bgp permit seq 30
route-map test_1 permit seq 10
        match ip address prefix-list test_1
!
router ospf 1
        router-id 111.11.1.3
        max-metric router-lsa include-stub on-startup
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map test_1
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 111.11.1.5
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 111.11.2.5
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
```

```
router bgp 65535
        bgp router-id 111.11.1.3
        neighbor 40.1.1.2 remote-as 65536
        neighbor 40.1.2.2 remote-as 65536
        neighbor 48.1.1.1 remote-as 65537
        neighbor 48.1.3.1 remote-as 65537
        neighbor 192.168.1.5 remote-as 65535
        neighbor 192.168.1.5 update-source loopback 1
        neighbor 195.170.1.255 remote-as 65536
        neighbor 195.170.1.255 ebgp-multihop 5
        neighbor 195.170.1.255 update-source loopback 6
        neighbor 196.170.1.255 remote-as 65536
        neighbor 196.170.1.255 ebgp-multihop 5
        neighbor 196.170.1.255 update-source loopback 6
        neighbor 197.170.1.255 remote-as 65537
        neighbor 197.170.1.255 ebgp-multihop 5
        neighbor 197.170.1.255 update-source loopback 6
        neighbor 198.170.1.255 remote-as 65537
        neighbor 198.170.1.255 ebgp-multihop 5
        neighbor 198.170.1.255 update-source loopback 6
        address-family ipv4 unicast
                neighbor 40.1.1.2 activate
                neighbor 40.1.2.2 activate
                neighbor 48.1.1.1 activate
                neighbor 48.1.3.1 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 192.168.1.5 next-hop-self
                neighbor 192.168.1.5 route-reflector-client
                neighbor 192.168.1.5 send-community extended
                neighbor 192.168.1.5 activate
                neighbor 195.170.1.255 send-community extended
                neighbor 195.170.1.255 activate
                neighbor 196.170.1.255 send-community extended
                neighbor 196.170.1.255 activate
                neighbor 197.170.1.255 send-community extended
                neighbor 197.170.1.255 activate
                neighbor 198.170.1.255 send-community extended
                neighbor 198.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf vrf1
        enable
        rp-candidate source-ip-interface loopback101 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface loopback101
router pim vrf vrf2
```

```
        enable
        rp-candidate source-ip-interface loopback102 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface loopback102
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================

Site-1-Border-vtep-primary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
101.10.10.10     n/a       FULL              30.1.1.0           1/1/36
111.12.1.3       0         FULL/DROther      20.1.1.2           vlan2

VRF : vrf1                             Process : 1
================================================

Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.1.5       1         FULL/BDR          60.0.1.1           vlan1001
111.12.1.5       1         FULL/DROther      60.0.1.3           vlan1001

VRF : vrf2                             Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.2.5       1         FULL/BDR          60.0.2.1           vlan1002
111.12.2.5       1         FULL/DROther      60.0.2.3           vlan1002

Site-1-Border-vtep-primary# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.11.1.3
Peers                  : 10           Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor    Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
40.1.1.2    65536       604     602     08h:35m:30s  Established   Up
40.1.2.2    65536       604     605     08h:35m:26s  Established   Up
48.1.1.1    65537       599     596     08h:34m:21s  Established   Up
48.1.3.1    65537       598     599     08h:34m:22s  Established   Up

Address-family : IPv6 Unicast
------------------------------
Address-family : L2VPN EVPN
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
```

```
2.2.2.2       65535       718     6602    08h:35m:09s  Established   Up
192.168.1.5   65535       602     6567    08h:29m:30s  Established   Up
195.170.1.255 65536       4804    4867    08h:35m:22s  Established   Up
196.170.1.255 65536       5027    4851    08h:35m:24s  Established   Up
197.170.1.255 65537       5761    4721    08h:34m:15s  Established   Up
198.170.1.255 65537       5191    4926    08h:34m:15s  Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.100.101.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.100.102.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Site-1-Border-vtep-primary# show interface vxlan vteps
Source    Destination   Origin    Status       VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
4.4.4.50  2.2.2.2       evpn      operational  9002      enabled   --    vrf2
4.4.4.50  2.2.2.2       evpn      operational  16777214  enabled   --    vrf1
4.4.4.50  3.3.3.50      evpn      operational  2100      disabled  101    --
4.4.4.50  3.3.3.50      evpn      operational  2101      disabled  102    --
4.4.4.50  3.3.3.50      evpn      operational  9002      enabled   --     vrf2
4.4.4.50  3.3.3.50      evpn      operational  16777214  enabled   --     vrf1
4.4.4.50  8.8.8.8       evpn      operational  9002      enabled   --     vrf2
4.4.4.50  8.8.8.8       evpn      operational  16777214  enabled   --     vrf1
4.4.4.50  80.80.80.80   evpn      operational  9002      enabled   --     vrf2
4.4.4.50  80.80.80.80   evpn      operational  16777214  enabled   --     vrf1
Site-1-Border-vtep-primary# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information

VRF                       : vrf1
E-BSR Address             : 111.100.101.100
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 14 mins 6 secs
Next Bootstrap Message    : 54 secs

C-BSR Admin Status        : This system is a Candidate-BSR
C-BSR Address             : 111.100.101.100
```

```
C-BSR Priority            : 0
C-BSR Hash Mask Length    : 30
C-BSR Message Interval    : 60
C-BSR Source IP Interface : loopback101

C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : 111.100.101.100
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 192
C-RP Source IP Interface  : loopback101

Group Address    Group Mask
---------------  ---------------
224.0.0.0        240.0.0.0

VRF                       : vrf2
E-BSR Address             : 111.100.102.100
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 13 mins 57 secs
Next Bootstrap Message    : 3 secs

C-BSR Admin Status        : This system is a Candidate-BSR
C-BSR Address             : 111.100.102.100
C-BSR Priority            : 0
C-BSR Hash Mask Length    : 30
C-BSR Message Interval    : 60
C-BSR Source IP Interface : loopback102

C-RP Admin Status         : This system is a Candidate-RP
C-RP Address              : 111.100.102.100
C-RP Hold Time            : 150
C-RP Advertise Period     : 60
C-RP Priority             : 192
C-RP Source IP Interface  : loopback102

Group Address    Group Mask
---------------  ---------------
224.0.0.0        240.0.0.0

Site-1-Border-vtep-primary# show ip pim rp-set all-vrfs

VRF: vrf1

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.101.100  150        139          192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.102.100  150        148          192

Site-1-Border-vtep-primary# show ip pim neighbor brief all-vrfs
```

```
-------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 7
-------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR        Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  Address (IPV4)
-------------------------------------------------------------------------------
vni16777214 2.2.2.2     08:36:24   00:03:08   1         00:03:30
vni16777214 3.3.3.50    08:30:46   00:03:19   1         00:03:30
vni16777214 8.8.8.8     08:35:19   00:03:07   1         00:03:30
vlan101     11.1.1.10   08:36:27   00:01:22   839123972 00:01:45    Nil
vlan1001    60.0.1.1    03:51:41   00:01:21   1         00:01:45    Nil
vlan1001    60.0.1.3    03:51:28   00:01:25   839123972 00:01:45    Nil
vni16777214 80.80.80.80 03:53:55   00:03:11   1         00:03:30
-------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 7
-------------------------------------------------------------------------------
-
vni9002     2.2.2.2     08:36:14   00:03:22   1         00:03:30
vni9002     3.3.3.50    08:30:48   00:03:21   1         00:03:30
vni9002     8.8.8.8     08:35:20   00:03:22   1         00:03:30
vlan102     11.1.2.10   08:36:22   00:01:30   839123972 00:01:45    Nil
vlan1002    60.0.2.1    03:51:39   00:01:18   1         00:01:45    Nil
vlan1002    60.0.2.3    03:51:29   00:01:20   839123972 00:01:45    Nil
vni9002     80.80.80.80 07:47:43   00:03:23   1         00:03:30
-------------------------------------------------------------------------------
-
Site-1-Border-vtep-primary#
Site-1-Border-vtep-primary# show ip mroute 226.5.1.1 all-vrfs detail

IP Multicast Route Entries

VRF : vrf1

Group Address                 : 226.5.1.1
Source Address                : 60.2.1.15
Neighbor                      : 60.0.1.1
Incoming interface            : vlan1001
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 03:25:03
Downstream Interface
Interface       State          Vteps
-----------     ----------     -----
vni16777214     forwarding     80.80.80.80
```

Site-1-Border-vtep-secondary

```
Current configuration:
!
!export-password: default
hostname Site-1-Border-vtep-secondary
router vrrp enable
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 1:11
```

```
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 2:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1-2
vlan 101
        ip igmp snooping enable
vlan 102
        ip igmp snooping enable
vlan 1001-1002,3001-3002
virtual-mac 00:01:20:11:56:10
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 101
                rd auto
                route-target export 101:141
                route-target import 101:141
                redistribute host-route
        vlan 102
                rd auto
                route-target export 102:142
                route-target import 102:142
                redistribute host-route
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1001-1002
        lacp mode active
        lacp rate fast
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
                vlan trunk allowed 1-2,101-102,1001-1002,3001-3002
        lacp mode active
        lacp rate fast
interface 1/1/1
        description port_isl
        no shutdown
        lag 120
interface 1/1/2
        description port_isl
        no shutdown
        lag 120
interface 1/1/3
```

```
        description port_ka
        no shutdown
        ip address 46.1.1.2/29
interface 1/1/19
        description port_Site-1-External-router
        no shutdown
        lag 50
interface 1/1/34
        description port_Site-3-Border-vtep-primary
        no shutdown
        ip address 48.1.2.2/29
interface 1/1/35
        description port_site-3-Border-vtep-secondary
        no shutdown
        ip address 48.1.4.2/29
interface 1/1/40
        description port_Site-1-Distro-vsx-Secondary
        no shutdown
        ip address 30.1.11.1/31
        ip ospf 1 area 0.0.0.0
interface 1/1/43
        description port_Site-1-Distro-vsx-Primary
        no shutdown
        ip address 30.1.2.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/53
        description port_Site-2-Border-vtep-primary
        no shutdown
        ip address 40.1.3.1/29
interface 1/1/54
        description port_Site-2-Border-vtep-secondary
        no shutdown
        ip address 40.1.4.1/29
interface loopback 1
        ip address 192.168.1.2/32
interface loopback 5
        ip address 5.5.5.50/32
interface loopback 6
        ip address 194.170.1.255/32
interface loopback 15
        ip address 4.4.4.50/32
interface loopback 100
        ip address 192.168.1.255/32
interface loopback 101
        vrf attach vrf1
        ip address 112.100.101.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 102
        vrf attach vrf2
        ip address 112.100.102.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 2
        ip address 20.1.1.2/29
        ip ospf 1 area 0.0.0.0
        ip ospf priority 0
        vrrp 1 address-family ipv4
        address 20.1.1.3 primary
        address 20.1.1.4 secondary
        no shutdown
```

```
        exit
interface vlan 101
        vrf attach vrf1
        ip address 11.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 102
        vrf attach vrf2
        ip address 11.1.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1001
        vrf attach vrf1
        vsx active-forwarding
        ip address 60.0.1.3/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1002
        vrf attach vrf2
        vsx active-forwarding
        ip address 60.0.2.3/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 3001
        vrf attach vrf1
        vsx active-forwarding
        ip address 60.10.1.2/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 3002
        vrf attach vrf2
        vsx active-forwarding
        ip address 60.10.2.2/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vxlan 1
        source ip 4.4.4.50
        no shutdown
        vni 2100
                vlan 101
        vni 2101
                vlan 102
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
        system-mac 00:01:20:11:56:10
        inter-switch-link lag 120
        role secondary
```

```
        keepalive peer 46.1.1.1 source 46.1.1.2
        vsx-sync mgmd-global pim
ip prefix-list test_1 seq 20 deny 196.170.1.255/32
ip prefix-list test_1 seq 30 deny 195.170.1.255/32
ip prefix-list test_1 seq 40 deny 197.170.1.255/32
ip prefix-list test_1 seq 50 deny 198.170.1.255/32
ip prefix-list test_1 seq 60 permit 80.80.80.80/32
ip prefix-list test_1 seq 70 permit 8.8.8.8/32sa
!
!
!
!
route-map tag_bgp_ospf permit seq 10
        set tag 120
route-map tag_ospf_bgp deny seq 10
        match tag 110
route-map tag_ospf_bgp deny seq 20
        match tag 120
route-map tag_ospf_bgp permit seq 30
route-map test_1 permit seq 10
        match ip address prefix-list test_1
!
router ospf 1
        router-id 111.12.1.3
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map test_1
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 111.12.1.5
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 111.12.2.5
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router bgp 65535
        bgp router-id 111.12.1.3
        neighbor 40.1.3.2 remote-as 65536
        neighbor 40.1.4.2 remote-as 65536
        neighbor 48.1.2.1 remote-as 65537
        neighbor 48.1.4.1 remote-as 65537
        neighbor 192.168.1.5 remote-as 65535
        neighbor 192.168.1.5 update-source loopback 1
        neighbor 195.170.1.255 remote-as 65536
        neighbor 195.170.1.255 ebgp-multihop 5
        neighbor 195.170.1.255 update-source loopback 6
        neighbor 196.170.1.255 remote-as 65536
        neighbor 196.170.1.255 ebgp-multihop 5
        neighbor 196.170.1.255 update-source loopback 6
        neighbor 197.170.1.255 remote-as 65537
        neighbor 197.170.1.255 ebgp-multihop 5
        neighbor 197.170.1.255 update-source loopback 6
        neighbor 198.170.1.255 remote-as 65537
        neighbor 198.170.1.255 ebgp-multihop 5
```

```
        neighbor 198.170.1.255 update-source loopback 6
        address-family ipv4 unicast
                neighbor 40.1.3.2 activate
                neighbor 40.1.4.2 activate
                neighbor 48.1.2.1 activate
                neighbor 48.1.4.1 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 192.168.1.5 next-hop-self
                neighbor 192.168.1.5 route-reflector-client
                neighbor 192.168.1.5 send-community extended
                neighbor 192.168.1.5 activate
                neighbor 195.170.1.255 send-community extended
                neighbor 195.170.1.255 activate
                neighbor 196.170.1.255 send-community extended
                neighbor 196.170.1.255 activate
                neighbor 197.170.1.255 send-community extended
                neighbor 197.170.1.255 activate
                neighbor 198.170.1.255 send-community extended
                neighbor 198.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf mgmt
Site-1-Border-vtep-secondary#
Site-1-Border-vtep-secondary#
=======================================
Show command outputs for  validation
=======================================
Site-1-Border-vtep-secondary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
101.10.10.10     n/a       FULL              30.1.2.0           1/1/43
111.11.1.3       10        FULL/DR           20.1.1.1           vlan2

VRF : vrf1                             Process : 1
================================================
```

```
Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.1.5       1         FULL/BDR          60.0.1.1           vlan1001
111.11.1.5       1         FULL/DR           60.0.1.2           vlan1001

VRF : vrf2                              Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.2.5       1         FULL/BDR          60.0.2.1           vlan1002
111.11.2.5       1         FULL/DR           60.0.2.2           vlan1002

Site-1-Border-vtep-secondary# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.12.1.3
Peers                  : 10           Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor    Remote-AS   MsgRcvd MsgSent  Up/Down Time   State         AdminStatus
40.1.3.2    65536       607     607      08h:38m:56s    Established   Up
40.1.4.2    65536       602     612      08h:38m:49s    Established   Up
48.1.2.1    65537       603     601      08h:37m:45s    Established   Up
48.1.4.1    65537       608     604      08h:37m:46s    Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent  Up/Down Time   State
AdminStatus
2.2.2.2       65535       722     6760     08h:38m:36s    Established   Up
192.168.1.5   65535       609     6715     08h:32m:56s    Established   Up
195.170.1.255 65536       4781    5029     08h:38m:41s    Established   Up
196.170.1.255 65536       5108    4995     08h:38m:51s    Established   Up
197.170.1.255 65537       5740    4951     08h:37m:41s    Established   Up
198.170.1.255 65537       5105    5151     08h:37m:41s    Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 112.100.101.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
```

```
------------------------------

Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 112.100.102.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Site-1-Border-vtep-secondary# show interface vxlan vteps
Source    Destination    Origin     Status        VNI       Routing   VLAN  VRF
--------------------------------------------------------------------------------
4.4.4.50  2.2.2.2        evpn       operational   9002      enabled   --     vrf2
4.4.4.50  2.2.2.2        evpn       operational   16777214  enabled   --     vrf1
4.4.4.50  3.3.3.50       evpn       operational   2100      disabled  101    --
4.4.4.50  3.3.3.50       evpn       operational   2101      disabled  102    --
4.4.4.50  3.3.3.50       evpn       operational   9002      enabled   --     vrf2
4.4.4.50  3.3.3.50       evpn       operational   16777214  enabled   --     vrf1
4.4.4.50  8.8.8.8        evpn       operational   9002      enabled   --     vrf2
4.4.4.50  8.8.8.8        evpn       operational   16777214  enabled   --     vrf1
4.4.4.50  80.80.80.80    evpn       operational   9002      enabled   --     vrf2
4.4.4.50  80.80.80.80    evpn       operational   16777214  enabled   --     vrf1

Site-1-Border-vtep-secondary# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information

VRF                        : vrf1
E-BSR Address              : 111.100.101.100
E-BSR Priority             : 0
E-BSR Hash Mask Length     : 30
E-BSR Up Time              : 17 mins 52 secs
Next Bootstrap Message     : 1 mins 18 secs

C-BSR Admin Status         : This system is not a Candidate-BSR

C-RP Admin Status          : This system is not a Candidate-RP

VRF                        : vrf2
E-BSR Address              : 111.100.102.100
E-BSR Priority             : 0
E-BSR Hash Mask Length     : 30
E-BSR Up Time              : 17 mins 43 secs
Next Bootstrap Message     : 1 mins 27 secs

C-BSR Admin Status         : This system is not a Candidate-BSR

C-RP Admin Status          : This system is not a Candidate-RP

Site-1-Border-vtep-secondary# show ip pim rp-set all-vrfs

VRF: vrf1

Status and Counters - PIM-SM Learned RP-Set Information
```

```
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.101.100  150        93           192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.102.100  150        102          192

Site-1-Border-vtep-secondary# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 7
--------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR        Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  Address (IPV4)
--------------------------------------------------------------------------------
vni16777214 2.2.2.2     08:39:23   00:03:09   1         00:03:30
vni16777214 3.3.3.50    08:33:45   00:03:20   1         00:03:30
vni16777214 8.8.8.8     08:38:18   00:03:09   1         00:03:30
vlan101     11.1.1.10   08:39:27   00:01:24   839123972 00:01:45   Nil
vlan1001    60.0.1.1    03:54:24   00:01:22   1         00:01:45   Nil
vlan1001    60.0.1.2    03:54:27   00:01:20   839123972 00:01:45   Nil
vni16777214 80.80.80.80 03:56:54   00:03:12   1         00:03:30
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 7
--------------------------------------------------------------------------------
-
vni9002     2.2.2.2     08:39:13   00:03:23   1         00:03:30
vni9002     3.3.3.50    08:33:47   00:03:22   1         00:03:30
vni9002     8.8.8.8     08:38:19   00:03:24   1         00:03:30
vlan102     11.1.2.10   08:39:25   00:01:31   839123972 00:01:45   Nil
vlan1002    60.0.2.1    03:54:27   00:01:19   1         00:01:45   Nil
vlan1002    60.0.2.2    03:54:28   00:01:22   839123972 00:01:45   Nil
vni9002     80.80.80.80 07:50:42   00:03:24   1         00:03:30
--------------------------------------------------------------------------------
-

Site-1-Border-vtep-secondary#
Site-1-Border-vtep-primary# show ip mroute 226.5.1.1 all-vrfs detail

IP Multicast Route Entries

VRF : vrf1

Group Address                 : 226.5.1.1
Source Address                : 60.2.1.15
Neighbor                      : 60.0.1.1
Incoming interface            : vlan2001
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 03:27:03
```

```
Downstream Interface
Interface       State          Vteps
-----------     ----------     -----
vni16777214     forwarding     80.80.80.80
```

Site-1-Distro-vsx-primary

```
!export-password: default
hostname Site-1-Distro-vsx-primary
no ip icmp redirect
!
!
!
!
!
ssh server vrf mgmt
vlan 1-5
vlan 2001
        ip igmp snooping enable
interface mgmt
        no shutdown
        ip dhcp
interface lag 2
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface lag 35 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 2
        lacp mode active
        lacp rate fast
interface lag 37 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 4
        lacp mode active
        lacp rate fast
interface 1/1/4
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
interface 1/1/5
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
interface 1/1/18
        description ISL
        no shutdown
        lag 2
interface 1/1/19
        description ISL
        no shutdown
        lag 2
```

```
interface 1/1/22
        no shutdown
        description port_ka
        ip address 2.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/27
        description port_site1_access-vtep1
        no shutdown
        lag 37
interface 1/1/33
        description port_Site-1-Border-vtep-secondary
        no shutdown
        ip address 30.1.2.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/36
        description port_Site-1-Border-vtep-primary
        no shutdown
        ip address 30.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface vlan 3
        vsx active-forwarding
        ip address 33.1.1.1/29
        ip ospf 1 area 0.0.0.0
interface vlan 4
        vsx active-forwarding
        ip address 40.1.1.2/29
        ip ospf 1 area 0.0.0.0
interface vlan 5
        vsx active-forwarding
        ip address 50.1.1.2/29
        ip ospf 1 area 0.0.0.0
vsx
        inter-switch-link lag 2
        role primary
        keepalive peer 2.1.1.0 source 2.1.1.1
!
!
!
!
!
router ospf 1
        router-id 101.10.10.10
        area 0.0.0.0
https-server rest access-mode read-only
https-server vrf mgmt
```

Site-1-Distro-vsx-secondary

```
!
!export-password: default
hostname Site-1-Distro-vsx-secondary
no ip icmp redirect
profile l3-core
!
!
!
!
!
```

```
ssh server vrf mgmt
vlan 1-5
interface mgmt
        no shutdown
        ip dhcp
interface lag 2
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface lag 37 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 4
        lacp mode active
        lacp rate fast
interface 1/1/17
        no shutdown
        description port_isl
        lag 2
interface 1/1/20
        no shutdown
        description port_isl
        lag 2
interface 1/1/22
        no shutdown
        description port_ka
        ip address 2.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/27
        no shutdown
        description port_site1_access-vtep1
        lag 37
interface 1/1/31
        no shutdown
        description port_Site-1-Border-vtep-secondary
        ip address 30.1.11.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/32
        no shutdown
        description port_Site-1-Border-vtep-primary
        ip address 30.1.10.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface vlan 3
        vsx active-forwarding
        ip address 33.1.1.2/29
        ip ospf 1 area 0.0.0.0
interface vlan 4
        vsx active-forwarding
        ip address 40.1.1.3/29
        ip ospf 1 area 0.0.0.0
interface vlan 5
        ip address 50.1.1.3/29
        ip ospf 1 area 0.0.0.0
vsx
        inter-switch-link lag 2
```

```
        role secondary
        keepalive peer 2.1.1.1 source 2.1.1.0
!
!
!
!
!
router ospf 1
        router-id 101.10.10.11
        area 0.0.0.0
https-server rest access-mode read-only
https-server vrf mgmt
```

Site-1-External-router

```
Current configuration:
!
!export-password: default
hostname Site-1-External-router
vrf vrf1
vrf vrf2
cli-session
        timeout 0
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vlan 1,1001-1002
vlan 1201
        ip igmp snooping enable
vlan 1202
        ip igmp snooping enable
interface mgmt
        no shutdown
        ip dhcp
interface lag 50
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1001-1002
        lacp mode active
        lacp rate fast
interface 1/1/8
        description port_Site-1-Border-vtep-primary
        no shutdown
        lag 50
interface 1/1/9
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1201-1202
interface 1/1/16
        description port_Site-1-Border-vtep-secondary
        no shutdown
        lag 50
interface loopback 101
        vrf attach vrf1
```

```
        ip address 110.100.101.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 102
        vrf attach vrf2
        ip address 110.100.102.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1001
        vrf attach vrf1
        ip address 60.0.1.1/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1002
        vrf attach vrf2
        ip address 60.0.2.1/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1201
        vrf attach vrf1
        ip address 60.2.1.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf passive
        ip ospf network point-to-point
        ip pim-sparse enable
interface vlan 1202
        vrf attach vrf2
        ip address 60.2.2.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf passive
        ip ospf network point-to-point
        ip pim-sparse enable
!
!
!
!
!
router ospf 1 vrf vrf1
        router-id 111.10.1.5
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 111.10.2.5
        area 0.0.0.0
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================

Site1-External-router# show ip ospf neighbors all-vrfs
VRF : vrf1                              Process : 1
==================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.11.1.5       1         FULL/DR           60.0.1.2           vlan1001
111.12.1.5       1         FULL/DROther      60.0.1.3           vlan1001
```

```
VRF : vrf2                              Process : 1
==================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.11.2.5       1         FULL/DR           60.0.2.2           vlan1002
111.12.2.5       1         FULL/DROther      60.0.2.3           vlan1002

Site1-External-router# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information

VRF                       : vrf1
E-BSR Address             : 111.100.101.100
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 9 mins 17 secs
Next Bootstrap Message    : 1 mins 53 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

VRF                       : vrf2
E-BSR Address             : 111.100.102.100
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 9 mins 8 secs
Next Bootstrap Message    : 2 mins 2 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

Site1-External-router# show ip pim rp-set all-vrfs

VRF: vrf1

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.101.100  150        121          192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.102.100  150        130          192

Site1-External-router# show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 2
-------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR        Hold Time  Secondary
```

```
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  Address (IPV4)
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
vlan1001    60.0.1.2    03:46:33   00:01:26   839123972 00:01:45   Nil
vlan1001    60.0.1.3    03:46:20   00:01:33   839123972 00:01:45   Nil
-------------------------------------------------------------------------------
-
-------------------------------------------------------------------------------
-
VRF : vrf2                            Total number of neighbors : 2
-------------------------------------------------------------------------------
-
vlan1002    60.0.2.2    03:46:31   00:01:28   839123972 00:01:45   Nil
vlan1002    60.0.2.3    03:46:21   00:01:28   839123972 00:01:45   Nil
-------------------------------------------------------------------------------
-

Site1-External-router#show ip mroute 226.5.1.1 all-vrfs detail

IP Multicast Route Entries

VRF : vrf1
Total number of entries : 1

Group Address                 : 226.5.1.1
Source Address                : 60.2.1.15
Neighbor                      :
Incoming interface            : vlan1201
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 00:10:12
Downstream Interface
Interface       State
-----------     ----------
vlan1001        forwarding
```

Site-2-Access-vtep-1

```
Current configuration:
!
!export-password: default
hostname Site-2-Access-vtep-1
vrf vrf1
        rd 104:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 32:14
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
```

```
ssh server vrf mgmt
vlan 1,6
vlan 501
        ip igmp snooping enable
vlan 502
        ip igmp snooping enable
virtual-mac 00:07:08:09:09:00
evpn
        redistribute local-mac
        redistribute local-svi
        vlan 501
                rd auto
                route-target export 501:141
                route-target import 501:141
                redistribute host-route
        vlan 502
                rd auto
                route-target export 502:142
                route-target import 502:142
                redistribute host-route
interface lag 36
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 6
        lacp mode active
        lacp rate fast
interface 1/1/48
        description port_Site-2-Distro-vsx-primary
        no shutdown
        lag 36
interface 1/1/49
        description port_Site-2-Distro-vsx-Secondary
        no shutdown
        lag 36
interface 1/1/52
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 501-502
interface loopback 1
        ip address 85.85.85.85/32
interface vlan 6
        ip address 60.1.5.3/29
        ip ospf 1 area 0.0.0.0
interface vlan 501
        vrf attach vrf1
        ip address 12.5.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 12.5.1.10
        ip igmp enable
        ip pim-sparse enable
interface vlan 502
        vrf attach vrf2
        ip address 12.5.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 12.5.2.10
        ip igmp enable
        ip pim-sparse enable
interface vxlan 1
        source ip 85.85.85.85
```

```
        no shutdown
        vni 2100
                vlan 501
        vni 2101
                vlan 502
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
!
!
!
!
!
router ospf 1
        router-id 112.14.1.3
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65536
        bgp router-id 112.14.1.3
        neighbor 192.168.1.3 remote-as 65536
        neighbor 192.168.1.3 update-source loopback 1
        neighbor 192.168.1.4 remote-as 65536
        neighbor 192.168.1.4 update-source loopback 1
        address-family ipv4 unicast
                redistribute connected
                redistribute ospf
        exit-address-family
        address-family l2vpn evpn
                neighbor 192.168.1.3 send-community extended
                neighbor 192.168.1.3 activate
                neighbor 192.168.1.4 send-community extended
                neighbor 192.168.1.4 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================
```

```
Site-2-Access-vtep-1# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 3
--------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR         Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority  (HH:MM:SS)  Address (IPV4)
--------------------------------------------------------------------------------
vni16777214 4.4.4.4     05:15:26   00:03:26   1          00:03:30
vlan501     12.5.1.10   01:02:34   00:01:43   1347440720 00:01:45   Nil
vni16777214 80.80.80.80 01:02:37   00:03:27   1          00:03:30
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 3
--------------------------------------------------------------------------------
-
vni9002     4.4.4.4     05:15:27   00:03:07   1          00:03:30
vlan502     12.5.2.10   04:56:22   00:01:27   1347440720 00:01:45   Nil
vni9002     80.80.80.80 04:56:25   00:03:09   1          00:03:30
--------------------------------------------------------------------------------
-

Site-2-Access-vtep-1# show ip ospf neighbors all-vrfs
VRF : default                           Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
------------------------------------------------------------------------
120.10.10.11     1         FULL/BDR          60.1.5.1           vlan6
120.10.10.15     1         FULL/DR           60.1.5.2           vlan6

Site-2-Access-vtep-1# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 112.14.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
192.168.1.3   65536       6026    609     08h:33m:25s  Established   Up
192.168.1.4   65536       6279    601     08h:33m:26s  Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
```

```
-----------
Local AS               : 65536        BGP Router Identifier  : 12.5.1.10
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 12.5.2.10
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Site-2-Access-vtep-1# show interface vxlan vteps
Source       Destination   Origin     Status        VNI      Routing   VLAN  VRF
-------------------------------------------------------------------------------
-
85.85.85.85  4.4.4.4       evpn       operational   9002     enabled   --     vrf2
85.85.85.85  4.4.4.4       evpn       operational   16777214 enabled   --     vrf1
85.85.85.85  80.80.80.80   evpn       operational   2100     disabled  501    --
85.85.85.85  80.80.80.80   evpn       operational   2101     disabled  502    --
85.85.85.85  80.80.80.80   evpn       operational   9002     enabled   --     vrf2
85.85.85.85  80.80.80.80   evpn       operational   16777214 enabled   --     vrf1

Site-2-Access-vtep-1# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information

VRF                       : vrf1
E-BSR Address             : 111.100.101.100
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 31 mins 54 secs
Next Bootstrap Message    : 1 mins 16 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

VRF                       : vrf2
E-BSR Address             : 111.100.102.100
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 31 mins 45 secs
Next Bootstrap Message    : 1 mins 25 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP
```

```
Site-2-Access-vtep-1# show ip pim rp-set all-vrfs

VRF: vrf1

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.101.100  150        91           192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.102.100  150        100          192
Site-2-Access-vtep-1# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 3
--------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR         Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority  (HH:MM:SS)  Address (IPV4)
--------------------------------------------------------------------------------
vni16777214 4.4.4.4     08:23:43   00:03:10   1          00:03:30
vlan501     12.5.1.10   04:10:51   00:01:28   1347440720 00:01:45   Nil
vni16777214 80.80.80.80 04:10:54   00:03:12   1          00:03:30
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 3
--------------------------------------------------------------------------------
-
vni9002     4.4.4.4     08:23:44   00:03:21   1          00:03:30
vlan502     12.5.2.10   08:04:39   00:01:42   1347440720 00:01:45   Nil
vni9002     80.80.80.80 08:04:42   00:03:24   1          00:03:30
--------------------------------------------------------------------------------
-

Site-2-Access-vtep-1# show ip mroute 226.5.1.1 all-vrfs detail

IP Multicast Route Entries

VRF : vrf1
Group Address                 : 226.5.1.1
Source Address                : 60.2.1.15
Neighbor                      : 80.80.80.80
Incoming interface            : vni16777214
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 03:42:47
Downstream Interface
Interface       State
-----------     ----------
vlan501         forwarding
```

Site-2-Access-vtep-2

```
Current configuration:
!
!export-password: default
hostname Site-2-Access-vtep-2
vrf vrf1
        rd 31:15
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 32:15
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vsf member 1
        type jl668a
vlan 1,7
vlan 701
        ip igmp snooping enable
vlan 702
        ip igmp snooping enable
virtual-mac 00:00:00:00:00:06
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
        vlan 701
                rd auto
                route-target export 701:141
                route-target import 701:141
                redistribute host-route
        vlan 702
                rd auto
                route-target export 702:142
                route-target import 702:142
                redistribute host-route
interface lag 36
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 7
        lacp mode active
        lacp rate fast
interface 1/1/5
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 701-702
interface 1/1/27
        description port_Site-2-Distro-vsx-primary
        no shutdown
        lag 36
```

```
interface 1/1/28
        description port_Site-2-Distro-vsx-secondary
        no shutdown
        lag 36
interface loopback 1
        ip address 4.4.4.4/32
interface vlan 1
        ip dhcp
interface vlan 7
        ip address 60.1.6.3/29
        ip ospf 1 area 0.0.0.0
interface vlan 701
        vrf attach vrf1
        ip address 12.7.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 12.7.1.10
        ip igmp enable
        ip pim-sparse enable
interface vlan 702
        vrf attach vrf2
        ip address 12.7.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 12.7.2.10
        ip igmp enable
        ip pim-sparse enable
interface vxlan 1
        source ip 4.4.4.4
        no shutdown
        vni 2300
                vlan 701
        vni 2301
                vlan 702
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
!
!
!
!
!
router ospf 1
        router-id 112.15.1.3
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65536
        bgp router-id 112.15.1.3
        neighbor 192.168.1.3 remote-as 65536
        neighbor 192.168.1.3 update-source loopback 1
        neighbor 192.168.1.4 remote-as 65536
        neighbor 192.168.1.4 update-source loopback 1
        address-family l2vpn evpn
                neighbor 192.168.1.3 send-community extended
                neighbor 192.168.1.3 activate
                neighbor 192.168.1.4 send-community extended
                neighbor 192.168.1.4 activate
        exit-address-family
!
        vrf vrf1
```

```
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================
Site-2-Access-vtep-2#
Site-2-Access-vtep-2#
Site-2-Access-vtep-2# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
=================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
120.10.10.11     1         FULL/BDR          60.1.6.1           vlan7

120.10.10.15     1         FULL/DR           60.1.6.2           vlan7

Site-2-Access-vtep-2# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 112.15.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------

Neighbor      Remote-AS  MsgRcvd  MsgSent  Up/Down Time   State
AdminStatus
192.168.1.3   65536      5432     585      08h:13m:44s    Established   Up
192.168.1.4   65536      5641     583      08h:12m:23s    Established   Up
```

```
Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 12.7.1.10
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 12.7.2.10
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Site-2-Access-vtep-2# show interface vxlan vteps
Source     Destination   Origin      Status         VNI       Routing   VLAN  VRF
------------------------------------------- ----------------------------------
-
4.4.4.4    80.80.80.80   evpn        operational    2300      disabled  701    --
4.4.4.4    80.80.80.80   evpn        operational    2301      disabled  702    --
4.4.4.4    80.80.80.80   evpn        operational    9002      enabled   --
vrf2
4.4.4.4    80.80.80.80   evpn        operational    16777214  enabled   --
vrf1
4.4.4.4    85.85.85.85   evpn        operational    9002      enabled   --
vrf2
4.4.4.4    85.85.85.85   evpn        operational    16777214  enabled   --
vrf1

Site-2-Access-vtep-2# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information

VRF                       : vrf1
E-BSR Address             : 111.100.101.100
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 34 mins 38 secs
Next Bootstrap Message    : 1 mins 32 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

VRF                       : vrf2
E-BSR Address             : 111.100.102.100
```

```
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 33 mins 29 secs
Next Bootstrap Message    : 1 mins 41 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

Site-2-Access-vtep-2# show ip pim rp-set all-vrfs

VRF: vrf1

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.101.100  150        107          192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.102.100  150        116          192

Site-2-Access-vtep-2# show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 3
-------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR         Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority  (HH:MM:SS)  Address (IPV4)
-------------------------------------------------------------------------------
vlan701     12.7.1.10   04:13:38   00:01:43   1347440720 00:01:45   Nil
vni16777214 80.80.80.80 04:13:38   00:03:27   1          00:03:30
vni16777214 85.85.85.85 08:26:27   00:03:24   1          00:03:30
-------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 3
-------------------------------------------------------------------------------
-
vlan702     12.7.2.10   08:07:23   00:01:26   1347440720  00:01:45   Nil
vni9002     80.80.80.80 08:07:26   00:03:09   1           00:03:30
vni9002     85.85.85.85 08:26:27   00:03:08   1           00:03:30
-------------------------------------------------------------------------------
-

Site-2-Access-vtep-2# show ip mroute 227.5.1.1 all-vrfs detail

IP Multicast Route Entries

VRF : vrf1
Total number of entries : 1

Group Address                : 227.5.1.1
Source Address               : 60.2.1.15
Neighbor                     :
Incoming interface           : vlan701
```

```
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 03:45:32
```

Site-2-Border-vtep-primary

```
Current configuration:
!
!export-password: default
hostname Site-2-Border-vtep-primary
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 1:12
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 2:12
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 501
        ip igmp snooping enable
vlan 502
        ip igmp snooping enable
vlan 701
        ip igmp snooping enable
vlan 702
        ip igmp snooping enable
vlan 752,1001-1002
vlan 1301
        ip igmp snooping enable
vlan 1302
        ip igmp snooping enable
vlan 3001-3002
virtual-mac 00:11:00:00:00:11
evpn
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 501
                rd auto
                route-target export 501:141
                route-target import 501:141
                redistribute host-route
        vlan 502
                rd auto
                route-target export 502:142
                route-target import 502:142
```

```
                redistribute host-route
        vlan 701
                rd auto
                route-target export 701:141
                route-target import 701:141
                redistribute host-route
        vlan 702
                rd auto
                route-target export 702:142
                route-target import 702:142
                redistribute host-route
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1,501-502,701-702,752,3001-3002
        lacp mode active
        lacp rate fast
interface 1/1/1
        description port_isl
        no shutdown
        lag 120
interface 1/1/2
        description port_isl
        no shutdown
        lag 120
interface 1/1/5
        description port_ka
        no shutdown
        ip address 45.1.1.1/24
interface 1/1/17
        description port_Site-2-External-router
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1001-1002
interface 1/1/47
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1301-1302
interface 1/1/48
        no shutdown
interface 1/1/49
        description port_Site-1_Border-vtep-secondary
        no shutdown
        ip address 40.1.3.2/29
interface 1/1/50
        description port_Site-1_Border-vtep-primary
        no shutdown
        ip address 40.1.1.2/29
interface 1/1/51
        description port_Site-2-Distro-vsx-primary
        no shutdown
        ip address 60.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/52
        description port_Site-2-Distro-vsx-secondary
        no shutdown
        ip address 60.1.2.1/31
```

```
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface loopback 1
        ip address 80.80.80.80/32
interface loopback 105
        vrf attach vrf1
        ip address 104.104.104.104/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 106
        vrf attach vrf2
        ip address 105.105.105.105/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 113
        ip address 195.170.1.255/32
interface loopback 114
        ip address 192.168.1.3/32
interface loopback 201
        vrf attach vrf1
        ip address 121.100.101.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 202
        vrf attach vrf2
        ip address 121.100.102.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 501
        vrf attach vrf1
        ip address 12.5.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 12.5.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 502
        vrf attach vrf2
        ip address 12.5.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 12.5.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 701
        vrf attach vrf1
        ip address 12.7.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 12.7.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 702
        vrf attach vrf2
        ip address 12.7.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 12.7.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 752
        no shutdown
```

```
        ip address 172.1.1.1/30
        ip ospf 1 area 0.0.0.0
interface vlan 1001
        vrf attach vrf1
        ip address 61.0.1.2/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1002
        vrf attach vrf2
        ip address 61.0.2.2/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1301
        vrf attach vrf1
        ip address 61.3.1.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf passive
        ip ospf network point-to-point
        ip igmp enable
        ip pim-sparse enable
interface vlan 1302
        vrf attach vrf2
        ip address 61.3.2.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf passive
        ip ospf network point-to-point
        ip igmp enable
        ip pim-sparse enable
interface vlan 3001
        vrf attach vrf1
        ip address 61.10.1.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 3002
        vrf attach vrf2
        ip address 61.10.2.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vxlan 1
        source ip 80.80.80.80
        no shutdown
        vni 2100
                vlan 501
        vni 2101
                vlan 502
        vni 2300
                vlan 701
        vni 2301
                vlan 702
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
        system-mac 00:11:00:00:00:11
        inter-switch-link lag 120
        role primary
        keepalive peer 45.1.1.2 source 45.1.1.1
```

```
ip prefix-list test_1 seq 10 deny 192.170.1.255/32
ip prefix-list test_1 seq 20 deny 193.170.1.255/32
ip prefix-list test_1 seq 40 deny 197.170.1.255/32
ip prefix-list test_1 seq 50 deny 198.170.1.255/32
ip prefix-list test_1 seq 60 permit 4.4.4.50/32
ip prefix-list test_1 seq 70 permit 8.8.8.8/32
!
!
!
!
route-map tag_bgp_ospf permit seq 10
        set tag 210
route-map tag_ospf_bgp deny seq 10
        match tag 210
route-map tag_ospf_bgp deny seq 20
        match tag 220
route-map tag_ospf_bgp permit seq 30
route-map test_1 permit seq 10
        match ip address prefix-list test_1
!
router ospf 1
        router-id 112.12.1.3
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map test_1
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 112.12.1.5
        distance 250
        redistribute connected
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 112.12.2.5
        distance 250
        redistribute connected
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router bgp 65536
        bgp router-id 112.12.1.3
        neighbor 4.4.4.4 remote-as 65536
        neighbor 4.4.4.4 update-source loopback 114
        neighbor 40.1.1.1 remote-as 65535
        neighbor 40.1.3.1 remote-as 65535
        neighbor 45.1.1.2 remote-as 65536
        neighbor 85.85.85.85 remote-as 65536
        neighbor 85.85.85.85 update-source loopback 114
        neighbor 193.170.1.255 remote-as 65535
        neighbor 193.170.1.255 ebgp-multihop 5
        neighbor 193.170.1.255 update-source loopback 113
        neighbor 194.170.1.255 remote-as 65535
        neighbor 194.170.1.255 ebgp-multihop 5
        neighbor 194.170.1.255 update-source loopback 113
        neighbor 197.170.1.255 remote-as 65537
        neighbor 197.170.1.255 ebgp-multihop 5
        neighbor 197.170.1.255 update-source loopback 113
        neighbor 198.170.1.255 remote-as 65537
        neighbor 198.170.1.255 ebgp-multihop 5
        neighbor 198.170.1.255 update-source loopback 113
        address-family ipv4 unicast
                neighbor 40.1.1.1 activate
```

```
                neighbor 40.1.3.1 activate
                neighbor 45.1.1.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 4.4.4.4 next-hop-self
                neighbor 4.4.4.4 route-reflector-client
                neighbor 4.4.4.4 send-community extended
                neighbor 4.4.4.4 activate
                neighbor 85.85.85.85 next-hop-self
                neighbor 85.85.85.85 route-reflector-client
                neighbor 85.85.85.85 send-community extended
                neighbor 85.85.85.85 activate
                neighbor 193.170.1.255 send-community extended
                neighbor 193.170.1.255 activate
                neighbor 194.170.1.255 send-community extended
                neighbor 194.170.1.255 activate
                neighbor 197.170.1.255 send-community extended
                neighbor 197.170.1.255 activate
                neighbor 198.170.1.255 send-community extended
                neighbor 198.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================
Site-2-Border-vtep-primary# show ip ospf neighbors all-vrfs
VRF : default                           Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
120.10.10.11     n/a       FULL              60.1.1.0           1/1/51
120.10.10.15     n/a       FULL              60.1.2.0           1/1/52

VRF : vrf1                              Process : 1
================================================

Total Number of Neighbors : 2
```

```
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.1.5       1         FULL/BDR          61.0.1.1           vlan1001
112.13.1.5       1         FULL/DR           61.10.1.2          vlan3001

VRF : vrf2                              Process : 1
=================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.2.5       1         FULL/BDR          61.0.2.1           vlan1002
112.13.1.5       1         FULL/DR           61.10.2.2          vlan3002

Site-2-Border-vtep-primary# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 112.12.1.3
Peers                  : 9            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
40.1.1.1      65535       629     638     08h:48m:25s  Established   Up
40.1.3.1      65535       630     639     08h:48m:27s  Established   Up
45.1.1.2      65536       662     662     08h:54m:34s  Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
4.4.4.4       65536       666     7144    08h:06m:48s  Established   Up
85.85.85.85   65536       641     6794    08h:28m:29s  Established   Up
193.170.1.255 65535       5144    5046    08h:48m:16s  Established   Up
194.170.1.255 65535       5301    5072    08h:48m:12s  Established   Up
197.170.1.255 65537       6018    5225    08h:47m:01s  Established   Up
198.170.1.255 65537       5428    5313    08h:47m:02s  Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 121.100.101.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------
Codes: * Dynamic Neighbor
```

```
VRF : vrf2
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 121.100.102.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Site-2-Border-vtep-primary# show interface vxlan vteps
Source       Destination   Origin    Status        VNI      Routing   VLAN  VRF
-------------------------------------------- ----------------------------------
-
80.80.80.80  4.4.4.4       evpn     operational   2300      disabled  701   --
80.80.80.80  4.4.4.4       evpn     operational   2301      disabled  702   --
80.80.80.80                evpn     operational   9002      enabled   --    vrf2
80.80.80.80  4.4.4.4       evpn     operational   16777214  enabled   --    vrf
80.80.80.80  4.4.4.50      evpn     operational   9002      enabled   --    vrf2
80.80.80.80  4.4.4.50      evpn     operational   16777214  enabled   --    vrf1
80.80.80.80  8.8.8.8       evpn     operational   9002      enabled   --    vrf2
80.80.80.80  8.8.8.8       evpn     operational   16777214  enabled   --    vrf1
80.80.80.80  85.85.85.85   evpn     operational   2100      disabled  501   --
80.80.80.80  85.85.85.85   evpn     operational   2101      disabled  502   --
80.80.80.80  85.85.85.85   evpn     operational   9002      enabled   --    vrf2
80.80.80.80  85.85.85.85   evpn     operational   16777214  enabled   --     vrf1

Site-2-Border-vtep-primary#  show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information

VRF                      : vrf1

E-BSR Address            : 111.100.101.100
E-BSR Priority           : 0
E-BSR Hash Mask Length   : 30
E-BSR Up Time            : 27 mins 0 secs
Next Bootstrap Message   : 0 secs
C-BSR Admin Status       : This system is not a Candidate-BSR
C-RP Admin Status        : This system is not a Candidate-RP
VRF                      : vrf2
E-BSR Address            : 111.100.102.100
E-BSR Priority           : 0
E-BSR Hash Mask Length   : 30
E-BSR Up Time            : 26 mins 51 secs
Next Bootstrap Message   : 1 mins 19 secs
C-BSR Admin Status       : This system is not a Candidate-BSR
C-RP Admin Status        : This system is not a Candidate-RP

Site-2-Border-vtep-primary# show ip pim rp-set all-vrfs
VRF: vrf1
Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.101.100  150        144          192

VRF: vrf2
```

```
Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.102.100  150        93           192

Site-2-Border-vtep-primary# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 8
--------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR         Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority  (HH:MM:SS)  Address (IPV4)
--------------------------------------------------------------------------------
vni16777214 4.4.4.4     04:06:16   00:03:26   1          00:03:30
vni16777214 4.4.4.50    04:06:16   00:03:27   1          00:03:30
vni16777214 8.8.8.8     04:06:16   00:03:25   1          00:03:30
vlan501     12.5.1.10   04:06:13   00:01:44   1431655765 00:01:45   Nil
vlan701     12.7.1.10   04:06:08   00:01:40   1347440720 00:01:45   Nil
vlan1001    61.0.1.1    04:06:16   00:01:31   1          00:01:45   Nil
vlan3001    61.10.1.2   04:06:05   00:01:43   1347440720 00:01:45   Nil
vni16777214 85.85.85.85 04:06:16   00:03:25   1          00:03:30
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 8
--------------------------------------------------------------------------------
-
vni9002     4.4.4.4     07:59:25   00:03:07   1          00:03:30
vni9002     4.4.4.50    07:59:54   00:03:08   1          00:03:30
vni9002     8.8.8.8     07:59:54   00:03:10   1          00:03:30
vlan502     12.5.2.10   07:59:53   00:01:28   1431655765 00:01:45   Nil
vlan702     12.7.2.10   07:59:53   00:01:27   1347440720 00:01:45   Nil
vlan1002    61.0.2.1    04:56:55   00:01:21   1          00:01:45   Nil
vlan3002    61.10.2.2   07:59:51   00:01:28   1347440720 00:01:45   Nil
vni9002     85.85.85.85 07:59:52   00:03:09   1          00:03:30
--------------------------------------------------------------------------------
-

Site-2-Border-vtep-primary# show ip mroute 225.5.1.1 all-vrfs detail
IP Multicast Route Entries
VRF : vrf1
Group Address                 : 225.5.1.1
Source Address                : 61.2.1.15
Neighbor                      : 61.0.1.1
Incoming interface            : vlan1001
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 03:38:22
Downstream Interface
Interface       State          Vteps
-----------     ----------     -----
vni16777214     forwarding     4.4.4.50
```

Site-2-Border-vtep-secondary

```
Current configuration:
!
```

```
!export-password: default
hostname Site-2-Border-vtep-secondary
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 1:12
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 2:12
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 501
        ip igmp snooping enable
vlan 502
        ip igmp snooping enable
vlan 701
        ip igmp snooping enable
vlan 702
        ip igmp snooping enable
vlan 1401
        ip igmp snooping enable
vlan 1402
        ip igmp snooping enable
vlan 752,2001-2002,3001-3002
virtual-mac 00:11:00:00:00:11
evpn
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 501
                rd auto
                route-target export 501:141
                route-target import 501:141
                redistribute host-route
        vlan 502
                rd auto
                route-target export 502:142
                route-target import 502:142
                redistribute host-route
        vlan 701
                rd auto
                route-target export 701:141
                route-target import 701:141
                redistribute host-route
        vlan 702
                rd auto
                route-target export 702:142
                route-target import 702:142
                redistribute host-route
interface mgmt
```

```
        no shutdown
        ip dhcp
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1,501-502,701-702,752,3001-3002
        lacp mode active
        lacp rate fast
interface 1/1/1
        description port_isl
        no shutdown
        lag 120
interface 1/1/2
        description port_isl
        no shutdown
        lag 120
interface 1/1/5
        description port_ka
        no shutdown
        ip address 45.1.1.2/24
interface 1/1/32
        description port_Site-2-External-router
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 2001-2002
interface 1/1/47
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1401-1402
interface 1/1/49
        description port_Site-1_Border-vtep-secondary
        no shutdown
        ip address 40.1.4.2/29
interface 1/1/50
        description port_Site-1_Border-vtep-primary
        no shutdown
        ip address 40.1.2.2/29
interface 1/1/51
        description port_Site-2-Distro-vsx-primary
        no shutdown
        ip address 60.1.3.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/52
        description port_Site-2-Distro-vsx-secondary
        no shutdown
        ip address 60.1.4.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface loopback 1
        ip address 80.80.80.80/32
interface loopback 2
        vrf attach vrf1
        ip address 121.121.121.121/32
        ip pim-sparse enable
interface loopback 113
        ip address 196.170.1.255/32
interface loopback 114
```

```
        ip address 192.168.1.4/32
interface loopback 201
        vrf attach vrf1
        ip address 122.100.101.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 202
        vrf attach vrf2
        ip address 122.100.102.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 501
        vrf attach vrf1
        ip address 12.5.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 12.5.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 502
        vrf attach vrf2
        ip address 12.5.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 12.5.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 701
        vrf attach vrf1
        ip address 12.7.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 12.7.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 702
        vrf attach vrf2
        ip address 12.7.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 12.7.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface 752
        no shutdown
        ip address 172.1.1.2/30
        ip ospf 1 area 0.0.0.0
interface vlan 1401
        vrf attach vrf1
        ip address 61.4.1.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf passive
        ip ospf network point-to-point
        ip igmp enable
        ip pim-sparse enable
interface vlan 1402
        vrf attach vrf2
        ip address 61.4.2.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf passive
        ip ospf network point-to-point
        ip igmp enable
```

```
        ip pim-sparse enable
interface vlan 2001
        vrf attach vrf1
        ip address 61.1.1.2/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 2002
        vrf attach vrf2
        ip address 61.1.2.2/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 3001
        vrf attach vrf1
        ip address 61.10.1.2/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 3002
        vrf attach vrf2
        ip address 61.10.2.2/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vxlan 1
        source ip 80.80.80.80
        no shutdown
        vni 2100
                vlan 501
        vni 2101
                vlan 502
        vni 2300
                vlan 701
        vni 2301
                vlan 702
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
        system-mac 00:11:00:00:00:11
        inter-switch-link lag 120
        role secondary
        keepalive peer 45.1.1.1 source 45.1.1.2
        ip prefix-list test_1 seq 10 deny 192.170.1.255/32
ip prefix-list test_1 seq 20 deny 193.170.1.255/32
ip prefix-list test_1 seq 40 deny 197.170.1.255/32
ip prefix-list test_1 seq 50 deny 198.170.1.255/32
ip prefix-list test_1 seq 60 permit 4.4.4.50/32
ip prefix-list test_1 seq 70 permit 8.8.8.8/32
!
!
!
!
route-map tag_bgp_ospf permit seq 10
        set tag 220
route-map tag_ospf_bgp deny seq 10
        match tag 210
route-map tag_ospf_bgp deny seq 20
        match tag 220
route-map tag_ospf_bgp permit seq 30
```

```
route-map test_1 permit seq 10
        match ip address prefix-list test_1
!
router ospf 1
        router-id 112.13.1.3
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map test_1
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 112.13.1.5
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 112.13.1.5
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
area 0.0.0.0
        router bgp 65536
        bgp router-id 112.13.1.3
        neighbor 4.4.4.4 remote-as 65536
        neighbor 4.4.4.4 update-source loopback 114
        neighbor 40.1.2.1 remote-as 65535
        neighbor 40.1.4.1 remote-as 65535
        neighbor 45.1.1.1 remote-as 65536
        neighbor 85.85.85.85 remote-as 65536
        neighbor 85.85.85.85 update-source loopback 114
        neighbor 193.170.1.255 remote-as 65535
        neighbor 193.170.1.255 ebgp-multihop 5
        neighbor 193.170.1.255 update-source loopback 113
        neighbor 194.170.1.255 remote-as 65535
        neighbor 194.170.1.255 ebgp-multihop 5
        neighbor 194.170.1.255 update-source loopback 113
        neighbor 197.170.1.255 remote-as 65537
        neighbor 197.170.1.255 ebgp-multihop 5
        neighbor 197.170.1.255 update-source loopback 113
        neighbor 198.170.1.255 remote-as 65537
        neighbor 198.170.1.255 ebgp-multihop 5
        neighbor 198.170.1.255 update-source loopback 113
        address-family ipv4 unicast
                neighbor 40.1.2.1 activate
                neighbor 40.1.4.1 activate
                neighbor 45.1.1.1 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 4.4.4.4 next-hop-self
                neighbor 4.4.4.4 route-reflector-client
                neighbor 4.4.4.4 send-community extended
                neighbor 4.4.4.4 activate
                neighbor 85.85.85.85 next-hop-self
                neighbor 85.85.85.85 route-reflector-client
                neighbor 85.85.85.85 send-community extended
                neighbor 85.85.85.85 activate
                neighbor 193.170.1.255 send-community extended
```

```
                neighbor 193.170.1.255 activate
                neighbor 194.170.1.255 send-community extended
                neighbor 194.170.1.255 activate
                neighbor 197.170.1.255 send-community extended
                neighbor 197.170.1.255 activate
                neighbor 198.170.1.255 send-community extended
                neighbor 198.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================
Site-2-Border-vtep-secondary# show ip ospf neighbors all-vrfs
VRF : default                           Process : 1
================================================

Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
120.10.10.11     n/a       FULL              60.1.3.0           1/1/51
120.10.10.15     n/a       FULL              60.1.4.0           1/1/52

VRF : vrf1                              Process : 1
================================================

Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.1.5       1         FULL/BDR          61.1.1.1           vlan2001
112.12.1.5       1         FULL/BDR          61.10.1.1          vlan3001
VRF : vrf2                              Process : 1

================================================

Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.2.5       1         FULL/BDR          61.1.2.1           vlan2002
112.12.2.5       1         FULL/BDR          61.10.2.1          vlan3002

Site-2-Border-vtep-secondary# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
```

```
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 112.13.1.3
Peers                  : 9            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
40.1.2.1      65535       633     635     08h:51m:12s  Established   Up
40.1.4.1      65535       636     636     08h:51m:12s  Established   Up
45.1.1.1      65536       665     665     08h:57m:25s  Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
4.4.4.4       65536       578     5585    08h:08m:18s  Established   Up
85.85.85.85   65536       637     7148    08h:31m:22s  Established   Up
193.170.1.255 65535       5183    5422    08h:51m:10s  Established   Up
194.170.1.255 65535       5302    5532    08h:51m:14s  Established   Up
197.170.1.255 65537       6186    5587    08h:49m:52s  Established   Up
198.170.1.255 65537       5543    5797    08h:49m:54s  Established   Up
Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 122.100.101.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 122.100.102.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Site-2-Border-vtep-secondary# show interface vxlan vteps
Source         Destination  Origin    Status         VNI       Routing   VLAN  VRF
```

```
------------------------------------------- ----------------------------------
-
80.80.80.80    4.4.4.4      evpn      operational    2300      disabled  701   --
80.80.80.80    4.4.4.4      evpn      operational    2301      disabled  702   --
80.80.80.80    4.4.4.4      evpn      operational    9002      enabled   --
vrf2
80.80.80.80    4.4.4.4      evpn      operational    16777214  enabled   --
vrf1
80.80.80.80    4.4.4.50     evpn      operational    9002      enabled   --
vrf2
80.80.80.80    4.4.4.50     evpn      operational    16777214  enabled   --
vrf1
80.80.80.80    8.8.8.8      evpn      operational    9002      enabled   --
vrf2
80.80.80.80    8.8.8.8      evpn      operational    16777214  enabled   --
vrf1
80.80.80.80    85.85.85.85  evpn      operational    2100      disabled  501   --
80.80.80.80    85.85.85.85  evpn      operational    2101      disabled  502   --
80.80.80.80    85.85.85.85  evpn      operational    9002      enabled   --
vrf2
80.80.80.80    85.85.85.85  evpn      operational    16777214  enabled   --
vrf1

Site-2-Border-vtep-secondary# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information
VRF                       : vrf1
E-BSR Address             : 111.100.101.100
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 29 mins 52 secs
Next Bootstrap Message    : 1 mins 18 secs

C-BSR Admin Status        : This system is not a Candidate-BSR
C-RP Admin Status         : This system is not a Candidate-RP
VRF                       : vrf2
E-BSR Address             : 111.100.102.100
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 29 mins 43 secs
Next Bootstrap Message    : 1 mins 27 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

Site-2-Border-vtep-secondary# show ip pim rp-set all-vrfs

VRF: vrf1

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.101.100  150        92           192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information

Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
```

```
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.102.100  150        101          192

Site-2-Border-vtep-secondary#  show ip pim neighbor brief all-vrfs`
Invalid input: `
Site-2-Border-vtep-secondary#  show ip pim neighbor brief all-vrfs
------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 8
------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR         Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority  (HH:MM:SS)  Address (IPV4)
------------------------------------------------------------------------------
vni16777214 4.4.4.4     04:08:53   00:03:10   1          00:03:30
vni16777214 4.4.4.50    04:08:53   00:03:11   1          00:03:30
vni16777214 8.8.8.8     04:08:53   00:03:09   1          00:03:30
vlan501     12.5.1.10   04:08:51   00:01:30   1431655765 00:01:45   Nil
vlan701     12.7.1.10   04:08:53   00:01:27   1347440720 00:01:45   Nil
vlan2001    61.1.1.1    04:08:52   00:01:29   1          00:01:45   Nil
vlan3001    61.10.1.1   04:08:51   00:01:26   1347440720 00:01:45   Nil
vni16777214 85.85.85.85 04:08:53   00:03:09   1          00:03:30
------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 8
------------------------------------------------------------------------------
-
vni9002     4.4.4.4     08:02:41   00:03:21   1          00:03:30
vni9002     4.4.4.50    08:02:43   00:03:22   1          00:03:30
vni9002     8.8.8.8     08:02:41   00:03:24   1          00:03:30
vlan502     12.5.2.10   08:02:36   00:01:39   1431655765 00:01:45   Nil
vlan702     12.7.2.10   08:02:37   00:01:41   1347440720 00:01:45   Nil
vlan2002    61.1.2.1    04:59:44   00:01:32   1          00:01:45   Nil
vlan3002    61.10.2.1   08:02:37   00:01:15   1347440720 00:01:45   Nil
vni9002     85.85.85.85 08:02:41   00:03:23   1          00:03:30
------------------------------------------------------------------------------
-
Site-2-Border-vtep-secondary#  show ip mroute 225.5.1.1 all-vrfs detail
IP Multicast Route Entries
VRF : vrf1
Total number of entries : 1
Group Address                 : 225.5.1.1
Source Address                : 61.2.1.15
Neighbor                      : 61.1.1.1
Incoming interface            : vlan2001
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 03:41:01
Downstream Interface
Interface       State          Vteps
-----------     ----------     -----
vni16777214     forwarding     4.4.4.50
```

Site-2-Distro-vsx-primary

```
!
!export-password: default
hostname Site-2-Distro-vsx-primary
```

```
no ip icmp redirect
profile l3-core
!
!
!
!
!
ssh server vrf mgmt
vlan 1,6-7
interface mgmt
        no shutdown
        ip dhcp
interface lag 2
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface lag 35 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 6
        lacp mode active
        lacp rate fast
interface lag 36 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 7
        lacp mode active
        lacp rate fast
interface 1/1/15
        description port_Site-2-access-vtep-2
        no shutdown
        lag 36
interface 1/1/33
        description port_Site-2-access-vtep-1
        no shutdown
        lag 35
interface 1/1/46
        description port_isl
        no shutdown
        lag 2
interface 1/1/47
        description port_isl
        no shutdown
        lag 2
interface 1/1/48
        description port_ka
        no shutdown
        ip address 11.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/51
        description port_Site-2_Border-vtep-primary
        no shutdown
        ip address 60.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/52
```

```
        description port_Site-2_Border-vtep-secondary
        no shutdown
        ip address 60.1.3.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface vlan 6
        vsx active-forwarding
        ip address 60.1.5.1/29
        ip ospf 1 area 0.0.0.0
interface vlan 7
        vsx active-forwarding
        ip address 60.1.6.1/29
        ip ospf 1 area 0.0.0.0
vsx
        inter-switch-link lag 2
        role primary
        keepalive peer 11.1.1.0 source 11.1.1.1
!
!
!
!
!
router ospf 1
        router-id 120.10.10.11
        area 0.0.0.0
https-server vrf mgmt
```

Site-2-Distro-vsx-secondary

```
!
!export-password: default
hostname Site-2-Distro-vsx-secondary
no ip icmp redirect
profile l3-core
!
!
!
!
!
ssh server vrf mgmt
vlan 1,6-7
interface mgmt
        no shutdown
        ip dhcp
interface lag 2
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface lag 35 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 6
        lacp mode active
        lacp rate fast
interface lag 36 multi-chassis
        no shutdown
        no routing
```

```
        vlan trunk native 1
        vlan trunk allowed 7
        lacp mode active
        lacp rate fast
interface 1/1/15
        description port_Site-2-access-vtep-2
        no shutdown
        lag 36
interface 1/1/34
        description port_Site-2-access-vtep-1
        no shutdown
        lag 35
interface 1/1/46
        description port_isl
        no shutdown
        lag 2
interface 1/1/47
        description port_isl
        no shutdown
        lag 2
interface 1/1/48
        description port_ka
        no shutdown
        ip address 11.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/51
        description port_Site-2_Border-vtep-primary
        no shutdown
        ip address 60.1.2.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/52
        description port_Site-2_Border-vtep-secondary
        no shutdown
        ip address 60.1.4.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface vlan 6
        vsx active-forwarding
        ip address 60.1.5.2/29
        ip ospf 1 area 0.0.0.0
interface vlan 7
        vsx active-forwarding
        ip address 60.1.6.2/29
        ip ospf 1 area 0.0.0.0
vsx
        inter-switch-link lag 2
        role secondary
        keepalive peer 11.1.1.1 source 11.1.1.0
!
!
!
!
!
router ospf 1
        router-id 120.10.10.15
        area 0.0.0.0
https-server vrf mgmt
```

Site-2-External-router

```
Current configuration:
!
!export-password: default
hostname Site-2-External-router
vrf vrf1
vrf vrf2
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1,1001-1002
vlan 1201
        ip igmp snooping enable
vlan 1202
        ip igmp snooping enable
vlan 2001-2002
interface 1/1/25
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1201-1202
interface 1/1/43
        description port_Site-2_Border-vtep-primary
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1001-1002
interface 1/1/44
        description port_Site-2_Border-vtep-secondary
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 2001-2002
interface vlan 1001
        vrf attach vrf1
        ip address 61.0.1.1/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1002
        vrf attach vrf2
        ip address 61.0.2.1/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1201
        vrf attach vrf1
        ip address 61.2.1.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf passive
        ip ospf network point-to-point
        ip igmp enable
        ip pim-sparse enable
interface vlan 1202
        vrf attach vrf2
        ip address 61.2.2.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf passive
```

```
        ip ospf network point-to-point
        ip igmp enable
        ip pim-sparse enable
interface vlan 2001
        vrf attach vrf1
        ip address 61.1.1.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 2002
        vrf attach vrf2
        ip address 61.1.2.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
!
!
!
!
!
router ospf 1 vrf vrf1
        router-id 112.11.1.5
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 112.11.2.5
        area 0.0.0.0
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================
Site-2-External-Router# show ip ospf neighbors all-vrfs
VRF : vrf1                              Process : 1
==================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.12.1.5       1         FULL/DR           61.0.1.2           vlan1001
112.13.1.5       1         FULL/DR           61.1.1.2           vlan2001
VRF : vrf2                              Process : 1
==================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.12.2.5       1         FULL/DR           61.0.2.2           vlan1002
112.13.1.5       1         FULL/DR           61.1.2.2           vlan2002

Site-2-External-Router# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information

VRF                       : vrf1
E-BSR Address             : 111.100.101.100
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 24 mins 10 secs
Next Bootstrap Message    : 2 mins 0 secs
```

```
C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

VRF                       : vrf2
E-BSR Address             : 111.100.102.100
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 30
E-BSR Up Time             : 24 mins 1 secs
Next Bootstrap Message    : 2 mins 9 secs

C-BSR Admin Status        : This system is not a Candidate-BSR

C-RP Admin Status         : This system is not a Candidate-RP

Site-2-External-Router# show ip pim rp-set all-vrfs

VRF: vrf1

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.101.100  150        136          192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.102.100  150        145          192

Site-2-External-Router# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                            Total number of neighbors : 2
--------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR         Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority  (HH:MM:SS)  Address (IPV4)
--------------------------------------------------------------------------------
vlan1001    61.0.1.2    04:03:24   00:01:24   1347440720 00:01:45   Nil
vlan2001    61.1.1.2    04:03:14   00:01:34   1347440720 00:01:45   Nil
--------------------------------------------------------------------------------
-
VRF : vrf2                            Total number of neighbors : 2
--------------------------------------------------------------------------------
-
vlan1002    61.0.2.2    04:54:08   00:01:18   1347440720 00:01:45   Nil
vlan2002    61.1.2.2    04:54:11   00:01:44   1347440720 00:01:45   Nil
--------------------------------------------------------------------------------
-

Site-2-External-Router# show ip mroute 225.5.1.1 all-vrfs detail
IP Multicast Route Entries
VRF : vrf1
Total number of entries : 1
Group Address                 : 225.5.1.1
Source Address                : 61.2.1.15
Neighbor                      :
```

```
Incoming interface            : vlan1201
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 00:23:44
Downstream Interface
Interface       State
-----------     ----------
vlan2001        forwarding
vlan1001        forwarding
```

Site-3-Access-vtep-1

```
Current configuration:
!
!export-password: default
hostname Site-3-Access-vtep-1
no ip icmp redirect
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vsf member 1
        type r8s89a
vlan 1
vlan 1501
        ip igmp snooping enable
vlan 1502
        ip igmp snooping enable
virtual-mac 00:01:80:41:56:40
evpn
        redistribute local-mac
        redistribute local-svi
        vlan 1501
                rd auto
                route-target export 1501:141
                route-target import 1501:141
                redistribute host-route
        vlan 1502
                rd auto
                route-target export 1502:142
                route-target import 1502:142
                redistribute host-route
interface 1/1/25
        description port_Site-3_Border-vtep-primary
        no shutdown
        routing
        ip address 80.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/26
        description port_Site-3_Border-vtep-secondary
        no shutdown
        routing
```

```
        ip address 80.1.4.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/27
        no shutdown
        no routing
        vlan access 1
interface 1/1/28
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1501-1502
interface loopback 1
        ip address 13.13.13.13/32
interface vlan 1
        ip dhcp
interface vxlan 1
        source ip 13.13.13.13
        no shutdown
        vni 2100
                vlan 1501
        vni 2101
                vlan 1502
!
!
!
!
!
router ospf 1
        router-id 113.13.1.3
        redistribute local loopback
        area 0.0.0.0
router bgp 65537
        bgp router-id 113.13.1.3
        neighbor 197.170.1.255 remote-as 65537
        neighbor 197.170.1.255 update-source loopback 1
        neighbor 198.170.1.255 remote-as 65537
        neighbor 198.170.1.255 update-source loopback 1
        address-family l2vpn evpn
                neighbor 197.170.1.255 send-community extended
                neighbor 197.170.1.255 activate
                neighbor 198.170.1.255 send-community extended
                neighbor 198.170.1.255 activate
        exit-address-family
!
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================
site3-6300-vtep1# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
113.11.1.3       n/a       FULL              80.1.1.1           1/1/25

113.12.1.3       n/a       FULL              80.1.4.1           1/1/26
```

```
site3-6300-vtep1# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 113.13.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
197.170.1.255 65537       4853    412     05h:51m:11s  Established   Up
198.170.1.255 65537       4443    411     05h:51m:10s  Established   Up

site3-6300-vtep1# show interface  vxlan vteps
Source        Destination    Origin     Status        VNI      Routing   VLAN  VRF
--------------------------------------------- ----------------------------------
-
13.13.13.13   8.8.8.8        evpn       operational   2100     disabled  1501   --
13.13.13.13   8.8.8.8        evpn       operational   2101     disabled  1502   --
```

Site-3-Access-vtep-2

```
Current configuration:
!
!export-password: default
hostname Site-3-Access-vtep-2
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vsf member 1
        type r8s89a
vlan 1
vlan 1701
ip igmp snooping enable
        vlan 1702
ip igmp snooping enable
        virtual-mac 00:01:90:41:56:40
        evpn
        redistribute local-mac
        redistribute local-svi
        vlan 1701
```

```
                rd auto
                route-target export 1701:141
                route-target import 1701:141
                redistribute host-route
        vlan 1702
                rd auto
                route-target export 1702:142
                route-target import 1702:142
                redistribute host-route
interface 1/1/25
        description port_Site-3_Border-vtep-secondary
        no shutdown
        routing
        ip address 80.1.3.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/26
        description port_Site-3_Border-vtep-primary
        no shutdown
        routing
        ip address 80.1.2.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/27
        no shutdown
        no routing
        vlan access 1
interface 1/1/28
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1701-1702
interface loopback 1
        ip address 14.14.14.14/32
interface vlan 1
        ip dhcp
interface vxlan 1
        source ip 14.14.14.14
        no shutdown
        vni 2300
                vlan 1701
        vni 2301
                vlan 1702
!
!
!
!
!
router ospf 1
        router-id 113.14.1.3
        redistribute local loopback
        area 0.0.0.0
router bgp 65537
        bgp router-id 113.14.1.3
        neighbor 197.170.1.255 remote-as 65537
        neighbor 197.170.1.255 update-source loopback 1
        neighbor 198.170.1.255 remote-as 65537
        neighbor 198.170.1.255 update-source loopback 1
        address-family l2vpn evpn
                neighbor 197.170.1.255 send-community extended
                neighbor 197.170.1.255 activate
```

```
               neighbor 198.170.1.255 send-community extended
               neighbor 198.170.1.255 activate
        exit-address-family
!
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================
site3-6300-vtep2# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
113.12.1.3       n/a       FULL              80.1.3.1           1/1/25
113.11.1.3       n/a       FULL              80.1.2.1           1/1/26

site3-6300-vtep2# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 113.14.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
197.170.1.255 65537       4910    415     05h:52m:53s  Established   Up
198.170.1.255 65537       4495    408     05h:52m:54s  Established   Up

site3-6300-vtep2#  show int vxlan vteps detail
Destination     :  8.8.8.8
Source          :  14.14.14.14
Origin          :  evpn
VRF             :  default
Status          :  operational
Nexthops
========
IP-ADDRESS                                INTERFACE   NEXTHOP-MAC
----------------------------------------  ----------  -------------------
80.1.3.1                                  1/1/25      bc:d7:a5:32:d0:00
80.1.2.1                                  1/1/26      bc:d7:a5:32:22:00
site3-6300-vtep2#  show int vxlan vteps
Source       Destination  Origin  Status        VNI      Routing          VLAN
VRF
```

```
------------------------------------------- ----------------------------------
-
14.14.14.14  8.8.8.8      evpn    operational   2300     disable      d  1701   --
14.14.14.14  8.8.8.8      evpn    operational   2301     disable      d  1702   --
```

Site-3-Border-vtep-primary

```
Current configuration:
!
!export-password: default
hostname Site-3-Border-vtep-primary
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 1:15
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 2:15
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vlan 1-2,1001-1002
vlan 1501
        ip igmp snooping enable
vlan 1502
        ip igmp snooping enable
vlan 1701
        ip igmp snooping enable
vlan 1702
        ip igmp snooping enable
virtual-mac 00:01:70:41:56:40
evpn
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 1501
                rd auto
                route-target export 1501:141
                route-target import 1501:141
                redistribute host-route
        vlan 1502
                rd auto
                route-target export 1502:142
                route-target import 1502:142
                redistribute host-route
        vlan 1701
                rd auto
                route-target export 1701:141
                route-target import 1701:141
                redistribute host-route
```

```
        vlan 1702
                rd auto
                route-target export 1702:142
                route-target import 1702:142
                redistribute host-route
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface 1/1/7
        description port_Site-1_Border-vtep-secondary
        no shutdown
        ip address 48.1.2.1/29
interface 1/1/10
        description port_Site-1_Border-vtep-primary
        no shutdown
        ip address 48.1.1.1/29
interface 1/1/19
        description port_isl
        no shutdown
        lag 120
interface 1/1/22
        description port_isl
        no shutdown
        lag 120
interface 1/1/25
        description port_ka
        no shutdown
        ip address 47.1.1.1/29
interface 1/1/31
        description port_Site-3-Access-vtep-1
        no shutdown
        ip address 80.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/34
        description port_Site-3-Access-vtep-2
        no shutdown
        ip address 80.1.2.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface loopback 1
        ip address 192.168.100.1/32
interface loopback 100
        ip address 192.168.100.255/32
interface loopback 112
        ip address 8.8.8.8/32
interface loopback 113
        ip address 197.170.1.255/32
interface loopback 201
        vrf attach vrf1
        ip address 131.100.101.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 202
        vrf attach vrf2
        ip address 131.100.102.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
```

```
interface vlan 2
        ip address 21.1.1.1/29
        ip ospf 1 area 0.0.0.0
interface vlan 1001
        vrf attach vrf1
        ip address 63.0.1.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1002
        vrf attach vrf2
        ip address 63.0.2.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1501
        vrf attach vrf1
        ip address 15.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.1.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1502
        vrf attach vrf2
        ip address 15.1.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.1.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1701
        vrf attach vrf1
        ip address 15.3.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.3.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1702
        vrf attach vrf2
        ip address 15.3.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.3.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vxlan 1
        source ip 8.8.8.8
        no shutdown
        vni 2100
                vlan 1501
        vni 2101
                vlan 1502
        vni 2300
                vlan 1701
        vni 2301
                vlan 1702
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
```

```
vsx
        system-mac 00:01:70:41:56:40
        inter-switch-link lag 120
        role primary
        keepalive peer 47.1.1.2 source 47.1.1.1
ip prefix-list test_1 seq 20 deny 193.170.1.255/32
ip prefix-list test_1 seq 30 deny 194.170.1.255/32
ip prefix-list test_1 seq 40 deny 195.170.1.255/32
ip prefix-list test_1 seq 50 deny 196.170.1.255/32
ip prefix-list test_1 seq 60 permit 4.4.4.50/32
ip prefix-list test_1 seq 70 permit 80.80.80.80/32
!
!
!
!
route-map test_1 permit seq 10
        match ip address prefix-list test_1
!
router ospf 1
        router-id 113.11.1.3
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map test_1
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 113.11.1.5
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 113.11.2.5
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65537
        bgp router-id 113.11.1.3
        neighbor 13.13.13.13 remote-as 65537
        neighbor 13.13.13.13 update-source loopback 113
        neighbor 14.14.14.14 remote-as 65537
        neighbor 14.14.14.14 update-source loopback 113
        neighbor 48.1.1.2 remote-as 65535
        neighbor 48.1.2.2 remote-as 65535
        neighbor 193.170.1.255 remote-as 65535
        neighbor 193.170.1.255 ebgp-multihop 5
        neighbor 193.170.1.255 update-source loopback 113
        neighbor 194.170.1.255 remote-as 65535
        neighbor 194.170.1.255 ebgp-multihop 5
        neighbor 194.170.1.255 update-source loopback 113
        neighbor 195.170.1.255 remote-as 65536
        neighbor 195.170.1.255 ebgp-multihop 5
        neighbor 195.170.1.255 update-source loopback 113
        neighbor 196.170.1.255 remote-as 65536
        neighbor 196.170.1.255 ebgp-multihop 5
        neighbor 196.170.1.255 update-source loopback 113
        address-family ipv4 unicast
                neighbor 48.1.1.2 activate
                neighbor 48.1.2.2 activate
                redistribute connected
                redistribute local loopback
```

```
        exit-address-family
        address-family l2vpn evpn
                neighbor 13.13.13.13 next-hop-self
                neighbor 13.13.13.13 route-reflector-client
                neighbor 13.13.13.13 send-community extended
                neighbor 13.13.13.13 activate
                neighbor 14.14.14.14 next-hop-self
                neighbor 14.14.14.14 route-reflector-client
                neighbor 14.14.14.14 send-community extended
                neighbor 14.14.14.14 activate
                neighbor 193.170.1.255 send-community extended
                neighbor 193.170.1.255 activate
                neighbor 194.170.1.255 send-community extended
                neighbor 194.170.1.255 activate
                neighbor 195.170.1.255 send-community extended
                neighbor 195.170.1.255 activate
                neighbor 196.170.1.255 send-community extended
                neighbor 196.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================
Site-3-Border-vtep-primary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 3

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
113.13.1.3       n/a       FULL              80.1.1.0           1/1/31
113.14.1.3       n/a       FULL              80.1.2.0           1/1/34
113.12.1.3       1         FULL/DR           21.1.1.2           vlan2
VRF : vrf1                             Process : 1
================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
113.12.1.5       1         FULL/DR           63.0.1.2           vlan1001
```

```
VRF : vrf2                              Process : 1
==================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
113.12.1.5       1         FULL/DR           63.0.2.2           vlan1002

Site-3-Border-vtep-primary# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 113.11.1.3
Peers                  : 8            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
48.1.1.2      65535       625     629     08h:59m:50s  Established   Up
48.1.2.2      65535       627     628     08h:59m:50s  Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
13.13.13.13   65537       626     9215    08h:58m:34s  Established   Up
14.14.14.14   65537       626     9221    08h:58m:35s  Established   Up
193.170.1.255 65535       4979    6089    08h:59m:44s  Established   Up
194.170.1.255 65535       5177    6024    08h:59m:46s  Established   Up
195.170.1.255 65536       4931    6006    08h:59m:35s  Established   Up
196.170.1.255 65536       5284    6025    08h:59m:35s  Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 131.100.101.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 131.100.102.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
```

```
Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------
Site-3-Border-vtep-primary# show interface vxlan vteps
Source      Destination   Origin    Status           VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
-
8.8.8.8     4.4.4.50      evpn      operational      9002      enabled   --
vrf2
8.8.8.8     4.4.4.50      evpn      operational      16777214  enabled   --
vrf1
8.8.8.8     13.13.13.13   evpn      operational      2100      disabled  1501  --
8.8.8.8     13.13.13.13   evpn      operational      2101      disabled  1502  --
8.8.8.8     14.14.14.14   evpn      operational      2300      disabled  1701  --
8.8.8.8     14.14.14.14   evpn      operational      2301      disabled  1702  --
8.8.8.8     80.80.80.80   evpn      operational      9002      enabled   --
vrf2
8.8.8.8     80.80.80.80   evpn      operational      16777214  enabled   --
vrf1

Site-3-Border-vtep-primary# show ip pim bas
Invalid input: bas

Site-3-Border-vtep-primary# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information
VRF                        : vrf1
E-BSR Address              : 111.100.101.100
E-BSR Priority             : 0
E-BSR Hash Mask Length     : 30
E-BSR Up Time              : 39 mins 43 secs
Next Bootstrap Message     : 1 mins 27 secs

C-BSR Admin Status         : This system is not a Candidate-BSR

C-RP Admin Status          : This system is not a Candidate-RP

VRF                        : vrf2
E-BSR Address              : 111.100.102.100
E-BSR Priority             : 0
E-BSR Hash Mask Length     : 30
E-BSR Up Time              : 39 mins 34 secs
Next Bootstrap Message     : 1 mins 36 secs

C-BSR Admin Status         : This system is not a Candidate-BSR

C-RP Admin Status          : This system is not a Candidate-RP

Site-3-Border-vtep-primary# show ip pim rp-set all-vrfs
VRF: vrf1
Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.101.100  150        102          192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information
```

```
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.102.100  150        111          192

Site-3-Border-vtep-primary# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 5
--------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR         Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority  (HH:MM:SS)  Address (IPV4)
--------------------------------------------------------------------------------
vni16777214 4.4.4.50    09:00:10   00:03:24   1          00:03:30
vlan1501    15.1.1.10   09:00:29   00:01:18   134744072  00:01:45  Nil
vlan1701    15.3.1.10   09:00:28   00:01:22   134744072  00:01:45  Nil
vlan1001    63.0.1.2    09:00:32   00:01:19   134744072  00:01:45  Nil
vni16777214 80.80.80.80 04:18:41   00:03:24   1          00:03:30
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 5
--------------------------------------------------------------------------------
-
vni9002     4.4.4.50    09:00:02   00:03:05   1          00:03:30
vlan1502    15.1.2.10   09:00:29   00:01:18   134744072  00:01:45  Nil
vlan1702    15.3.2.10   09:00:31   00:01:19   134744072  00:01:45  Nil
vlan1002    63.0.2.2    09:00:29   00:01:18   134744072  00:01:45  Nil
vni9002     80.80.80.80 08:12:30   00:03:06   1          00:03:30
--------------------------------------------------------------------------------
-

Site-3-Border-vtep-primary# show ip mroute 226.5.1.1 all-vrfs detail

IP Multicast Route Entries

VRF : vrf1
Total number of entries : 1

Group Address                 : 226.5.1.1
Source Address                : 15.1.1.15
Neighbor                      :
Incoming interface            : vlan1501
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 00:39:13
Downstream Interface
Interface       State          Vteps
-----------     ----------     -----
vni16777214     forwarding     4.4.4.50, 80.80.80.80

Site-3-Border-vtep-primary# show ip mroute 229.5.1.1 all-vrfs detail

IP Multicast Route Entries

VRF : vrf1

Group Address                 : 229.5.1.1
Source Address                : 60.2.1.15
```

```
Neighbor                       : 4.4.4.50
Incoming interface             : vni16777214
Intra-Inter Forwarded VTEP(s)  :
Multicast Routing Protocol     : PIM-SM
Unicast Routing Protocol       : BGP
Metric                         : 0
Metric  Pref                   : 20
Uptime (HH:MM:SS)              : 03:51:06
Downstream Interface
Interface       State
-----------     ----------
vlan1501        forwarding
```

Site-3-Border-vtep-secondary

```
Current configuration:
!
!export-password: default
hostname Site-3-Border-vtep-secondary
no ip icmp redirect
profile leaf
route-redistribute active-routes-only
vrf vrf1
        rd 1:15
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 2:15
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vlan 1-2,1001-1002
vlan 1501
        ip igmp snooping enable
vlan 1502
        ip igmp snooping enable
vlan 1701
        ip igmp snooping enable
vlan 1702
        ip igmp snooping enable
virtual-mac 00:01:70:41:56:40
evpn
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 1501
                rd auto
                route-target export 1501:141
                route-target import 1501:141
                redistribute host-route
        vlan 1502
```

```
                rd auto
                route-target export 1502:142
                route-target import 1502:142
                redistribute host-route
        vlan 1701
                rd auto
                route-target export 1701:141
                route-target import 1701:141
                redistribute host-route
        vlan 1702
                rd auto
                route-target export 1702:142
                route-target import 1702:142
                redistribute host-route
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface 1/1/7
        description port_Site-1_Border-vtep-secondary
        no shutdown
        ip address 48.1.4.1/29
interface 1/1/10
        description port_Site-1_Border-vtep-primary
        no shutdown
        ip address 48.1.3.1/29
interface 1/1/19
        description port_isl
        no shutdown
        lag 120
interface 1/1/22
        description port_isl
        no shutdown
        lag 120
interface 1/1/25
        description port_ka
        no shutdown
        ip address 47.1.1.2/29
interface 1/1/31
        description port_Site-3-Access-vtep-2
        no shutdown
        ip address 80.1.3.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/34
        description port_Site-3-Access-vtep-1
        no shutdown
        ip address 80.1.4.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface loopback 1
        ip address 192.168.100.2/32
interface loopback 100
        ip address 192.168.100.255/32
interface loopback 112
        ip address 8.8.8.8/32
interface loopback 113
        ip address 198.170.1.255/32
interface loopback 201
```

```
        vrf attach vrf1
        ip address 132.100.101.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 202
        vrf attach vrf2
        ip address 132.100.102.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 2
        ip address 21.1.1.2/29
        ip ospf 1 area 0.0.0.0
interface vlan 1001
        vrf attach vrf1
        ip address 63.0.1.2/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1002
        vrf attach vrf2
        ip address 63.0.2.2/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1501
        vrf attach vrf1
        ip address 15.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.1.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1502
        vrf attach vrf2
        ip address 15.1.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.1.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1701
        vrf attach vrf1
        ip address 15.3.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.3.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1702
        vrf attach vrf2
        ip address 15.3.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.3.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vxlan 1
        source ip 8.8.8.8
        no shutdown
        vni 2100
                vlan 1501
        vni 2101
                vlan 1502
        vni 2300
```

```
                vlan 1701
        vni 2301
                vlan 1702
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
        system-mac 00:01:70:41:56:40
        inter-switch-link lag 120
        role secondary
        keepalive peer 47.1.1.1 source 47.1.1.2
ip prefix-list test_1 seq 20 deny 193.170.1.255/32
ip prefix-list test_1 seq 30 deny 194.170.1.255/32
ip prefix-list test_1 seq 40 deny 195.170.1.255/32
ip prefix-list test_1 seq 50 deny 196.170.1.255/32
ip prefix-list test_1 seq 60 permit 4.4.4.50/32
ip prefix-list test_1 seq 70 permit 80.80.80.80/32
!
!
!
!
route-map test_1 permit seq 10
        match ip address prefix-list test_1
!
router ospf 1
        router-id 113.12.1.3
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map test_1
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 113.12.1.5
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 113.12.1.5
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65537
        bgp router-id 113.12.1.3
        neighbor 13.13.13.13 remote-as 65537
        neighbor 13.13.13.13 update-source loopback 113
        neighbor 14.14.14.14 remote-as 65537
        neighbor 14.14.14.14 update-source loopback 113
        neighbor 48.1.3.2 remote-as 65535
        neighbor 48.1.4.2 remote-as 65535
        neighbor 193.170.1.255 remote-as 65535
        neighbor 193.170.1.255 ebgp-multihop 5
        neighbor 193.170.1.255 update-source loopback 113
        neighbor 194.170.1.255 remote-as 65535
        neighbor 194.170.1.255 ebgp-multihop 5
        neighbor 194.170.1.255 update-source loopback 113
        neighbor 195.170.1.255 remote-as 65536
        neighbor 195.170.1.255 ebgp-multihop 5
```

```
        neighbor 195.170.1.255 update-source loopback 113
        neighbor 196.170.1.255 remote-as 65536
        neighbor 196.170.1.255 ebgp-multihop 5
        neighbor 196.170.1.255 update-source loopback 113
        address-family ipv4 unicast
                neighbor 48.1.3.2 activate
                neighbor 48.1.4.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 13.13.13.13 next-hop-self
                neighbor 13.13.13.13 route-reflector-client
                neighbor 13.13.13.13 send-community extended
                neighbor 13.13.13.13 activate
                neighbor 14.14.14.14 next-hop-self
                neighbor 14.14.14.14 route-reflector-client
                neighbor 14.14.14.14 send-community extended
                neighbor 14.14.14.14 activate
                neighbor 193.170.1.255 send-community extended
                neighbor 193.170.1.255 activate
                neighbor 194.170.1.255 send-community extended
                neighbor 194.170.1.255 activate
                neighbor 195.170.1.255 send-community extended
                neighbor 195.170.1.255 activate
                neighbor 196.170.1.255 send-community extended
                neighbor 196.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
router pim vrf vrf1
        enable
router pim vrf vrf2
        enable
https-server vrf default
https-server vrf mgmt

=======================================
Show command outputs for  validation
=======================================

Site-3-Border-vtep-secondary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 3

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
```

```
113.14.1.3       n/a       FULL              80.1.3.0          1/1/31
113.13.1.3       n/a       FULL              80.1.4.0          1/1/34
113.11.1.3       1         FULL/BDR          21.1.1.1          vlan2

VRF : vrf1                              Process : 1
================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
113.11.1.5       1         FULL/BDR          63.0.1.1           vlan1001

VRF : vrf2                              Process : 1
================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
113.11.2.5       1         FULL/BDR          63.0.2.1           vlan1002

Site-3-Border-vtep-secondary# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 113.12.1.3
Peers                  : 8            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
48.1.3.2      65535       630     631     09h:02m:14s  Established   Up
48.1.4.2      65535       632     636     09h:02m:14s  Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
13.13.13.13   65537       629     8544    09h:00m:56s  Established   Up
14.14.14.14   65537       625     8547    09h:00m:59s  Established   Up
193.170.1.255 65535       5210    5533    09h:02m:06s  Established   Up
194.170.1.255 65535       5419    5400    09h:02m:09s  Established   Up
195.170.1.255 65536       5125    5456    09h:01m:59s  Established   Up
196.170.1.255 65536       5439    5401    09h:01m:59s  Established   Up

Codes: * Dynamic Neighbor

VRF : vrf1
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 132.100.101.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
```

```
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 132.100.102.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Site-3-Border-vtep-secondary# show interface vxlan vteps
Source    Destination   Origin   Status           VNI       Routing   VLAN  VRF
--------------- --------------- ------------ --------------------- ----------
8.8.8.8   4.4.4.50      evpn     operational      9002      enabled   --     vrf2
8.8.8.8   4.4.4.50      evpn     operational      16777214  enabled   --     vrf1
8.8.8.8   13.13.13.13   evpn     operational      2100      disabled  1501   --
8.8.8.8   13.13.13.13   evpn     operational      2101      disabled  1502   --
8.8.8.8   14.14.14.14   evpn     operational      2300      disabled  1701   --
8.8.8.8   14.14.14.14   evpn     operational      2301      disabled  1702   --
8.8.8.8   80.80.80.80   evpn     operational      9002      enabled   --     vrf2
8.8.8.8   80.80.80.80   evpn     operational      16777214  enabled   --     vrf1

Site-3-Border-vtep-secondary# show ip pim bsr all-vrfs
Status and Counters- PIM-SM Bootstrap Router Information

VRF                        : vrf1
E-BSR Address              : 111.100.101.100
E-BSR Priority             : 0
E-BSR Hash Mask Length     : 30
E-BSR Up Time              : 42 mins 11 secs
Next Bootstrap Message     : 1 mins 59 secs

C-BSR Admin Status         : This system is not a Candidate-BSR

C-RP Admin Status          : This system is not a Candidate-RP

VRF                        : vrf2
E-BSR Address              : 111.100.102.100
E-BSR Priority             : 0
E-BSR Hash Mask Length     : 30
E-BSR Up Time              : 42 mins 2 secs
Next Bootstrap Message     : 2 mins 8 secs

C-BSR Admin Status         : This system is not a Candidate-BSR

C-RP Admin Status          : This system is not a Candidate-RP

Site-3-Border-vtep-secondary# show ip pim rp-set all-vrfs
VRF: vrf1
Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
```

```
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.101.100  150        126          192

VRF: vrf2

Status and Counters - PIM-SM Learned RP-Set Information

Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        111.100.102.100  150        135          192

Site-3-Border-vtep-secondary# show ip pim  neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 5
--------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR         Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority  (HH:MM:SS)  Address (IPV4)
--------------------------------------------------------------------------------
vni16777214 4.4.4.50    09:02:51   00:03:13   1          00:03:30
vlan1501    15.1.1.10   09:03:10   00:01:39   134744072  00:01:45   Nil
vlan1701    15.3.1.10   09:03:06   00:01:42   134744072  00:01:45   Nil
vlan1001    63.0.1.1    09:03:11   00:01:37   134744072  00:01:45   Nil
vni16777214 80.80.80.80 04:21:22   00:03:14   1          00:03:30
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 5
--------------------------------------------------------------------------------
-
vni16777214 80.80.80.80 04:21:22   00:03:14   1          00:03:30
vni9002     4.4.4.50    09:02:43   00:03:24   1          00:03:30
vlan1502    15.1.2.10   09:03:10   00:01:40   134744072  00:01:45  Nil
vlan1702    15.3.2.10   09:03:10   00:01:38   134744072  00:01:45  Nil
vlan1002    63.0.2.1    09:03:13   00:01:42   134744072  00:01:45  Nil
vni9002     80.80.80.80 08:15:10   00:03:26   1          00:03:30
--------------------------------------------------------------------------------
-
Site-3-Border-vtep-secondary# show ip mroute 229.5.1.1 all-vrfs detail

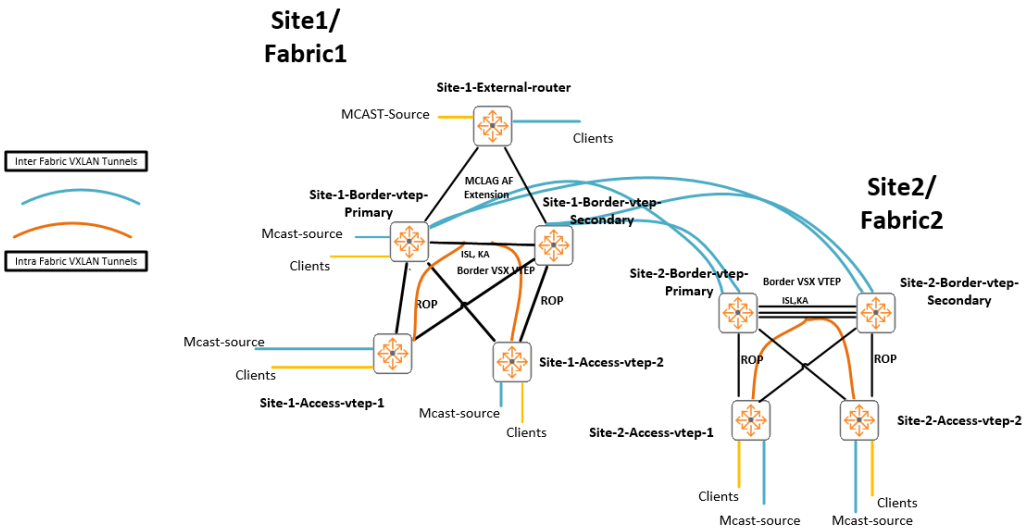
IP Multicast Route Entries

VRF : vrf1

Group Address                 : 229.5.1.1
Source Address                : 60.2.1.15
Neighbor                      : 4.4.4.50
Incoming interface            : vni16777214
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 03:53:33
Downstream Interface
Interface       State
-----------     ----------
vlan1501        forwarding
```

Use case 3: one fabric per site (PIM-SSM)

Figure 1 *Use case 3: one fabric per site (PIM-SSM)*



Configuration and verification details for the devices in this use case are provided in the following sections:

- Site-1-Access-vtep-1
- Site-1-Access-vtep-2
- Site-1-Border-vtep-Primary
- Site-1-Border-vtep-Secondary
- Site-1-External-router
- Site-2-Access-vtep-1
- Site-2-Access-vtep-2
- Site-2-Border-vtep-Primary
- Site-2-Border-vtep-Secondary

Site-1-Access-vtep-1

```
hostname Site-1-Access-vtep-1
vrf vrf1
        rd 31:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 32:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
ssh server vrf default
ssh server vrf mgmt
access-list ip ssm_map_vrf2
        10 permit any 11.1.51.100 225.5.0.2
        20 permit any 11.1.51.100 225.6.0.2
        30 permit any 11.1.51.100 225.1.0.2
        40 permit any 11.1.51.100 226.5.0.2
access-list ip vrf2_ssm_acl
        10 permit any any 225.5.0.2
```

```
        20 permit any any 225.6.0.2
        30 permit any any 226.5.0.2
        40 permit any any 225.1.0.2
vlan 101
        ip igmp snooping enable
vlan 111
        ip igmp snooping enable
virtual-mac 00:01:20:11:56:20
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
        vlan 101
                rd auto
                route-target export 101:101
                route-target import 101:101
                redistribute host-route
        vlan 111
                rd auto
                route-target export 111:111
                route-target import 111:111
                redistribute host-route
interface mgmt
        no shutdown
        ip dhcp
interface 1/1/5
        description port_Site-1-Border-vtep-Primary
        no shutdown
        ip address 30.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/6
        description port_Site-1-Border-vtep-Secondary
        no shutdown
        ip address 31.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/7
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 101,111
interface loopback 1
        ip address 192.168.1.5/32
        ip ospf 1 area 0.0.0.0
interface vlan 101
        vrf attach vrf1
        ip address 11.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.1.10
        ip igmp enable
        ip pim-sparse enable
interface vlan 111
        vrf attach vrf2
        ip address 11.1.11.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.11.10
        ip igmp enable
        ip igmp apply ssm-map access-list ssm_map_vrf2
        ip pim-sparse enable
```

```
interface vxlan 1
        source ip 192.168.1.5
        no shutdown
        vni 2000
                vlan 101
        vni 2010
                vlan 111
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
!
!
router ospf 1
        router-id 111.13.1.3
        redistribute local loopback
        area 0.0.0.0
router bgp 65535
        bgp router-id 111.13.1.3
        neighbor 192.168.1.1 remote-as 65535
        neighbor 192.168.1.1 update-source loopback 1
        neighbor 192.168.1.2 remote-as 65535
        neighbor 192.168.1.2 update-source loopback 1
        address-family l2vpn evpn
                neighbor 192.168.1.1 send-community extended
                neighbor 192.168.1.1 activate
                neighbor 192.168.1.2 send-community extended
                neighbor 192.168.1.2 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute ospf
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute ospf
                exit-address-family
!
router pim vrf vrf1
        enable
        pim-ssm
router pim vrf vrf2
        enable
        pim-ssm
        pim-ssm range-access-list vrf2_ssm_acl
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================
Site-1-Access-vtep-1# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2
```

```
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.11.1.3       n/a       FULL              30.1.1.1           1/1/5
111.12.1.3       n/a       FULL              31.1.1.1           1/1/6

Site-1-Access-vtep-1# show bgp l2vpn evpn summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.13.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Neighbor      Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
192.168.1.1   65535       105     88      01h:05m:13s  Established   Up
192.168.1.2   65535       104     87      01h:05m:21s  Established   Up

Site-1-Access-vtep-1# show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 2
-------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires    DR        Hold Time  Secondary
           (IPV4)       (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  Address (IPV4)
-------------------------------------------------------------------------------
vni16777214 5.5.5.50     01:05:18   00:03:15   1         00:03:30
vlan101     11.1.1.10    01:05:11   00:01:35   839189765 00:01:45   Nil
-------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 2
-------------------------------------------------------------------------------
-
vni9002     5.5.5.50     00:41:15   00:03:24   1         00:03:30
vlan111     11.1.11.10   00:41:27   00:01:29   839189765 00:01:45   Nil
-------------------------------------------------------------------------------
-
Site-1-Access-vtep-1# show ip pim rp-set all-vrfs
Site-1-Access-vtep-1# show ip pim bsr elected all-vrfs

Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                       : vrf1
E-BSR Address             :
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 0
E-BSR Up Time             : 0 secs
Next Bootstrap Message    : 0 secs

VRF                       : vrf2
E-BSR Address             :
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 0
E-BSR Up Time             : 0 secs
Next Bootstrap Message    : 0 secs

Site-1-Access-vtep-1# show ip mroute brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of entries : 2
-------------------------------------------------------------------------------
-
```

```
Group Address    Source Address   Neighbor       Interface      Uptime       State
                                                               (HH:MM:SS)
---------------  ---------------  ------------   -----------    ----------   -----
-
232.5.0.1        60.1.25.100                     vlan101        00:21:22
bridge
232.6.0.1        60.1.25.100                     vlan101        00:21:22
bridge
-------------------------------------------------------------------------------
-
VRF : vrf2                            Total number of entries : 2
-------------------------------------------------------------------------------
-
225.5.0.2        11.1.51.100                     vlan111        00:31:51
bridge
225.6.0.2        11.1.51.100                     vlan111        00:31:57
bridge
-------------------------------------------------------------------------------
-

Site-1-Access-vtep-1# show ip mroute 232.5.0.1 vrf vrf1
IP Multicast Route Entries
VRF : vrf1
Total number of entries : 1
Group Address                  : 232.5.0.1
Source Address                 : 60.1.25.100
Neighbor                       :
Incoming interface             : vlan101
Multicast Routing Protocol     : PIM-SSM
Unicast Routing Protocol       : BGP
Metric                         : 0
Metric  Pref                   : 200
Uptime (HH:MM:SS)              : 00:21:29

Site-1-Access-vtep-1# show ip mroute 232.6.0.1 vrf vrf1
IP Multicast Route Entries
VRF : vrf1
Total number of entries : 1
Group Address                  : 232.6.0.1
Source Address                 : 60.1.25.100
Neighbor                       :
Incoming interface             : vlan101
Multicast Routing Protocol     : PIM-SSM
Unicast Routing Protocol       : BGP
Metric                         : 0
Metric  Pref                   : 200
Uptime (HH:MM:SS)              : 00:21:33

Site-1-Access-vtep-1# show ip mroute 225.5.0.2 vrf vrf2
IP Multicast Route Entries
VRF : vrf2
Total number of entries : 1
Group Address                  : 225.5.0.2
Source Address                 : 11.1.51.100
Neighbor                       :
Incoming interface             : vlan111
Multicast Routing Protocol     : PIM-SSM
Unicast Routing Protocol       : BGP
Metric                         : 0
Metric  Pref                   : 200
Uptime (HH:MM:SS)              : 00:32:14
```

```
Site-1-Access-vtep-1# show ip mroute 225.6.0.2 vrf vrf2
IP Multicast Route Entries
VRF : vrf2
Total number of entries : 1
Group Address                 : 225.6.0.2
Source Address                : 11.1.51.100
Neighbor                      :
Incoming interface            : vlan111
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 00:32:24

Site-1-Access-vtep-1# show ip igmp snooping vlan 111 group 225.5.0.2
IGMP ports and group information for group 225.5.0.2
VLAN ID   : 111
VLAN Name : VLAN111
Group Address : 225.5.0.2
Last Reporter : 11.1.11.100
Group Type    : Filter

                                              V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
vxlan1(2.2.2.2) 3    INC  23m 25s   3m 15s                        1         0

Group Address  : 225.5.0.2
Source Address : 11.1.51.100
Source Type    : Filter

Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
vxlan1(2.2.2.2)          INC  23m 25s   3m 15s    Auto

Site-1-Access-vtep-1# show ip igmp snooping vlan 111 group 225.6.0.2
IGMP ports and group information for group 225.6.0.2
VLAN ID   : 111
VLAN Name : VLAN111
Group Address : 225.6.0.2
Last Reporter : 11.1.11.50
Group Type    : Filter

                                              V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
1/1/7           3    INC  24m 12s   3m 10s                        1         0

Group Address  : 225.6.0.2
Source Address : 11.1.51.100
Source Type    : Filter

Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
1/1/7                    INC  24m 12s   3m 10s    Auto

Site-1-Access-vtep-1# show ip igmp ssm-map all-vrfs

IGMP SSM-map Information.
```

```
VRF Name   : default
Interface Name   SSM-map ACL name
--------------  ----------------

IGMP is not enabled on any of the interfaces.
No interfaces found for VRF mgmt.
VRF Name   : vrf1
Interface Name   SSM-map ACL name
--------------  ----------------

VRF Name   : vrf2
Interface Name   SSM-map ACL name
--------------  ----------------
vlan111           ssm_map_vrf2

Site-1-Access-vtep-1# show ip pim vrf vrf1

PIM Global Parameters

VRF                              :  vrf1
PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive

Site-1-Access-vtep-1# show ip pim vrf vrf2

PIM Global Parameters

VRF                              :  vrf2
PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  vrf2_ssm_acl
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
Site-1-Access-vtep-1#
Site-1-Access-vtep-1# show interface vxlan vteps
Source       Destination   Origin    Status          VNI       Routing   VLAN  VRF
-------------------------------------------- ----------------------------------
-
192.168.1.5  2.2.2.2       evpn      operational     2000      disabled  101   --
192.168.1.5  2.2.2.2       evpn      operational     2010      disabled  111   --
192.168.1.5  5.5.5.50      evpn      operational     2000      disabled  101   --
192.168.1.5  5.5.5.50      evpn      operational     2010      disabled  111   --
192.168.1.5  5.5.5.50      evpn      operational     9002      enabled   --
vrf2
192.168.1.5  5.5.5.50      evpn      operational     16777214  enabled   --
vrf1
Site-1-Access-vtep-1#
```

Site-1-Access-vtep-2

```
hostname Site-1-Access-vtep-2
profile leaf
cli-session
        timeout 0
```

```
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vlan 1
vlan 101
        ip igmp snooping enable
vlan 111
        ip igmp snooping enable
virtual-mac 00:01:20:11:56:25
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
        vlan 101
                rd auto
                route-target export 101:101
                route-target import 101:101
                redistribute host-route
        vlan 111
                rd auto
                route-target export 111:111
                route-target import 111:111
                redistribute host-route
interface 1/1/25
        description port_Site-1-Border-vtep-Primary
        no shutdown
        ip address 30.1.2.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/26
        description port_Site-1-Border-vtep-Secondary
        no shutdown
        ip address 31.1.2.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/27
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 101,111
interface loopback 1
        ip address 2.2.2.2/32
        ip ospf 1 area 0.0.0.0
interface vxlan 1
        source ip 2.2.2.2
        no shutdown
        vni 2000
                vlan 101
        vni 2010
                vlan 111
!
!
!
!
!
```

```
router ospf 1
        router-id 111.14.1.3
        redistribute local loopback
        area 0.0.0.0
router bgp 65535
        bgp router-id 111.14.1.3
        neighbor 192.168.1.1 remote-as 65535
        neighbor 192.168.1.1 update-source loopback 1
        neighbor 192.168.1.2 remote-as 65535
        neighbor 192.168.1.2 update-source loopback 1
        address-family l2vpn evpn
                neighbor 192.168.1.1 send-community extended
                neighbor 192.168.1.1 activate
                neighbor 192.168.1.2 send-community extended
                neighbor 192.168.1.2 activate
        exit-address-family
!
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================

Site-1-Access-vtep-2# show ip ospf neighbors all-vrfs

VRF : default                          Process : 1
==================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.11.1.3       n/a       FULL              30.1.2.1           1/1/25
111.12.1.3       n/a       FULL              31.1.2.1           1/1/26

Site-1-Access-vtep-2# show bgp l2vpn evpn summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.14.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Neighbor      Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
192.168.1.1   65535       116     86      01h:07m:15s  Established   Up
192.168.1.2   65535       113     86      01h:07m:11s  Established   Up

Site-1-Access-vtep-2# show interface vxlan vteps
Source    Destination   Origin   Status           VNI       Routing   VLAN  VRF
--------------- --------------- ------------ -------------------- --------- ---
-
2.2.2.2   192.168.1.5   evpn     operational      2000      disabled  101    --
2.2.2.2   192.168.1.5   evpn     operational      2010      disabled  111    --
2.2.2.2   5.5.5.50      evpn     operational      2000      disabled  101    --
2.2.2.2   5.5.5.50      evpn     operational      2010      disabled  111    --

Site-1-Access-vtep-2# show ip igmp snooping
IGMP Snooping Protocol Info
Total VLANs with IGMP enabled             : 2
Current count of multicast groups joined  : 4
IGMP Drop Unknown Multicast               : Global
```

```
VLAN ID : 101
VLAN Name : VLAN101
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 11.1.1.10
Querier Port : vxlan1(192.168.1.5)
Querier UpTime :1h 7m
Querier Expiration Time :4m 6s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
232.5.0.1              Filter    3    INC  24m 34s   4m 18s
232.6.0.1              Filter    3    INC  25m 10s   4m 17s
VLAN ID : 111
VLAN Name : VLAN111
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 11.1.11.10
Querier Port : vxlan1(192.168.1.5)
Querier UpTime :1h 7m
Querier Expiration Time :4m 6s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.5.0.2              Filter    2         24m 34s   4m 12s
225.6.0.2              Filter    2         1h 7m     4m 15s

Site-1-Access-vtep-2# show ip igmp snooping vlan 111 group 225.5.0.2
IGMP ports and group information for group 225.5.0.2
VLAN ID   : 111
VLAN Name : VLAN111
Group Address : 225.5.0.2
Last Reporter : 11.1.11.100
Group Type    : Filter
                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
1/1/27          2    EXC  24m 58s   3m 48s              3m 48s    0         0

Site-1-Access-vtep-2# show ip igmp snooping vlan 111 group 225.6.0.2
IGMP ports and group information for group 225.6.0.2
VLAN ID   : 111
VLAN Name : VLAN111
Group Address : 225.6.0.2
Last Reporter : 11.1.11.50
Group Type    : Filter
                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
vxlan1(192.168.1.5)      2    EXC  1h 7m     3m 43s    3m 43s    0         0

Site-1-Access-vtep-2# show ip igmp snooping vlan 101 group 232.5.0.1
IGMP ports and group information for group 232.5.0.1

VLAN ID   : 101
VLAN Name : VLAN101

Group Address : 232.5.0.1
Last Reporter : 11.1.1.100
Group Type    : Filter
```

```
                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires     Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
1/1/27          3    INC  25m 24s   3m 28s                         1         0

Group Address  : 232.5.0.1
Source Address : 60.1.25.100
Source Type    : Filter

Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
1/1/27                   INC  25m 24s   3m 28s    Auto

Site-1-Access-vtep-2# show ip igmp snooping vlan 101 group 232.6.0.1
IGMP ports and group information for group 232.6.0.1
VLAN ID   : 101
VLAN Name : VLAN101
Group Address : 232.6.0.1
Last Reporter : 11.1.1.50
Group Type    : Filter

                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires     Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
vxlan1(192.168.1.5)      3    INC  26m 8s    3m 19s              1         0

Group Address  : 232.6.0.1
Source Address : 60.1.25.100
Source Type    : Filter

Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
vxlan1(192.168.1.5)      INC  26m 8s    3m 19s    Auto

Site-1-Access-vtep-2#
```

Site-1-Border-vtep-Primary

```
hostname Site-1-Border-vtep-Primary
no ip icmp redirect
profile default
route-redistribute active-routes-only
vrf ka
vrf vrf1
        rd 1:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 2:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
```

```
!
ssh server vrf default
ssh server vrf mgmt
access-list ip ssm_map_vrf2
        vsx-sync
        !
        10 permit any 11.1.51.100 225.5.0.2
        20 permit any 11.1.51.100 225.6.0.2
        30 permit any 11.1.51.100 225.1.0.2
        40 permit any 11.1.51.100 226.5.0.2
access-list ip vrf2_ssm_acl
        vsx-sync
        !
        10 permit any any 225.5.0.2
        20 permit any any 225.6.0.2
        30 permit any any 226.5.0.2
        40 permit any any 225.1.0.2
vlan 101
        ip igmp snooping enable
vlan 111
        ip igmp snooping enable
vlan 751, 1015-1016
vlan 1045
        ip igmp snooping enable
vlan 1046
        ip igmp snooping enable
vlan 2007,3015-3016
virtual-mac 00:01:20:11:56:10
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 101
                rd auto
                route-target export 101:101
                route-target import 101:101
                redistribute host-route
        vlan 111
                rd auto
                route-target export 111:111
                route-target import 111:111
                redistribute host-route
interface lag 10 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1015-1016
        lacp mode active
        lacp rate fast
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1,101,111,751,1015-1016,2007,3015-3016
        lacp mode active
        lacp rate fast
interface 1/3/1
        description port_Site-1-External-router
        no shutdown
        lag 10
```

```
interface 1/3/2
        description port_isl
        no shutdown
        lag 120
interface 1/5/3
        description port_Site-1-Access-vtep-1
        no shutdown
        routing
        ip address 30.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/5/4
        description port_Site-1-Access-vtep-2
        no shutdown
        routing
        ip address 30.1.2.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/5/7
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1045-1046
interface 1/6/5
        description port_Site-2-Border-vtep-Primary
        no shutdown
        routing
        ip address 40.1.1.1/29
interface 1/6/6
        description port_Site-2-Border-vtep-Secondary
        no shutdown
        routing
        ip address 40.1.2.1/29
interface loopback 1
        ip address 192.168.1.1/32
interface loopback 100
        ip address 192.168.1.255/32
interface loopback 101
        vrf attach vrf1
        ip address 222.22.1.2/32
        ip pim-sparse enable
interface loopback 102
        vrf attach vrf2
        ip address 101.101.101.101/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 112
        ip address 5.5.5.50/32
interface loopback 113
        ip address 193.170.1.255/32
interface vlan 101
        vrf attach vrf1
        ip address 11.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 111
        vrf attach vrf2
        ip address 11.1.11.10/24
```

```
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.11.10
        ip igmp enable
        ip igmp apply ssm-map access-list ssm_map_vrf2
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 751
        no shutdown
        ip address 171.1.1.1/30
        ip ospf 1 area 0.0.0.0
interface vlan 1015
        vrf attach vrf1
        vsx active-forwarding
        ip address 60.1.15.5/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1016
        vrf attach vrf2
        vsx active-forwarding
        ip address 60.1.16.5/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1045
        vrf attach vrf1
        ip address 60.1.45.1/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
interface vlan 1046
        vrf attach vrf2
        ip address 60.1.46.1/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
interface vlan 2007
        description port_ka
        vrf attach ka
        ip address 46.1.1.1/29
interface vlan 3015
        vrf attach vrf1
        ip address 60.3.15.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 3016
        vrf attach vrf2
        ip address 60.3.16.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vxlan 1
        source ip 5.5.5.50
        no shutdown
        vni 2000
                vlan 101
        vni 2010
                vlan 111
        vni 9002
                vrf vrf2
                routing
```

```
        vni 16777214
                vrf vrf1
        routing
vsx
        inter-switch-link lag 120
        role primary
        keepalive peer 46.1.1.2 source 46.1.1.1 vrf ka
!
route-map tag_bgp_ospf permit seq 10
        set tag 110
route-map tag_ospf_bgp deny seq 10
        match tag 110
route-map tag_ospf_bgp deny seq 20
        match tag 120
route-map tag_ospf_bgp permit seq 30
!
!
!
!
router ospf 1
        router-id 111.11.1.3
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 111.11.1.5
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 111.11.2.5
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router bgp 65535
        bgp router-id 111.11.1.3
        neighbor 2.2.2.2 remote-as 65535
        neighbor 2.2.2.2 update-source loopback 1
        neighbor 40.1.1.2 remote-as 65536
        neighbor 40.1.2.2 remote-as 65536
        neighbor 192.168.1.5 remote-as 65535
        neighbor 192.168.1.5 update-source loopback 1
        neighbor 195.170.1.255 remote-as 65536
        neighbor 195.170.1.255 ebgp-multihop 5
        neighbor 195.170.1.255 update-source loopback 113
        neighbor 196.170.1.255 remote-as 65536
        neighbor 196.170.1.255 ebgp-multihop 5
        neighbor 196.170.1.255 update-source loopback 113
        address-family ipv4 unicast
                neighbor 40.1.1.2 activate
                neighbor 40.1.2.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 2.2.2.2 next-hop-self
```

```
                neighbor 2.2.2.2 route-reflector-client
                neighbor 2.2.2.2 send-community extended
                neighbor 2.2.2.2 activate
                neighbor 192.168.1.5 next-hop-self
                neighbor 192.168.1.5 route-reflector-client
                neighbor 192.168.1.5 send-community extended
                neighbor 192.168.1.5 activate
                neighbor 195.170.1.255 send-community extended
                neighbor 195.170.1.255 activate
                neighbor 196.170.1.255 send-community extended
                neighbor 196.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf vrf1
        enable
        pim-ssm
router pim vrf vrf2
        enable
        pim-ssm
        pim-ssm range-access-list vrf2_ssm_acl
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================
Site-1-Border-vtep-Primary# show ip ospf neighbors
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.13.1.3       n/a       FULL              30.1.1.0           1/5/3
111.14.1.3       n/a       FULL              30.1.2.0           1/5/4

Site-1-Border-vtep-Primary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.13.1.3       n/a       FULL              30.1.1.0           1/5/3
111.14.1.3       n/a       FULL              30.1.2.0           1/5/4

VRF : vrf1                             Process : 1
```

```
================================================

Total Number of Neighbors : 3

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.1.5       1         FULL/DROther      60.1.15.6          vlan1015
111.12.1.5       1         FULL/DR           60.1.15.3          vlan1015
111.12.1.5       1         FULL/DR           60.3.15.2          vlan3015
VRF : vrf2                              Process : 1
================================================

Total Number of Neighbors : 3

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.2.5       1         FULL/DROther      60.1.16.6          vlan1016
111.12.2.5       1         FULL/DR           60.1.16.3          vlan1016
111.12.2.5       1         FULL/DR           60.3.16.2          vlan3016

Site-1-Border-vtep-Primary# show bgp l2vpn evpn summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.11.1.3
Peers                  : 4            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Neighbor      Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
2.2.2.2       65535       68      98      00h:52m:00s  Established   Up
192.168.1.5   65535       73      90      00h:51m:48s  Established   Up
195.170.1.255 65536       90      100     00h:52m:06s  Established   Up
196.170.1.255 65536       94      98      00h:52m:00s  Established   Up

Site-1-Border-vtep-Primary# show interface vxlan vteps
Source     Destination  Origin  Status             VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
5.5.5.50   192.168.1.5  evpn    operational        2000      disabled  101    --
5.5.5.50   192.168.1.5  evpn    operational        2010      disabled  111    --
5.5.5.50   192.168.1.5  evpn    operational        9002      enabled   --     vrf2
5.5.5.50   192.168.1.5  evpn    operational        16777214  enabled   --     vrf1
5.5.5.50   2.2.2.2      evpn    operational        2000      disabled  101    --
5.5.5.50   2.2.2.2      evpn    operational        2010      disabled  111    --
5.5.5.50   80.80.80.80  evpn    operational        9002      enabled   --     vrf2
5.5.5.50   80.80.80.80  evpn    operational        16777214  enabled   --     vrf1

Site-1-Border-vtep-Primary# show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 6
-------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires    DR        Hold Time  Secondary
            (IPV4)       (HH:MM:SS) (HH:MM:SS) Priority (HH:MM:SS) Address (IPV4)
-------------------------------------------------------------------------------
vlan101     11.1.1.10    00:51:57   00:01:23   839189765 00:01:45   Nil
vlan1015    60.1.15.3    00:52:18   00:01:29   839189765 00:01:45   Nil
vlan1015    60.1.15.6    00:52:18   00:01:29   1         00:01:45   Nil
vlan3015    60.3.15.2    00:52:21   00:01:28   839189765 00:01:45   Nil
vni16777214 80.80.80.80  00:52:05   00:03:30   1         00:03:30
vni16777214 192.168.1.5  00:52:02   00:03:28   1         00:03:30
```

```
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 6
--------------------------------------------------------------------------------
-
vlan111     11.1.11.10    00:28:31   00:01:39   839189765 00:01:45   Nil
vlan1016    60.1.16.3     00:28:44   00:01:36   839189765 00:01:45   Nil
vlan1016    60.1.16.6     00:28:42   00:01:37   1         00:01:45   Nil
vlan3016    60.3.16.2     00:28:27   00:01:21   839189765 00:01:45   Nil
vni9002     80.80.80.80   00:28:33   00:03:05   1         00:03:30
vni9002     192.168.1.5   00:28:25   00:03:02   1         00:03:30
--------------------------------------------------------------------------------
-

Site-1-Border-vtep-Primary# show ip pim rp-set all-vrfs
Site-1-Border-vtep-Primary# show ip pim bsr elected all-vrfs
Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                       : vrf1
E-BSR Address             :
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 0
E-BSR Up Time             : 0 secs
Next Bootstrap Message    : 0 secs

VRF                       : vrf2
E-BSR Address             :
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 0
E-BSR Up Time             : 0 secs
Next Bootstrap Message    : 0 secs

Site-1-Border-vtep-Primary#
Site-1-Border-vtep-Primary# show ip mroute vrf vrf1
IP Multicast Route Entries

VRF : vrf1
Total number of entries : 4

Group Address           : 232.5.0.1
Source Address          : 60.1.25.100
SSM Mroute              : True
Neighbor                : 60.1.15.6
Uptime                  : 00:07:58
State                   : route
Incoming interface      : vlan1015
Outgoing Interface List :
Interface       State
-----------     ----------
vni16777214     forwarding
vlan101         forwarding

Group Address           : 232.5.0.1
Source Address          : 60.1.25.100
SSM Mroute              : True
Neighbor                : 60.1.15.6
Uptime                  : 00:07:58
State                   : bridge
Incoming interface      : vlan101

Group Address           : 232.6.0.1
Source Address          : 60.1.25.100
```

```
SSM Mroute              : True
Neighbor                : 60.1.15.6
Uptime                  : 00:07:59
State                   : route
Incoming interface      : vlan1015
Outgoing Interface List :
Interface       State
-----------     ----------
vlan101         forwarding
vni16777214     forwarding

Group Address           : 232.6.0.1
Source Address          : 60.1.25.100
SSM Mroute              : True
Neighbor                : 60.1.15.6
Uptime                  : 00:07:59
State                   : bridge
Incoming interface      : vlan101

Site-1-Border-vtep-Primary# show ip mroute vrf vrf2
IP Multicast Route Entries

VRF : vrf2
Total number of entries : 5

Group Address           : 225.1.0.2
Source Address          : 11.1.51.100
SSM Mroute              : True
Neighbor                : 60.3.16.2
Uptime                  : 00:13:45
State                   : route
Incoming interface      : vlan3016
Outgoing Interface List :
Interface       State
-----------     ----------
vlan1016        forwarding
Group Address           : 225.1.0.2
Source Address          : 11.1.51.100
SSM Mroute              : True
Neighbor                : 80.80.80.80
Uptime                  : 00:13:45
State                   : route
Incoming interface      : vni9002
Outgoing Interface List :
Interface       State
-----------     ----------
vlan1016        forwarding
vlan3016        forwarding

Group Address           : 225.1.0.2
Source Address          : 11.1.51.100
SSM Mroute              : True
Neighbor                : 80.80.80.80
Uptime                  : 00:13:45
State                   : bridge
Incoming interface      : vlan1016
Group Address           : 225.5.0.2
Source Address          : 11.1.51.100
SSM Mroute              : True
Neighbor                : 80.80.80.80
Uptime                  : 00:18:31
State                   : route
```

```
Incoming interface      : vni9002
Outgoing Interface List :
Interface       State
-----------     ----------
vlan111         forwarding
vlan3016        forwarding

Group Address           : 225.6.0.2
Source Address          : 11.1.51.100
SSM Mroute              : True
Neighbor                : 80.80.80.80
Uptime                  : 00:18:38
State                   : route
Incoming interface      : vni9002
Outgoing Interface List :
Interface       State
-----------     ----------
vlan111         forwarding
vlan3016        forwarding

Site-1-Border-vtep-Primary# show ip mroute 232.5.0.1 vrf vrf1
IP Multicast Route Entries

VRF : vrf1
Total number of entries : 2

Group Address                 : 232.5.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan1015
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:08:29
Downstream Interface
Interface       State
-----------     ----------
vni16777214     forwarding
vlan101         forwarding

Group Address                 : 232.5.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan101
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:08:30

Site-1-Border-vtep-Primary# show ip mroute 225.5.0.2 vrf vrf2

IP Multicast Route Entries

VRF : vrf2

Group Address                 : 225.5.0.2
Source Address                : 11.1.51.100
Neighbor                      : 80.80.80.80
```

```
Incoming interface            : vni9002
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:19:16
Downstream Interface
Interface       State
-----------     ----------
vlan111         forwarding
vlan3016        forwarding

Site-1-Border-vtep-Primary# show ip mroute 232.16.0.1 all-vrfs

IP Multicast Route Entries

VRF : vrf1
Total number of entries : 1

Group Address                 : 232.16.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan1015
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:00:04
Downstream Interface
Interface       State
-----------     ----------
vni16777214     forwarding

Site-1-Border-vtep-Primary# show ip mroute 232.16.0.1 all-vrfs
IP Multicast Route Entries

VRF : vrf1
Total number of entries : 1

Group Address                 : 232.16.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan1015
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:00:21
Downstream Interface
Interface       State
-----------     ----------
vni16777214     forwarding

Site-1-Border-vtep-Primary# show ip mroute 232.15.0.1 all-vrfs
IP Multicast Route Entries

VRF : vrf1
Total number of entries : 1
```

```
Group Address                 : 232.15.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan1015
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:00:25
Downstream Interface
Interface       State
-----------     ----------
vni16777214     forwarding

Site-1-Border-vtep-Primary# show ip mroute 232.5.0.1 all-vrfs
IP Multicast Route Entries

VRF : vrf1
Total number of entries : 2

Group Address                 : 232.5.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan1015
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:11:26
Downstream Interface
Interface       State
-----------     ----------
vni16777214     forwarding
vlan101         forwarding

Group Address                 : 232.5.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan101
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:11:26

Site-1-Border-vtep-Primary# show ip mroute 232.6.0.1 all-vrfs
IP Multicast Route Entries
VRF : vrf1
Total number of entries : 2
Group Address                 : 232.6.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan1015
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:11:30
```

```
Downstream Interface

Interface       State
-----------     ----------
vlan101         forwarding
vni16777214     forwarding

Group Address                 : 232.6.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan101
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:11:30

Site-1-Border-vtep-Primary# show ip mroute 225.5.0.2 vrf vrf2
IP Multicast Route Entries
VRF : vrf2
Group Address                 : 225.5.0.2
Source Address                : 11.1.51.100
Neighbor                      : 80.80.80.80
Incoming interface            : vni9002
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:22:11
Downstream Interface
Interface       State
-----------     ----------
vlan111         forwarding
vlan3016        forwarding

Site-1-Border-vtep-Primary# show ip mroute 226.5.0.2 vrf vrf2
Site-1-Border-vtep-Primary# show ip pim vrf vrf1
PIM Global Parameters
VRF                             :  vrf1
PIM Status                      :  Enabled
PIM SSM Status                  :  Enabled
PIM SSM Range ACL               :  Not Configured
Join/Prune Interval (sec)       :  60
SPT Threshold                   :  Enabled
State Refresh Interval (sec)    :  60
PIM NSF Status                  :  Inactive

Site-1-Border-vtep-Primary# show ip pim vrf vrf2
PIM Global Parameters
VRF                             :  vrf2
PIM Status                      :  Enabled
PIM SSM Status                  :  Enabled
PIM SSM Range ACL               :  vrf2_ssm_acl
Join/Prune Interval (sec)       :  60
SPT Threshold                   :  Enabled
State Refresh Interval (sec)    :  60
PIM NSF Status                  :  Inactive

Site-1-Border-vtep-Primary# show ip igmp ssm-map all-vrfs
IGMP SSM-map Information.
```

```
VRF Name   : default
Interface Name   SSM-map ACL name
--------------  ----------------
IGMP is not enabled on any of the interfaces.

VRF Name   : ka

Interface Name   SSM-map ACL name
--------------  ----------------
IGMP is not enabled on any of the interfaces.
No interfaces found for VRF mgmt.

VRF Name   : vrf1

Interface Name   SSM-map ACL name
--------------  ----------------
VRF Name   : vrf2

Interface Name   SSM-map ACL name
--------------  ----------------
vlan111           ssm_map_vrf2

Site-1-Border-vtep-Primary# show ip igmp snooping vlan 111  group 225.5.0.2
IGMP ports and group information for group 225.5.0.2
VLAN ID   : 111
VLAN Name : VLAN111
Group Address : 225.5.0.2
Last Reporter : 11.1.11.100
Group Type    : Filter
                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
vxlan1(2.2.2.2) 3    INC  18m 21s   4m 11s                        1         0
Group Address  : 225.5.0.2
Source Address : 11.1.51.100
Source Type    : Filter
Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
vxlan1(2.2.2.2)          INC  18m 21s   4m 11s    Auto

Site-1-Border-vtep-Primary# show ip igmp snooping vlan 111  group 225.6.0.2
IGMP ports and group information for group 225.6.0.2
VLAN ID   : 111
VLAN Name : VLAN111
Group Address : 225.6.0.2
Last Reporter : 11.1.11.50
Group Type    : Filter
                                              V1     V2        Sources   Sources
Port               Vers Mode Uptime  Expires Timer  Timer     Forwarded Blocked
---------------    ---- ---- ------- ------- ------ --------- --------- --------
vxlan1(192.168.1.5) 3    INC  19m 2s  4m 10s                   1         0

Group Address  : 225.6.0.2
Source Address : 11.1.51.100
Source Type    : Filter

Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
vxlan1(192.168.1.5)      INC  19m 2s    4m 10s    Auto
Site-1-Border-vtep-Primary#
```

Site-1-Border-vtep-Secondary

```
hostname Site-1-Border-vtep-Secondary
no ip icmp redirect
route-redistribute active-routes-only
vrf ka
vrf vrf1
        rd 1:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 2:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
access-list ip ssm_map_vrf2
        vsx-sync
        !
        10 permit any 11.1.51.100 225.5.0.2
        20 permit any 11.1.51.100 225.6.0.2
        30 permit any 11.1.51.100 225.1.0.2
        40 permit any 11.1.51.100 226.5.0.2
access-list ip vrf2_ssm_acl
        vsx-sync
        !
        10 permit any any 225.5.0.2
        20 permit any any 225.6.0.2
        30 permit any any 226.5.0.2
        40 permit any any 225.1.0.2
vlan 1
vlan 101
        ip igmp snooping enable
vlan 111
        ip igmp snooping enable
vlan 751,1015-1016,2007,3015-3016
virtual-mac 00:01:20:11:56:10
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 101
                rd auto
                route-target export 101:101
                route-target import 101:101
                redistribute host-route
        vlan 111
                rd auto
                route-target export 111:111
                route-target import 111:111
                redistribute host-route
interface lag 10 multi-chassis
        no shutdown
        no routing
```

```
        vlan trunk native 1
        vlan trunk allowed 1015-1016
        lacp mode active
        lacp rate fast
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1,101,111,751,1015-1016,2007,3015-3016
        lacp mode active
        lacp rate fast
interface 1/3/1
        description port_Site-1-External-router
        no shutdown
        lag 10
interface 1/3/2
        description port_isl
        no shutdown
        lag 120
interface 1/5/45
        description port_Site-1-Access-vtep-1
        no shutdown
        routing
        ip address 31.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/5/46
        description port_Site-1-Access-vtep-2
        no shutdown
        routing
        ip address 31.1.2.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/7/47
        description port_Site-2-Border-vtep-Primary
        no shutdown
        routing
        ip address 40.1.3.1/29
interface 1/7/48
        description port_Site-2-Border-vtep-Secondary
        no shutdown
        routing
        ip address 40.1.4.1/29
interface loopback 1
        ip address 192.168.1.2/32
interface loopback 100
        ip address 192.168.1.255/32
interface loopback 101
        vrf attach vrf1
        ip address 150.150.150.150/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 102
        vrf attach vrf2
        ip address 151.151.151.151/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 103
        ip address 192.169.1.255/32
interface loopback 112
        ip address 5.5.5.50/32
interface loopback 113
```

```
        ip address 194.170.1.255/32
interface vlan 1
        ip dhcp
interface vlan 101
        vrf attach vrf1
        ip address 11.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 111
        vrf attach vrf2
        ip address 11.1.11.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.11.10
        ip igmp enable
        ip igmp apply ssm-map access-list ssm_map_vrf2
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 751
        no shutdown
        ip address 171.1.1.2/30
        ip ospf 1 area 0.0.0.0
interface vlan 1015
        vrf attach vrf1
        vsx active-forwarding
        ip address 60.1.15.3/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1016
        vrf attach vrf2
        vsx active-forwarding
        ip address 60.1.16.3/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 2007
        description port_ka
        vrf attach ka
        ip address 46.1.1.2/29
interface vlan 3015
        vrf attach vrf1
        ip address 60.3.15.2/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 3016
        vrf attach vrf2
        ip address 60.3.16.2/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vxlan 1
        source ip 5.5.5.50
        no shutdown
        vni 2000
                vlan 101
        vni 2010
                vlan 111
                vni 9002
```

```
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
        routing
vsx
        inter-switch-link lag 120
        role secondary
        keepalive peer 46.1.1.1 source 46.1.1.2 vrf ka
!
!
!
route-map tag_bgp_ospf permit seq 10
        set tag 120
route-map tag_ospf_bgp deny seq 10
        match tag 110
route-map tag_ospf_bgp deny seq 20
        match tag 120
route-map tag_ospf_bgp permit seq 30
!
router ospf 1
        router-id 111.12.1.3
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 111.12.1.5
        distance 250
        redistribute bgp route-map tag_bgp_ospf
        redistribute connected
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 111.12.2.5
        distance 250
        redistribute bgp route-map tag_bgp_ospf
        redistribute connected
        area 0.0.0.0
        router bgp 65535
        bgp router-id 111.12.1.3
        neighbor 2.2.2.2 remote-as 65535
        neighbor 2.2.2.2 update-source loopback 1
        neighbor 40.1.3.2 remote-as 65536
        neighbor 40.1.4.2 remote-as 65536
        neighbor 192.168.1.5 remote-as 65535
        neighbor 192.168.1.5 update-source loopback 1
        neighbor 195.170.1.255 remote-as 65536
        neighbor 195.170.1.255 ebgp-multihop 5
        neighbor 195.170.1.255 update-source loopback 113
        neighbor 196.170.1.255 remote-as 65536
        neighbor 196.170.1.255 ebgp-multihop 5
        neighbor 196.170.1.255 update-source loopback 113
        address-family ipv4 unicast
                neighbor 40.1.3.2 activate
                neighbor 40.1.4.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 2.2.2.2 next-hop-self
                neighbor 2.2.2.2 route-reflector-client
```

```
                neighbor 2.2.2.2 send-community extended
                neighbor 2.2.2.2 activate
                neighbor 192.168.1.5 next-hop-self
                neighbor 192.168.1.5 route-reflector-client
                neighbor 192.168.1.5 send-community extended
                neighbor 192.168.1.5 activate
                neighbor 195.170.1.255 send-community extended
                neighbor 195.170.1.255 activate
                neighbor 196.170.1.255 send-community extended
                neighbor 196.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf vrf1
        enable
        pim-ssm
router pim vrf vrf2
        enable
        pim-ssm
        pim-ssm range-access-list vrf2_ssm_acl
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================

Site-1-Border-vtep-Secondary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.13.1.3       n/a       FULL              31.1.1.0           1/5/45
111.14.1.3       n/a       FULL              31.1.2.0           1/5/46

VRF : vrf1                             Process : 1
================================================

Total Number of Neighbors : 3

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.1.5       1         FULL/DROther      60.1.15.6          vlan1015
111.11.1.5       1         FULL/BDR          60.1.15.5          vlan1015
111.11.1.5       1         FULL/BDR          60.3.15.1          vlan3015

VRF : vrf2                             Process : 1
```

```
================================================

Total Number of Neighbors : 3

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.2.5       1         FULL/DROther      60.1.16.6          vlan1016
111.11.2.5       1         FULL/BDR          60.1.16.5          vlan1016
111.11.2.5       1         FULL/BDR          60.3.16.1          vlan3016

Site-1-Border-vtep-Secondary# show bgp l2vpn evpn summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.12.1.3
Peers                  : 4            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Neighbor      Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
2.2.2.2       65535       75      102     00h:57m:43s  Established   Up
192.168.1.5   65535       79      96      00h:57m:43s  Established   Up
195.170.1.255 65536       92      100     00h:57m:53s  Established   Up
196.170.1.255 65536       91      103     00h:57m:43s  Established   Up

Site-1-Border-vtep-Secondary# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 6
--------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires    DR        Hold Time  Secondary
           (IPV4)       (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  Address (IPV4)
--------------------------------------------------------------------------------
vlan101     11.1.1.10    00:57:36   00:01:44   839189765 00:01:45   Nil
vlan1015    60.1.15.5    00:58:02   00:01:19   839189765 00:01:45   Nil
vlan1015    60.1.15.6    00:57:57   00:01:20   1         00:01:45   Nil
vlan3015    60.3.15.1    00:58:00   00:01:15   839189765 00:01:45   Nil
vni16777214 80.80.80.80  00:57:44   00:03:21   1         00:03:30
vni16777214 192.168.1.5  00:57:41   00:03:19   1         00:03:30
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 6
--------------------------------------------------------------------------------
-
vlan111     11.1.11.10   00:33:48   00:01:35   839189765 00:01:45   Nil
vlan1016    60.1.16.5    00:33:49   00:01:26   839189765 00:01:45   Nil
vlan1016    60.1.16.6    00:33:51   00:01:28   1         00:01:45   Nil
vlan3016    60.3.16.1    00:34:06   00:01:39   839189765 00:01:45   Nil
vni9002     80.80.80.80  00:33:43   00:03:26   1         00:03:30
vni9002     192.168.1.5  00:34:04   00:03:23   1         00:03:30
--------------------------------------------------------------------------------
-

Site-1-Border-vtep-Secondary# show ip pim rp-set all-vrfs
Site-1-Border-vtep-Secondary# show ip pim bsr elected all-vrfs
Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                       : vrf1
E-BSR Address             :
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 0
E-BSR Up Time             : 0 secs
```

```
Next Bootstrap Message    : 0 secs

VRF                       : vrf2
E-BSR Address             :
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 0
E-BSR Up Time             : 0 secs
Next Bootstrap Message    : 0 secs

Site-1-Border-vtep-Secondary# show ip igmp snooping vlan 111 vrf vrf2
Invalid input: vrf
Site-1-Border-vtep-Secondary# show ip igmp snooping vlan 111
IGMP Snooping Protocol Info
Total VLANs with IGMP enabled             : 2
Current count of multicast groups joined  : 2
IGMP Drop Unknown Multicast               : Global
VLAN ID : 111
VLAN Name : VLAN111
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 11.1.11.10
Querier Port : vxlan1(192.168.1.5)
Querier UpTime :58m 18s
Querier Expiration Time :2m 39s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.5.0.2              Filter    3    INC  15m 30s   2m 45s
225.6.0.2              Filter    3    INC  16m 7s    2m 50s

Site-1-Border-vtep-Secondary# show ip igmp snooping vlan 111  group 225.5.0.2
IGMP ports and group information for group 225.5.0.2
VLAN ID   : 111
VLAN Name : VLAN111
Group Address : 225.5.0.2
Last Reporter : 11.1.11.100
Group Type    : Filter

                                            V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
vxlan1(2.2.2.2) 3    INC  15m 35s   2m 40s                        1         0

Group Address  : 225.5.0.2
Source Address : 11.1.51.100
Source Type    : Filter

Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
vxlan1(2.2.2.2)          INC  15m 35s   2m 40s    Auto

Site-1-Border-vtep-Secondary# show ip mroute brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : vrf1                            Total number of entries : 6
-------------------------------------------------------------------------------
-
Group Address  Source Address     Neighbor    Interface      Uptime        State
                                                           (HH:MM:SS)
-------------------------------------------------------------------------------
232.5.0.1      60.1.25.100        60.1.15.6   vlan101        00:14:21      bridge
```

```
232.5.0.1      60.1.25.100        60.1.15.6   vlan1015       00:14:21      route
232.6.0.1      60.1.25.100        60.1.15.6   vlan101        00:14:21      bridge
232.6.0.1      60.1.25.100        60.1.15.6   vlan1015       00:14:21      route
232.15.0.1     60.1.25.100        60.1.15.6   vlan1015       00:03:35      route
232.16.0.1     60.1.25.100        60.1.15.6   vlan1015       00:03:35      route
-------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of entries : 7
-------------------------------------------------------------------------------
-
225.1.0.2      11.1.51.100        80.80.80.80 vni9002        00:20:05      route
225.5.0.2      11.1.51.100        80.80.80.80 vni9002        00:24:50      route
225.5.0.2      11.1.51.100        60.3.16.1   vlan3016       00:24:51      route
225.5.0.2      11.1.51.100        80.80.80.80 vlan111        00:24:51      bridge
225.6.0.2      11.1.51.100        60.3.16.1   vlan3016       00:24:57      route
225.6.0.2      11.1.51.100        80.80.80.80 vni9002        00:24:57      route
225.6.0.2      11.1.51.100        80.80.80.80 vlan111        00:24:58      bridge
-------------------------------------------------------------------------------
-
Site-1-Border-vtep-Secondary#
Site-1-Border-vtep-Secondary# show ip mroute 232.5.0.1 vrf vrf1
IP Multicast Route Entries

VRF : vrf1

Total number of entries : 2
Group Address                 : 232.5.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan101
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:14:33
Group Address                 : 232.5.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan1015
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:14:34
Downstream Interface
Interface       State
-----------     ----------
vni16777214     forwarding
vlan101         forwarding

Site-1-Border-vtep-Secondary# show ip mroute 232.15.0.1 vrf vrf1
IP Multicast Route Entries

VRF : vrf1

Total number of entries : 1
Group Address                 : 232.15.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan1015
```

```
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:03:54
Downstream Interface
Interface       State
-----------     ----------
vni16777214     forwarding

Site-1-Border-vtep-Secondary# show ip mroute 232.16.0.1 vrf vrf1
IP Multicast Route Entries
VRF : vrf1
Total number of entries : 1
Group Address                 : 232.16.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan1015
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:03:59
Downstream Interface
Interface       State
-----------     ----------
vni16777214     forwarding

Site-1-Border-vtep-Secondary# show ip mroute 232.6.0.1 vrf vrf1
IP Multicast Route Entries

VRF : vrf1
Total number of entries : 2
Group Address                 : 232.6.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan101
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:14:48
Group Address                 : 232.6.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.15.6
Incoming interface            : vlan1015
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 00:14:49
Downstream Interface
Interface       State
-----------     ----------
vlan101         forwarding
vni16777214     forwarding

Site-1-Border-vtep-Secondary# show ip igmp ssm-map all-vrfs
```

```
IGMP SSM-map Information.
VRF Name   : default
Interface Name   SSM-map ACL name
--------------  ----------------
IGMP is not enabled on any of the interfaces.
VRF Name   : ka

Interface Name   SSM-map ACL name
--------------  ----------------
IGMP is not enabled on any of the interfaces.
No interfaces found for VRF mgmt.
VRF Name   : vrf1

Interface Name   SSM-map ACL name
--------------  ----------------
VRF Name   : vrf2

Interface Name   SSM-map ACL name
--------------  ----------------
vlan111           ssm_map_vrf2

Site-1-Border-vtep-Secondary# show ip pim vrf vrf1
PIM Global Parameters
VRF                              :  vrf1
PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive

Site-1-Border-vtep-Secondary# show ip pim vrf vrf2
PIM Global Parameters
VRF                              :  vrf2
PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  vrf2_ssm_acl
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive

Site-1-Border-vtep-Secondary# show ip mroute 225.5.0.2 vrf vrf2
IP Multicast Route Entries
VRF : vrf2
Group Address                 : 225.5.0.2
Source Address                : 11.1.51.100
Neighbor                      : 80.80.80.80
Incoming interface            : vni9002
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:26:06
Downstream Interface
Interface       State
-----------     ----------
vlan111         forwarding
vlan3016        forwarding
```

```
Group Address                 : 225.5.0.2
Source Address                : 11.1.51.100
Neighbor                      : 60.3.16.1
Incoming interface            : vlan3016
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:26:07
Downstream Interface
Interface       State
-----------     ----------
vlan111         forwarding

Group Address                 : 225.5.0.2
Source Address                : 11.1.51.100
Neighbor                      : 80.80.80.80
Incoming interface            : vlan111
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:26:07

Site-1-Border-vtep-Secondary# show ip mroute 225.6.0.2 vrf vrf2
IP Multicast Route Entries
VRF : vrf2
Total number of entries : 3
Group Address                 : 225.6.0.2
Source Address                : 11.1.51.100
Neighbor                      : 60.3.16.1
Incoming interface            : vlan3016
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:26:18
Downstream Interface
Interface       State
-----------     ----------
vlan111         forwarding

Group Address                 : 225.6.0.2
Source Address                : 11.1.51.100
Neighbor                      : 80.80.80.80
Incoming interface            : vni9002
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:26:18
Downstream Interface
Interface       State
-----------     ----------
vlan111         forwarding
vlan3016        forwarding

Group Address                 : 225.6.0.2
```

```
Source Address                : 11.1.51.100
Neighbor                      : 80.80.80.80
Incoming interface            : vlan111
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:26:18

Site-1-Border-vtep-Secondary# show ip mroute 225.1.0.2 vrf vrf2
IP Multicast Route Entries
VRF : vrf2
Group Address                 : 225.1.0.2
Source Address                : 11.1.51.100
Neighbor                      : 80.80.80.80
Incoming interface            : vni9002
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:22:06
Downstream Interface
Interface       State
-----------     ----------
vlan3016        forwarding
vlan1016        forwarding

Site-1-Border-vtep-Secondary#
Site-1-Border-vtep-Secondary# show interface vxlan vteps
Source    Destination      Origin   Status          VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
-
5.5.5.50  80.80.80.80      evpn     operational     9002      enabled   --
vrf2
5.5.5.50  80.80.80.80      evpn     operational     16777214  enabled   --
vrf1
5.5.5.50  192.168.1.5      evpn     operational     2000      disabled  101    --
5.5.5.50  192.168.1.5      evpn     operational     2010      disabled  111    --
5.5.5.50  192.168.1.5      evpn     operational     9002      enabled   --
vrf2
5.5.5.50  192.168.1.5      evpn     operational     16777214  enabled   --
vrf1
5.5.5.50  2.2.2.2          evpn     operational     2000      disabled  101    --
5.5.5.50  2.2.2.2          evpn     operational     2010      disabled  111    --
Site-1-Border-vtep-Secondary#
```

Site-1-External-router

```
hostname Site-1-External-router
vrf vrf1
vrf vrf2
cli-session
        timeout 0
!
!
!
!
!
!
```

```
ssh server vrf default
ssh server vrf mgmt
access-list ip ssm_map_vrf2
        10 permit any 11.1.51.100 225.5.0.2
        20 permit any 11.1.51.100 225.6.0.2
        30 permit any 11.1.51.100 225.1.0.2
        40 permit any 11.1.51.100 226.5.0.2
        50 permit any 11.1.51.100 225.1.0.2
access-list ip vrf2_ssm_acl
        10 permit any any 225.5.0.2
        20 permit any any 225.6.0.2
        30 permit any any 226.5.0.2
        40 permit any any 225.1.0.2
vlan 1,1015-1016
vlan 1025
        ip igmp snooping enable
vlan 1026
        ip igmp snooping enable
interface lag 10
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1015-1016
        lacp mode active
        lacp rate fast
interface 1/1/10
        description port_Site-1-Border-vtep-primary
        no shutdown
        lag 10
interface 1/1/11
        description port_Site-1-Border-vtep-secondary
        no shutdown
        lag 10
interface 1/1/12
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1025-1026
interface loopback 101
        vrf attach vrf1
        ip address 110.100.100.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 102
        vrf attach vrf2
        ip address 111.101.101.101/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1015
        vrf attach vrf1
        ip address 60.1.15.6/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1016
        vrf attach vrf2
        ip address 60.1.16.6/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1025
        vrf attach vrf1
        ip address 60.1.25.2/24
```

```
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
interface vlan 1026
        vrf attach vrf2
        ip address 60.1.26.2/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip igmp apply ssm-map access-list ssm_map_vrf2
        ip pim-sparse enable
!
!
!
!
!
router ospf 1 vrf vrf1
        router-id 111.10.1.5
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 111.10.2.5
        area 0.0.0.0
router pim vrf vrf1
        enable
        pim-ssm
router pim vrf vrf2
        enable
        pim-ssm
        pim-ssm range-access-list vrf2_ssm_acl
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================

Site-1-External-router# show ip ospf neighbors all-vrfs
VRF : vrf1                              Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.11.1.5       1         FULL/BDR          60.1.15.5          vlan1015
111.12.1.5       1         FULL/DR           60.1.15.3          vlan1015

VRF : vrf2                              Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.11.2.5       1         FULL/BDR          60.1.16.5          vlan1016
111.12.2.5       1         FULL/DR           60.1.16.3          vlan1016

Site-1-External-router# show ip mroute brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of entries : 5
-------------------------------------------------------------------------------
-
Group Address  Source Address     Neighbor    Interface      Uptime        State
                                                           (HH:MM:SS)
```

```
-------------------------------------------------------------------------------
232.1.0.1      60.1.25.100                  vlan1025       00:48:06      bridge
232.5.0.1      60.1.25.100                  vlan1025       00:48:06      route
232.6.0.1      60.1.25.100                  vlan1025       00:48:06      route
232.15.0.1     60.1.25.100                  vlan1025       00:37:20      route
232.16.0.1     60.1.25.100                  vlan1025       00:37:20      route
-------------------------------------------------------------------------------
-
VRF : vrf2                            Total number of entries : 1
-------------------------------------------------------------------------------
-
225.1.0.2      11.1.51.100        60.1.16.5   vlan1016       00:50:33      route
-------------------------------------------------------------------------------
-

Site-1-External-router# show ip igmp snooping
IGMP Snooping Protocol Info
Total VLANs with IGMP enabled             : 2
Current count of multicast groups joined  : 2
IGMP Drop Unknown Multicast               : Global
VLAN ID : 1025
VLAN Name : VLAN1025
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address [this switch] : 60.1.25.2
Querier Port :
Querier UpTime :1h 37m
Querier Expiration Time :0m 33s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
232.1.0.1              Filter    3    INC  50m 44s   2m 53s
VLAN ID : 1026
VLAN Name : VLAN1026
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address [this switch] : 60.1.26.2
Querier Port :
Querier UpTime :1h 37m
Querier Expiration Time :0m 32s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.1.0.2              Filter    3    INC  50m 45s   2m 50s

Site-1-External-router# show ip igmp snooping vlan 1025 group 232.1.0.1
IGMP ports and group information for group 232.1.0.1
VLAN ID   : 1025
VLAN Name : VLAN1025
Group Address : 232.1.0.1
Last Reporter : 60.1.25.100
Group Type    : Filter
                                              V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
1/1/12          3    INC  51m 3s    2m 34s                        1         0

Group Address  : 232.1.0.1
Source Address : 60.1.25.100
Source Type    : Filter
```

```
Port                      Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
1/1/12                    INC  51m 3s    2m 34s    Auto

Site-1-External-router# show ip igmp snooping vlan 1026 group 225.1.0.2
IGMP ports and group information for group 225.1.0.2
VLAN ID   : 1026
VLAN Name : VLAN1026
Group Address : 225.1.0.2
Last Reporter : 60.1.26.100
Group Type    : Filter
                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
1/1/12          3    INC  51m 14s   2m 21s                        1         0

Group Address  : 225.1.0.2
Source Address : 11.1.51.100
Source Type    : Filter

Port                      Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
1/1/12                    INC  51m 14s   2m 21s    Auto

Site-1-External-router# show ip igmp ssm-map all-vrfs
IGMP SSM-map Information.
VRF Name   : default
Interface Name   SSM-map ACL name
--------------  ----------------
IGMP is not enabled on any of the interfaces.
No interfaces found for VRF mgmt.

VRF Name   : vrf1
Interface Name   SSM-map ACL name
--------------  ----------------
VRF Name   : vrf2
Interface Name   SSM-map ACL name
--------------  ----------------
vlan1026           ssm_map_vrf2
Site-1-External-router#
```

Site-2-Access-vtep-1

```
hostname Site-2-Access-vtep-1
vrf vrf1
        rd 104:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 105:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
```

```
ssh server vrf mgmt
access-list ip ssm_map_vrf2
        10 permit any 11.1.51.100 225.5.0.2
        20 permit any 11.1.51.100 225.6.0.2
        30 permit any 11.1.51.100 225.1.0.2
        40 permit any 11.1.51.100 226.5.0.2
access-list ip vrf2_ssm_acl
        10 permit any any 225.5.0.2
        20 permit any any 225.6.0.2
        30 permit any any 226.5.0.2
        40 permit any any 225.1.0.2
vlan 1,6
vlan 141
        ip igmp snooping enable
vlan 151
        ip igmp snooping enable
virtual-mac 00:07:08:09:09:00
evpn
        redistribute local-mac
        redistribute local-svi
        vlan 141
                rd auto
                route-target export 141:141
                route-target import 141:141
                redistribute host-route
        vlan 151
                rd auto
                route-target export 151:151
                route-target import 151:151
                redistribute host-route
interface mgmt
        no shutdown
        ip dhcp
interface 1/1/34
        description port_Site-2-Border-vtep-Primary
        no shutdown
        ip address 60.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/35
        description port_Site-2-Border-vtep-Secondary
        no shutdown
        ip address 60.1.3.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/46
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 141,151
interface loopback 1
        ip address 85.85.85.85/32
interface vlan 141
        vrf attach vrf1
        ip address 11.1.41.3/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.41.10
        ip igmp enable
        ip pim-sparse enable
interface vlan 151
        vrf attach vrf2
```

```
        ip address 11.1.51.3/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.51.10
        ip igmp enable
        ip igmp apply ssm-map access-list ssm_map_vrf2
        ip pim-sparse enable
interface vxlan 1
        source ip 85.85.85.85
        no shutdown
        vni 2040
                vlan 141
        vni 2050
                vlan 151
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
!
!
!
!
!
router ospf 1
        router-id 112.13.1.3
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65536
        bgp router-id 112.13.1.3
        neighbor 192.168.1.3 remote-as 65536
        neighbor 192.168.1.3 update-source loopback 1
        neighbor 192.168.1.4 remote-as 65536
        neighbor 192.168.1.4 update-source loopback 1
        address-family ipv4 unicast
                redistribute connected
                redistribute ospf
        exit-address-family
        address-family l2vpn evpn
                neighbor 192.168.1.3 send-community extended
                neighbor 192.168.1.3 activate
                neighbor 192.168.1.4 send-community extended
                neighbor 192.168.1.4 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute ospf
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute ospf
                exit-address-family
!
router pim vrf vrf1
        enable
        pim-ssm
router pim vrf vrf2
```

```
        enable
        pim-ssm
        pim-ssm range-access-list vrf2_ssm_acl
https-server vrf default
https-server vrf mgmt

========================================
Show command outputs for  validation
========================================

Site-2-Access-vtep-1# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================
Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.1.3       n/a       FULL              60.1.1.1           1/1/34
112.12.1.3       n/a       FULL              60.1.3.1           1/1/35

Site-2-Access-vtep-1# show bgp l2vpn evpn summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 112.13.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Neighbor      Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
192.168.1.3   65536       169     139     01h:49m:40s  Established   Up
192.168.1.4   65536       175     140     01h:49m:44s  Established   Up

Site-2-Access-vtep-1# show interface vxlan vteps
Source       Destination    Origin   Status         VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
-
85.85.85.85  4.4.4.4        evpn     operational    2040      disabled  141    --
85.85.85.85  4.4.4.4        evpn     operational    2050      disabled  151    --
85.85.85.85  80.80.80.80    evpn     operational    2040      disabled  141    --
85.85.85.85  80.80.80.80    evpn     operational    2050      disabled  151    --
85.85.85.85  80.80.80.80    evpn     operational    9002      enabled   --
vrf2
85.85.85.85  80.80.80.80    evpn     operational    16777214  enabled   --
vrf1

Site-2-Access-vtep-1# show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : vrf1                             Total number of neighbors : 3
-------------------------------------------------------------------------------
-------------------------------------------------------------
-------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR         Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority  (HH:MM:SS)  Address (IPV4)
-------------------------------------------------------------------------------
vlan141     11.1.41.1   01:49:46   00:01:29   1347440720  00:01:45  11.1.41.10
vlan141     11.1.41.2   01:49:45   00:01:30   1347440720  00:01:45  Nil
vni16777214 80.80.80.80 01:49:49   00:03:16   1           00:03:30
-------------------------------------------------------------------------------
-
VRF : vrf2                             Total number of neighbors : 3
```

```
-------------------------------------------------------------------------------
-
vlan151     11.1.51.1   01:23:10   00:01:35   1347440720  00:01:45  11.1.51.10
vlan151     11.1.51.2   01:23:34   00:01:41   1347440720  00:01:45  Nil
vni9002     80.80.80.80 01:23:09   00:03:22   1           00:03:30
-------------------------------------------------------------------------------
-
Site-2-Access-vtep-1# show ip igmp snooping
IGMP Snooping Protocol Info
Total VLANs with IGMP enabled             : 2
Current count of multicast groups joined  : 4
IGMP Drop Unknown Multicast               : Global
VLAN ID : 141
VLAN Name : VLAN141
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 11.1.41.1
Querier Port : vxlan1(80.80.80.80)
Querier UpTime :1h 49m
Querier Expiration Time :3m 33s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
232.15.0.1             Filter    3    INC  53m 16s   3m 43s
232.16.0.1             Filter    3    INC  53m 17s   3m 46s

VLAN ID : 151
VLAN Name : VLAN151
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 11.1.51.1
Querier Port : vxlan1(80.80.80.80)
Querier UpTime :1h 49m
Querier Expiration Time :3m 32s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
226.5.0.2              Filter    3    INC  1h 4m     3m 38s
226.6.0.2              Filter    2         1h 4m     3m 43s

Site-2-Access-vtep-1# show ip igmp snooping vlan 141 group 232.15.0.1
IGMP ports and group information for group 232.15.0.1
VLAN ID   : 141
VLAN Name : VLAN141
Group Address : 232.15.0.1
Last Reporter : 11.1.41.50
Group Type    : Filter
                                              V1         V2         Sources   Sources
Port            Vers Mode Uptime    Expires   Timer      Timer      Forwarded Blocked
--------------- ---- ---- --------  -------- ---------- ---------- --------- -------
-
vxlan1(4.4.4.4) 3    INC  53m 25s   3m 34s                         1         0

Group Address  : 232.15.0.1
Source Address : 60.1.25.100
Source Type    : Filter

Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
vxlan1(4.4.4.4)          INC  53m 25s   3m 34s    Auto

Site-2-Access-vtep-1# show ip igmp snooping vlan 141 group 232.16.0.1
```

```
IGMP ports and group information for group 232.16.0.1
VLAN ID   : 141
VLAN Name : VLAN141
Group Address : 232.16.0.1
Last Reporter : 11.1.41.100
Group Type    : Filter

                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
1/1/46          3    INC  53m 33s   3m 30s                        1         0
Group Address  : 232.16.0.1
Source Address : 60.1.25.100
Source Type    : Filter

Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
1/1/46                   INC  53m 33s   3m 30s    Auto

Site-2-Access-vtep-1# show ip igmp snooping vlan 151 group 226.5.0.2
IGMP ports and group information for group 226.5.0.2
VLAN ID   : 151
VLAN Name : VLAN151
Group Address : 226.5.0.2
Last Reporter : 11.1.51.50
Group Type    : Filter
                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
vxlan1(4.4.4.4) 3    INC  1h 5m     3m 6s                         1         0

Group Address  : 226.5.0.2
Source Address : 11.1.51.100
Source Type    : Filter

Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
vxlan1(4.4.4.4)          INC  1h 5m     3m 6s     Auto

Site-2-Access-vtep-1# show ip igmp snooping vlan 151 group 226.6.0.2
IGMP ports and group information for group 226.6.0.2
VLAN ID   : 151
VLAN Name : VLAN151
Group Address : 226.6.0.2
Last Reporter : 11.1.51.100
Group Type    : Filter
                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
1/1/46          2    EXC  1h 4m     3m 7s                3m 7s     0         0
Site-2-Access-vtep-1#
```

Site-2-Access-vtep-2

```
hostname Site-2-Access-vtep-2
cli-session
        timeout 0
!
```

```
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vlan 1
vlan 141
        ip igmp snooping enable
vlan 151
        ip igmp snooping enable
virtual-mac 00:07:08:09:09:01
evpn
        redistribute local-mac
        redistribute local-svi
        vlan 141
                rd auto
                route-target export 141:141
                route-target import 141:141
                redistribute host-route
        vlan 151
                rd auto
                route-target export 151:151
                route-target import 151:151
                redistribute host-route
interface 1/1/34
        description port_Site-2-Border-vtep-Primary
        no shutdown
        ip address 60.1.2.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/35
        description port_Site-2-Border-vtep-Secondary
        no shutdown
        ip address 60.1.4.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/46
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 141,151
interface loopback 1
        ip address 4.4.4.4/32
interface vxlan 1
        source ip 4.4.4.4
        no shutdown
        vni 2040
                vlan 141
        vni 2050
                vlan 151
!
!
!
!
!
router ospf 1
        router-id 112.14.1.3
        redistribute connected
        redistribute local loopback
```

```
        area 0.0.0.0
        router bgp 65536
bgp router-id 112.14.1.3
        neighbor 192.168.1.3 remote-as 65536
        neighbor 192.168.1.3 update-source loopback 1
        neighbor 192.168.1.4 remote-as 65536
        neighbor 192.168.1.4 update-source loopback 1
        address-family ipv4 unicast
                redistribute connected
                redistribute ospf
        exit-address-family
        address-family l2vpn evpn
                neighbor 192.168.1.3 send-community extended
                neighbor 192.168.1.3 activate
                neighbor 192.168.1.4 send-community extended
                neighbor 192.168.1.4 activate
        exit-address-family
!
https-server vrf default
https-server vrf mgmt

=======================================
Show command outputs for  validation
=======================================

Site-2-Access-vtep-2# show ip ospf neighbors
VRF : default                          Process : 1
================================================
Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.1.3       n/a       FULL              60.1.2.1           1/1/34
112.12.1.3       n/a       FULL              60.1.4.1           1/1/35

Site-2-Access-vtep-2# show bgp l2vpn evpn summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 112.14.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Neighbor      Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
192.168.1.3   65536       184     140     01h:55m:37s  Established   Up
192.168.1.4   65536       185     142     01h:55m:36s  Established   Up

Site-2-Access-vtep-2# show interface vxlan vteps
Source       Destination    Origin   Status         VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
-
4.4.4.4      80.80.80.80    evpn    operational    2040      disabled  141    --
4.4.4.4      80.80.80.80    evpn    operational    2050      disabled  151    --
4.4.4.4      85.85.85.85    evpn    operational    2040      disabled  141    --
4.4.4.4      85.85.85.85    evpn    operational    2050      disabled  151    --

Site-2-Access-vtep-2# show ip igmp snooping
IGMP Snooping Protocol Info
Total VLANs with IGMP enabled             : 2
Current count of multicast groups joined  : 4
IGMP Drop Unknown Multicast               : Global
```

```
VLAN ID : 141
VLAN Name : VLAN141
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 11.1.41.1
Querier Port : vxlan1(80.80.80.80)
Querier UpTime :1h 55m
Querier Expiration Time :2m 14s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
232.15.0.1             Filter    3    INC  58m 48s   2m 26s
232.16.0.1             Filter    3    INC  58m 47s   2m 24s

VLAN ID : 151
VLAN Name : VLAN151
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 11.1.51.1
Querier Port : vxlan1(80.80.80.80)
Querier UpTime :1h 55m
Querier Expiration Time :2m 14s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
226.5.0.2              Filter    2         1h 55m    2m 19s
226.6.0.2              Filter    2         1h 9m     2m 26s

Site-2-Access-vtep-2# show ip igmp snooping vlan 141 group 232.15.0.1
IGMP ports and group information for group 232.15.0.1
VLAN ID   : 141
VLAN Name : VLAN141
Group Address : 232.15.0.1
Last Reporter : 11.1.41.50
Group Type    : Filter
                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
1/1/46          3    INC  59m 0s    4m 13s                        1         0

Group Address  : 232.15.0.1
Source Address : 60.1.25.100
Source Type    : Filter

Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
1/1/46                   INC  59m 0s    4m 13s    Auto

Site-2-Access-vtep-2# show ip igmp snooping vlan 142 group 226.5.0.2
Group address not found.

Site-2-Access-vtep-2# show ip igmp snooping vlan 151 group 226.5.0.2
IGMP ports and group information for group 226.5.0.2
VLAN ID   : 151
VLAN Name : VLAN151
Group Address : 226.5.0.2
Last Reporter : 11.1.51.50
Group Type    : Filter
                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
```

```
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
1/1/46          2    EXC  1h 56m    4m 2s               4m 2s     0         0
Site-2-Access-vtep-2#
```

Site-2-Border-vtep-Primary

```
hostname Site-2-Border-vtep-Primary
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 5:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 6:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
access-list ip ssm_map_vrf2
        10 permit any 11.1.51.100 225.5.0.2
        20 permit any 11.1.51.100 225.6.0.2
        30 permit any 11.1.51.100 225.1.0.2
        40 permit any 11.1.51.100 226.5.0.2
access-list ip vrf2_ssm_acl
        10 permit any any 225.5.0.2
        20 permit any any 225.6.0.2
        30 permit any any 226.5.0.2
        40 permit any any 225.1.0.2
vlan 1
vlan 141
        ip igmp snooping enable
vlan 151
        ip igmp snooping enable
vlan 752, 1039-1040
virtual-mac 00:11:00:00:00:11
evpn
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 141
                rd auto
                route-target export 141:141
                route-target import 141:141
                redistribute host-route
        vlan 151
                rd auto
                route-target export 151:151
                route-target import 151:151
                redistribute host-route
interface lag 120
        description ISL
```

```
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface 1/1/1
        description port_Site-1-Border-vtep-Primary
        no shutdown
        ip address 40.1.1.2/29
interface 1/1/2
        description port_Site-1-Border-vtep-Secondary
        no shutdown
        ip address 40.1.3.2/29
interface 1/1/34
        description Keepalive
        no shutdown
        ip address 45.1.1.1/24
interface 1/1/35
        description port_isl
        no shutdown
        lag 120
interface 1/1/46
        description Site-2-Access-vtep-1
        no shutdown
        ip address 60.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/47
        description Site-2-Access-vtep-2
        no shutdown
        ip address 60.1.2.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface loopback 1
        ip address 80.80.80.80/32
interface loopback 105
        vrf attach vrf1
        ip address 104.104.104.104/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 106
        vrf attach vrf2
        ip address 105.105.105.105/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 113
        ip address 195.170.1.255/32
interface loopback 114
        ip address 192.168.1.3/32
interface vlan 141
        vrf attach vrf1
        ip address 11.1.41.1/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.41.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 151
        vrf attach vrf2
        ip address 11.1.51.1/24
        active-gateway ip mac 00:00:11:16:16:00
```

```
        active-gateway ip 11.1.51.10
        ip igmp enable
        ip igmp apply ssm-map access-list ssm_map_vrf2
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 752
        no shutdown
        ip address 172.1.1.1/30
        ip ospf 1 area 0.0.0.0
interface vlan 1039
        vrf attach vrf1
        ip address 60.1.39.2/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 1040
        vrf attach vrf2
        ip address 60.1.40.2/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vxlan 1
        source ip 80.80.80.80
        no shutdown
        vni 2040
                vlan 141
        vni 2050
                vlan 151
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
        inter-switch-link lag 120
        role primary
        keepalive peer 45.1.1.2 source 45.1.1.1
route-map tag_bgp_ospf permit seq 10
        set tag 210
route-map tag_ospf_bgp deny seq 10
        match tag 210
route-map tag_ospf_bgp deny seq 20
        match tag 220
route-map tag_ospf_bgp permit seq 30
!
!
!
router ospf 1
        router-id 112.11.1.3
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 112.11.1.5
        distance 250
        redistribute bgp route-map tag_bgp_ospf
        redistribute connected
```

```
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 112.11.2.5
        distance 250
        redistribute bgp route-map tag_bgp_ospf
        redistribute connected
        area 0.0.0.0
router bgp 65536
        bgp router-id 112.11.1.3
        neighbor 4.4.4.4 remote-as 65536
        neighbor 4.4.4.4 update-source loopback 114
        neighbor 40.1.1.1 remote-as 65535
        neighbor 40.1.3.1 remote-as 65535
        neighbor 45.1.1.2 remote-as 65536
        neighbor 85.85.85.85 remote-as 65536
        neighbor 85.85.85.85 update-source loopback 114
        neighbor 193.170.1.255 remote-as 65535
        neighbor 193.170.1.255 ebgp-multihop 5
        neighbor 193.170.1.255 update-source loopback 113
        neighbor 194.170.1.255 remote-as 65535
        neighbor 194.170.1.255 ebgp-multihop 5
        neighbor 194.170.1.255 update-source loopback 113
        address-family ipv4 unicast
                neighbor 40.1.1.1 activate
                neighbor 40.1.3.1 activate
                neighbor 45.1.1.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 4.4.4.4 next-hop-self
                neighbor 4.4.4.4 route-reflector-client
                neighbor 4.4.4.4 send-community extended
                neighbor 4.4.4.4 activate
                neighbor 85.85.85.85 next-hop-self
                neighbor 85.85.85.85 route-reflector-client
                neighbor 85.85.85.85 send-community extended
                neighbor 85.85.85.85 activate
                neighbor 193.170.1.255 send-community extended
                neighbor 193.170.1.255 activate
                neighbor 194.170.1.255 send-community extended
                neighbor 194.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf vrf1
        enable
        pim-ssm
router pim vrf vrf2
```

```
        enable
        pim-ssm
        pim-ssm range-access-list vrf2_ssm_acl
https-server vrf mgmt

=======================================
Show command outputs for  validation
=======================================

Site-2-Border-vtep-Primary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.13.1.3       n/a       FULL              60.1.1.0           1/1/46
112.14.1.3       n/a       FULL              60.1.2.0           1/1/47

VRF : vrf1                             Process : 1
================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.12.1.5       1         FULL/DR           60.1.39.3          vlan1039

VRF : vrf2                             Process : 1
================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.12.2.5       1         FULL/DR           60.1.40.3          vlan1040

Site-2-Border-vtep-Primary# show bgp l2vpn evpn summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 112.11.1.3
Peers                  : 4            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Neighbor      Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
4.4.4.4       65536       130     173     01h:46m:04s  Established   Up
85.85.85.85   65536       135     165     01h:45m:50s  Established   Up
193.170.1.255 65535       161     149     01h:44m:04s  Established   Up
194.170.1.255 65535       154     144     01h:44m:04s  Established   Up

Site-2-Border-vtep-Primary# show interface vxlan vteps
Source       Destination    Origin   Status         VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
-
80.80.80.80  4.4.4.4        evpn     operational    2040      disabled  141    --
80.80.80.80  4.4.4.4        evpn     operational    2050      disabled  151    --
80.80.80.80  5.5.5.50       evpn     operational    9002      enabled   --
vrf2
```

```
80.80.80.80  5.5.5.50       evpn     operational    16777214  enabled   --
vrf1
80.80.80.80  85.85.85.85    evpn     operational    2040      disabled  141    --
80.80.80.80  85.85.85.85    evpn     operational    2050      disabled  151    --
80.80.80.80  85.85.85.85    evpn     operational    9002      enabled   --
vrf2
80.80.80.80  85.85.85.85    evpn     operational    16777214  enabled   --
vrf1

Site-2-Border-vtep-Primary# show ip igmp ssm-map all-vrfs
IGMP SSM-map Information.
VRF Name   : default

Interface Name   SSM-map ACL name
--------------  ----------------
IGMP is not enabled on any of the interfaces.
No interfaces found for VRF mgmt.

VRF Name   : vrf1

Interface Name   SSM-map ACL name
--------------  ----------------

VRF Name   : vrf2

Interface Name   SSM-map ACL name
--------------  ----------------
vlan151           ssm_map_vrf2

Site-2-Border-vtep-Primary# show ip pim vrf vrf1
PIM Global Parameters
VRF                              :  vrf1
PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive

Site-2-Border-vtep-Primary# show ip pim vrf vrf2
PIM Global Parameters

VRF                              :  vrf2

PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  vrf2_ssm_acl
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive

Site-2-Border-vtep-Primary# show ip mroute brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                            Total number of entries : 6
--------------------------------------------------------------------------------
-
Group Address  Source Address     Neighbor    Interface      Uptime        State
                                                           (HH:MM:SS)
--------------------------------------------------------------------------------
```

```
232.5.0.1      60.1.25.100        5.5.5.50    vni16777214    01:00:00      route
232.6.0.1      60.1.25.100        5.5.5.50    vni16777214    01:00:00      route
232.15.0.1     60.1.25.100        5.5.5.50    vni16777214    00:49:14      route
232.15.0.1     60.1.25.100        5.5.5.50    vlan141        00:49:14      bridge
232.16.0.1     60.1.25.100        5.5.5.50    vlan141        00:49:14      bridge
232.16.0.1     60.1.25.100        5.5.5.50    vni16777214    00:49:14      route
-------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of entries : 5
-------------------------------------------------------------------------------
-
225.1.0.2      11.1.51.100                    vlan151        01:20:16      route
225.5.0.2      11.1.51.100                    vlan151        01:20:16      route
225.6.0.2      11.1.51.100                    vlan151        01:20:16      route
226.5.0.2      11.1.51.100                    vlan151        01:20:16      bridge
226.6.0.2      11.1.51.100                    vlan151        01:20:16      bridge
-------------------------------------------------------------------------------
-

Site-2-Border-vtep-Primary# show ip mroute 232.5.0.1 all-vrfs
IP Multicast Route Entries
VRF : vrf1
Group Address                 : 232.5.0.1
Source Address                : 60.1.25.100
Neighbor                      : 5.5.5.50
Incoming interface            : vni16777214
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 01:00:06
Downstream Interface
Interface       State
-----------     ----------
vlan1039        forwarding

Site-2-Border-vtep-Primary# show ip mroute 232.6.0.1 all-vrfs
IP Multicast Route Entries
VRF : vrf1
Group Address                 : 232.6.0.1
Source Address                : 60.1.25.100
Neighbor                      : 5.5.5.50
Incoming interface            : vni16777214
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 01:00:09
Downstream Interface
Interface       State
-----------     ----------
vlan1039        forwarding

Site-2-Border-vtep-Primary# show ip mroute 232.15.0.1 all-vrfs
IP Multicast Route Entries
VRF : vrf1
Group Address                 : 232.15.0.1
Source Address                : 60.1.25.100
Neighbor                      : 5.5.5.50
Incoming interface            : vni16777214
```

```
Intra-Inter Forwarded VTEP(s) : 85.85.85.85
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:49:27
Downstream Interface
Interface       State
-----------     ----------
vlan1039        forwarding

Group Address                 : 232.15.0.1
Source Address                : 60.1.25.100
Neighbor                      : 5.5.5.50
Incoming interface            : vlan141
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:49:27

Site-2-Border-vtep-Primary# show ip mroute 232.16.0.1 all-vrfs
IP Multicast Route Entries

VRF : vrf1

Total number of entries : 2
Group Address                 : 232.16.0.1
Source Address                : 60.1.25.100
Neighbor                      : 5.5.5.50
Incoming interface            : vlan141
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:49:31
Group Address                 : 232.16.0.1
Source Address                : 60.1.25.100
Neighbor                      : 5.5.5.50
Incoming interface            : vni16777214
Intra-Inter Forwarded VTEP(s) : 85.85.85.85
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:49:31
Downstream Interface
Interface       State
-----------     ----------
vlan1039        forwarding

Site-2-Border-vtep-Primary# show ip mroute 225.1.0.2 all-vrfs
IP Multicast Route Entries

VRF : vrf2

Total number of entries : 1
Group Address                 : 225.1.0.2
Source Address                : 11.1.51.100
Neighbor                      :
```

```
Incoming interface            : vlan151
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:20:42
Downstream Interface
Interface       State
-----------     ----------
vni9002         forwarding

Site-2-Border-vtep-Primary# show ip mroute 225.5.0.2 all-vrfs
IP Multicast Route Entries
VRF : vrf2
Total number of entries : 1
Group Address                 : 225.5.0.2
Source Address                : 11.1.51.100
Neighbor                      :
Incoming interface            : vlan151
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:20:47
Downstream Interface
Interface       State
-----------     ----------
vni9002         forwarding

Site-2-Border-vtep-Primary# show ip mroute 225.6.0.2 all-vrfs
IP Multicast Route Entries
VRF : vrf2
Total number of entries : 1
Group Address                 : 225.6.0.2
Source Address                : 11.1.51.100
Neighbor                      :
Incoming interface            : vlan151
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:20:50
Downstream Interface
Interface       State
-----------     ----------
vni9002         forwarding

Site-2-Border-vtep-Primary# show interface vxlan vteps
Source       Destination    Origin   Status         VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
-
80.80.80.80  4.4.4.4        evpn     operational    2040      disabled  141    --
80.80.80.80  4.4.4.4        evpn     operational    2050      disabled  151    --
80.80.80.80  5.5.5.50       evpn     operational    9002      enabled   --
vrf2
80.80.80.80  5.5.5.50       evpn     operational    16777214  enabled   --
vrf1
80.80.80.80  85.85.85.85    evpn     operational    2040      disabled  141    --
80.80.80.80  85.85.85.85    evpn     operational    2050      disabled  151    --
```

```
80.80.80.80  85.85.85.85    evpn     operational    9002      enabled   --
vrf2
80.80.80.80  85.85.85.85    evpn     operational    16777214  enabled   --
vrf1

Site-2-Border-vtep-Primary# show ip pim rp-set all-vrfs
Site-2-Border-vtep-Primary# show ip pim bsr elected all-vrfs
Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                       : vrf1

E-BSR Address             :
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 0
E-BSR Up Time             : 0 secs
Next Bootstrap Message    : 0 secs

VRF                       : vrf2

E-BSR Address             :
E-BSR Priority            : 0
E-BSR Hash Mask Length    : 0
E-BSR Up Time             : 0 secs
Next Bootstrap Message    : 0 secs

Site-2-Border-vtep-Primary# show ip igmp snooping vlan 151
IGMP Snooping Protocol Info
Total VLANs with IGMP enabled             : 2
Current count of multicast groups joined  : 2
IGMP Drop Unknown Multicast               : Global
VLAN ID : 151
VLAN Name : VLAN151
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address [this switch] : 11.1.51.1
Querier Port :
Querier UpTime :2h 8m
Querier Expiration Time :0m 24s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
226.5.0.2              Filter    3    INC  1h 20m    2m 48s
226.6.0.2              Filter    2         1h 20m    2m 44s

Site-2-Border-vtep-Primary# show ip igmp snooping vlan 151 group 226.5.0.2
IGMP ports and group information for group 226.5.0.2
VLAN ID   : 151
VLAN Name : VLAN151
Group Address : 226.5.0.2
Last Reporter : 11.1.51.50
Group Type    : Filter
                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
vxlan1(4.4.4.4) 3    INC  1h 20m    2m 44s                        1         0

Group Address  : 226.5.0.2
Source Address : 11.1.51.100
Source Type    : Filter
Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
```

```
vxlan1(4.4.4.4)          INC  1h 20m    2m 44s    Auto

Site-2-Border-vtep-Primary# show ip igmp snooping vlan 141
IGMP Snooping Protocol Info
Total VLANs with IGMP enabled             : 2
Current count of multicast groups joined  : 2
IGMP Drop Unknown Multicast               : Global
VLAN ID : 141
VLAN Name : VLAN141
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address [this switch] : 11.1.41.1
Querier Port :
Querier UpTime :2h 3m
Querier Expiration Time :0m 58s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
232.15.0.1             Filter    3    INC  1h 4m     3m 20s
232.16.0.1             Filter    3    INC  1h 4m     3m 16s

Site-2-Border-vtep-Primary# show ip igmp snooping vlan 141 group 232.15.0.1
IGMP ports and group information for group 232.15.0.1
VLAN ID   : 141
VLAN Name : VLAN141
Group Address : 232.15.0.1
Last Reporter : 11.1.41.50
Group Type    : Filter
                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
vxlan1(4.4.4.4) 3    INC  1h 8m     3m 0s                         1         0

Group Address  : 232.15.0.1
Source Address : 60.1.25.100
Source Type    : Filter
Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
vxlan1(4.4.4.4)          INC  1h 8m     3m 0s     Auto
Site-2-Border-vtep-Primary#
```

Site-2-Border-vtep-Secondary

```
hostname Site-2-Border-vtep-Secondary
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 5:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 6:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
```

```
!
!
ssh server vrf mgmt
access-list ip ssm_map_vrf2
        10 permit any 11.1.51.100 225.5.0.2
        20 permit any 11.1.51.100 225.6.0.2
        30 permit any 11.1.51.100 225.1.0.2
        40 permit any 11.1.51.100 226.5.0.2
access-list ip vrf2_ssm_acl
        10 permit any any 225.5.0.2
        20 permit any any 225.6.0.2
        30 permit any any 226.5.0.2
        40 permit any any 225.1.0.2
vlan 141
        ip igmp snooping enable
vlan 151
        ip igmp snooping enable
vlan 752, 1039-1040
virtual-mac 00:11:00:00:00:11
evpn
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 141
                rd auto
                route-target export 141:141
                route-target import 141:141
                redistribute host-route
        vlan 151
                rd auto
                route-target export 151:151
                route-target import 151:151
                redistribute host-route
interface lag 120
        description ISL
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface 1/1/1
        description port_Site-1-Border-vtep-Primary
        no shutdown
        ip address 40.1.2.2/29
interface 1/1/2
        description port_Site-1-Border-vtep-Secondary
        no shutdown
        ip address 40.1.4.2/29
interface 1/1/34
        description Keepalive
        no shutdown
        ip address 45.1.1.2/24
interface 1/1/35
        description port_isl
        no shutdown
        lag 120
interface 1/1/47
        description Site-2-Access-vtep-1
        no shutdown
        ip address 60.1.3.1/31
```

```
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/48
        description Site-2-Access-vtep-2
        no shutdown
        ip address 60.1.4.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface loopback 1
        ip address 80.80.80.80/32
interface loopback 2
        vrf attach vrf1
        ip address 121.121.121.121/32
        ip pim-sparse enable
interface loopback 113
        ip address 196.170.1.255/32
interface loopback 114
        ip address 192.168.1.4/32
interface vlan 141
        vrf attach vrf1
        ip address 11.1.41.2/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.41.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 151
        vrf attach vrf2
        ip address 11.1.51.2/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.51.10
        ip igmp enable
        ip igmp apply ssm-map access-list ssm_map_vrf2
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 752
        no shutdown
        ip address 172.1.1.2/30
        ip ospf 1 area 0.0.0.0
interface vlan 1039
        vrf attach vrf1
        ip address 60.1.39.3/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 1040
        vrf attach vrf2
        ip address 60.1.40.3/24
        ip ospf 1 area 0.0.0.0
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vxlan 1
        source ip 80.80.80.80
        no shutdown
        vni 2040
                vlan 141
        vni 2050
                vlan 151
        vni 9002
                vrf vrf2
```

```
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
        inter-switch-link lag 120
        role secondary
        keepalive peer 45.1.1.1 source 45.1.1.2
!
route-map tag_bgp_ospf permit seq 10
        set tag 220
route-map tag_ospf_bgp deny seq 10
        match tag 210
route-map tag_ospf_bgp deny seq 20
        match tag 220
route-map tag_ospf_bgp permit seq 30
!
!
!
router ospf 1
        router-id 112.12.1.3
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 112.12.1.5
        distance 250
        redistribute bgp route-map tag_bgp_ospf
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 112.12.2.5
        distance 250
        redistribute bgp route-map tag_bgp_ospf
        redistribute connected
        area 0.0.0.0
        router bgp 65536
        bgp router-id 112.12.1.3
        neighbor 4.4.4.4 remote-as 65536
        neighbor 40.1.2.1 remote-as 65535
        neighbor 40.1.4.1 remote-as 65535
        neighbor 45.1.1.1 remote-as 65536
        neighbor 85.85.85.85 remote-as 65536
        neighbor 85.85.85.85 update-source loopback 114
        neighbor 193.170.1.255 remote-as 65535
        neighbor 193.170.1.255 ebgp-multihop 5
        neighbor 193.170.1.255 update-source loopback 113
        neighbor 194.170.1.255 remote-as 65535
        neighbor 194.170.1.255 ebgp-multihop 5
        neighbor 194.170.1.255 update-source loopback 113
        address-family ipv4 unicast
                neighbor 40.1.2.1 activate
                neighbor 40.1.4.1 activate
                neighbor 45.1.1.1 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 4.4.4.4 next-hop-self
```

```
                neighbor 4.4.4.4 route-reflector-client
                neighbor 4.4.4.4 send-community extended
                neighbor 4.4.4.4 activate
                neighbor 85.85.85.85 next-hop-self
                neighbor 85.85.85.85 route-reflector-client
                neighbor 85.85.85.85 send-community extended
                neighbor 85.85.85.85 activate
                neighbor 193.170.1.255 send-community extended
                neighbor 193.170.1.255 activate
                neighbor 194.170.1.255 send-community extended
                neighbor 194.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf vrf1
        enable
        pim-ssm
router pim vrf vrf2
        enable
        pim-ssm
        pim-ssm range-access-list vrf2_ssm_acl
https-server vrf mgmt

=======================================
Show command outputs for  validation
=======================================

Site-2-Border-vtep-Secondary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
=================================================
Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.13.1.3       n/a       FULL              60.1.3.0           1/1/47
112.14.1.3       n/a       FULL              60.1.4.0           1/1/48
VRF : vrf1                             Process : 1
=================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.1.5       1         FULL/BDR          60.1.39.2          vlan1039
VRF : vrf2                             Process : 1
=================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
```

```
--------------------------------------------------------------------------------
112.11.2.5       1         FULL/BDR          60.1.40.2          vlan1040

Site-2-Border-vtep-Secondary# show bgp l2vpn evpn summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65536        BGP Router Identifier  : 112.12.1.3
Peers                  : 4            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Neighbor      Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
4.4.4.4       65536       134     176     01h:47m:29s  Established   Up
85.85.85.85   65536       137     172     01h:47m:20s  Established   Up
193.170.1.255 65535       159     155     01h:45m:24s  Established   Up
194.170.1.255 65535       158     145     01h:45m:20s  Established   Up

Site-2-Border-vtep-Secondary# show interface vxlan vteps
Source       Destination    Origin   Status         VNI       Routing   VLAN  VRF
--------------------------------------------------------------------------------
-
80.80.80.80  4.4.4.4        evpn     operational    2040      disabled  141    --
80.80.80.80  4.4.4.4        evpn     operational    2050      disabled  151    --
80.80.80.80  5.5.5.50       evpn     operational    9002      enabled   --
vrf2
80.80.80.80  5.5.5.50       evpn     operational    16777214  enabled   --
vrf1
80.80.80.80  85.85.85.85    evpn     operational    2040      disabled  141    --
80.80.80.80  85.85.85.85    evpn     operational    2050      disabled  151    --
80.80.80.80  85.85.85.85    evpn     operational    9002      enabled   --
vrf2
80.80.80.80  85.85.85.85    evpn     operational    16777214  enabled   --
vrf1

Site-2-Border-vtep-Secondary# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 5
--------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires    DR        Hold Time  Secondary
           (IPV4)       (HH:MM:SS) (HH:MM:SS) Priority (HH:MM:SS) Address (IPV4)
--------------------------------------------------------------------------------
vni16777214 5.5.5.50     01:45:43   00:03:23   1          00:03:30
vlan141     11.1.41.1    01:48:14   00:01:35   1347440720 00:01:45   11.1.41.10
vlan141     11.1.41.3    01:47:42   00:01:39   1431655765 00:01:45   Nil
vlan1039    60.1.39.2    01:48:28   00:01:20   1347440720 00:01:45   Nil
vni16777214 85.85.85.85  01:47:44   00:03:18   1          00:03:30
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 5
--------------------------------------------------------------------------------
-
vni9002     5.5.5.50     01:21:38   00:03:23   1          00:03:30
vlan151     11.1.51.1    01:21:38   00:01:41   1347440720 00:01:45   11.1.51.10
vlan151     11.1.51.3    01:21:32   00:01:44   1431655765 00:01:45   Nil
vlan1040    60.1.40.2    01:21:33   00:01:42   1347440720 00:01:45   Nil
vni9002     85.85.85.85  01:21:37   00:03:28   1          00:03:30
--------------------------------------------------------------------------------
-
Site-2-Border-vtep-Secondary# show ip pim vrf vrf1
PIM Global Parameters
```

```
VRF                               :  vrf1

PIM Status                        :  Enabled
PIM SSM Status                    :  Enabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive

Site-2-Border-vtep-Secondary# show ip pim vrf vrf2
PIM Global Parameters

VRF                               :  vrf2

PIM Status                        :  Enabled
PIM SSM Status                    :  Enabled
PIM SSM Range ACL                 :  vrf2_ssm_acl
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive

Site-2-Border-vtep-Secondary# show ip igmp snooping vlan 141
IGMP Snooping Protocol Info
Total VLANs with IGMP enabled             : 2
Current count of multicast groups joined  : 2
IGMP Drop Unknown Multicast               : Global
VLAN ID : 141
VLAN Name : VLAN141
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 11.1.41.1
Querier Port : lag120
Querier UpTime :1h 48m
Querier Expiration Time :3m 21s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
232.15.0.1             Filter    3    INC  51m 22s   3m 36s
232.16.0.1             Filter    3    INC  51m 21s   3m 31s

Site-2-Border-vtep-Secondary# show ip igmp snooping vlan 141 group 232.15.0.1
IGMP ports and group information for group 232.15.0.1
VLAN ID   : 141
VLAN Name : VLAN141
Group Address : 232.15.0.1
Last Reporter : 11.1.41.50
Group Type    : Filter

                                              V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
vxlan1(4.4.4.4) 3    INC  51m 39s   3m 19s                        1         0
Group Address  : 232.15.0.1
Source Address : 60.1.25.100
Source Type    : Filter

Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
```

```
vxlan1(4.4.4.4)          INC  51m 39s   3m 19s    Auto

Site-2-Border-vtep-Secondary# show ip igmp snooping
IGMP Snooping Protocol Info
Total VLANs with IGMP enabled             : 2
Current count of multicast groups joined  : 4
IGMP Drop Unknown Multicast               : Global
VLAN ID : 141
VLAN Name : VLAN141
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 11.1.41.1
Querier Port : lag120
Querier UpTime :1h 48m
Querier Expiration Time :2m 52s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
232.15.0.1             Filter    3    INC  51m 51s   3m 7s
232.16.0.1             Filter    3    INC  51m 50s   3m 2s

VLAN ID : 151
VLAN Name : VLAN151
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 11.1.51.1
Querier Port : lag120
Querier UpTime :1h 48m
Querier Expiration Time :2m 51s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
226.5.0.2              Filter    3    INC  1h 3m     3m 3s
226.6.0.2              Filter    2         1h 2m     3m 6s

Site-2-Border-vtep-Secondary# show ip igmp snooping vlan 151 group 226.5.0.2
IGMP ports and group information for group 226.5.0.2
VLAN ID   : 151
VLAN Name : VLAN151
Group Address : 226.5.0.2
Last Reporter : 11.1.51.50
Group Type    : Filter
                                                V1        V2        Sources   Sources
Port            Vers Mode Uptime    Expires  Timer     Timer     Forwarded Blocked
--------------- ---- ---- --------  -------- --------- --------- --------- -------
-
vxlan1(4.4.4.4) 3    INC  1h 4m     4m 10s                        1         0

Group Address  : 226.5.0.2
Source Address : 11.1.51.100
Source Type    : Filter

Port                     Mode Uptime    Expires   Configured Mode
------------------------ ---- --------- --------- ----------------
vxlan1(4.4.4.4)          INC  1h 4m     4m 10s    Auto

Site-2-Border-vtep-Secondary# show ip igmp ssm-map all-vrfs
IGMP SSM-map Information.
VRF Name   : default
Interface Name   SSM-map ACL name
--------------  ----------------
IGMP is not enabled on any of the interfaces.
```

```
No interfaces found for VRF mgmt.

VRF Name   : vrf1

Interface Name   SSM-map ACL name
--------------  ----------------
VRF Name   : vrf2

Interface Name   SSM-map ACL name
--------------  ----------------
vlan151           ssm_map_vrf2
Site-2-Border-vtep-Secondary#
Site-2-Border-vtep-Secondary# show ip pim rp-set all-vrfs
Site-2-Border-vtep-Secondary# show ip pim bsr elected all-vrfs
Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                      : vrf1

E-BSR Address            :
E-BSR Priority           : 0
E-BSR Hash Mask Length   : 0
E-BSR Up Time            : 0 secs
Next Bootstrap Message   : 0 secs

VRF                      : vrf2

E-BSR Address            :
E-BSR Priority           : 0
E-BSR Hash Mask Length   : 0
E-BSR Up Time            : 0 secs
Next Bootstrap Message   : 0 secs

Site-2-Border-vtep-Secondary# show ip mroute 232.5.0.1 all-vrfs
IP Multicast Route Entries
VRF : vrf1
Group Address                : 232.5.0.1
Source Address               : 60.1.25.100
Neighbor                     : 5.5.5.50
Incoming interface           : vni16777214
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol   : PIM-SSM
Unicast Routing Protocol     : BGP
Metric                       : 0
Metric  Pref                 : 20
Uptime (HH:MM:SS)            : 01:11:55
Downstream Interface

Interface       State
-----------     ----------
vlan1039        forwarding
Group Address                : 232.5.0.1
Source Address               : 60.1.25.100
Neighbor                     : 60.1.39.2
Incoming interface           : vlan1039
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol   : PIM-SSM
Unicast Routing Protocol     : BGP
Metric                       : 0
Metric  Pref                 : 20
Uptime (HH:MM:SS)            : 01:11:56

Site-2-Border-vtep-Secondary# show ip mroute 232.15.0.1 all-vrfs
```

```
IP Multicast Route Entries

VRF : vrf1

Total number of entries : 3
Group Address                  : 232.15.0.1
Source Address                 : 60.1.25.100
Neighbor                       : 5.5.5.50
Incoming interface             : vlan141
Intra-Inter Forwarded VTEP(s)  :
Multicast Routing Protocol     : PIM-SSM
Unicast Routing Protocol       : BGP
Metric                         : 0
Metric  Pref                   : 20
Uptime (HH:MM:SS)              : 01:01:14
Group Address                  : 232.15.0.1
Source Address                 : 60.1.25.100
Neighbor                       : 60.1.39.2
Incoming interface             : vlan1039
Intra-Inter Forwarded VTEP(s)  :
Multicast Routing Protocol     : PIM-SSM
Unicast Routing Protocol       : BGP
Metric                         : 0
Metric  Pref                   : 20
Uptime (HH:MM:SS)              : 01:01:14
Downstream Interface

Interface       State
-----------     ----------
vni16777214     forwarding
Group Address                  : 232.15.0.1
Source Address                 : 60.1.25.100
Neighbor                       : 5.5.5.50
Incoming interface             : vni16777214
Intra-Inter Forwarded VTEP(s)  : 85.85.85.85
Multicast Routing Protocol     : PIM-SSM
Unicast Routing Protocol       : BGP
Metric                         : 0
Metric  Pref                   : 20
Uptime (HH:MM:SS)              : 01:01:14
Downstream Interface

Interface       State
-----------     ----------
vlan1039        forwarding

Site-2-Border-vtep-Secondary# show ip mroute 232.16.0.1 all-vrfs
IP Multicast Route Entries

VRF : vrf1

Total number of entries : 3
Group Address                  : 232.16.0.1
Source Address                 : 60.1.25.100
Neighbor                       : 60.1.39.2
Incoming interface             : vlan1039
Intra-Inter Forwarded VTEP(s)  :
Multicast Routing Protocol     : PIM-SSM
Unicast Routing Protocol       : BGP
Metric                         : 0
Metric  Pref                   : 20
Uptime (HH:MM:SS)              : 01:01:18
```

```
Downstream Interface

Interface       State
-----------     ----------
vni16777214     forwarding

Group Address                 : 232.16.0.1
Source Address                : 60.1.25.100
Neighbor                      : 5.5.5.50
Incoming interface            : vlan141
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 01:01:18
Group Address                 : 232.16.0.1
Source Address                : 60.1.25.100
Neighbor                      : 5.5.5.50
Incoming interface            : vni16777214
Intra-Inter Forwarded VTEP(s) : 85.85.85.85
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 01:01:18
Downstream Interface

Interface       State
-----------     ----------
vlan1039        forwarding

Site-2-Border-vtep-Secondary# show ip mroute 232.6.0.1 all-vrfs
IP Multicast Route Entries

VRF : vrf1

Group Address                 : 232.6.0.1
Source Address                : 60.1.25.100
Neighbor                      : 5.5.5.50
Incoming interface            : vni16777214
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 01:12:08
Downstream Interface

Interface       State
-----------     ----------
vlan1039        forwarding

Group Address                 : 232.6.0.1
Source Address                : 60.1.25.100
Neighbor                      : 60.1.39.2
Incoming interface            : vlan1039
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
```

```
Uptime (HH:MM:SS)             : 01:12:09

Site-2-Border-vtep-Secondary# show ip mroute 225.5.0.2 vrf vrf2
IP Multicast Route Entries

VRF : vrf2

Total number of entries : 1
Group Address                 : 225.5.0.2
Source Address                : 11.1.51.100
Neighbor                      :
Incoming interface            : vlan151
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:32:27
Downstream Interface
Interface       State
-----------     ----------
vni9002         forwarding

Site-2-Border-vtep-Secondary# show ip mroute 225.6.0.2 all-vrfs
IP Multicast Route Entries

VRF : vrf2

Total number of entries : 1
Group Address                 : 225.6.0.2
Source Address                : 11.1.51.100
Neighbor                      :
Incoming interface            : vlan151
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:32:41
Downstream Interface
Interface       State
-----------     ----------
vni9002         forwarding

Site-2-Border-vtep-Secondary# show ip mroute 225.1.0.2 all-vrfs
IP Multicast Route Entries

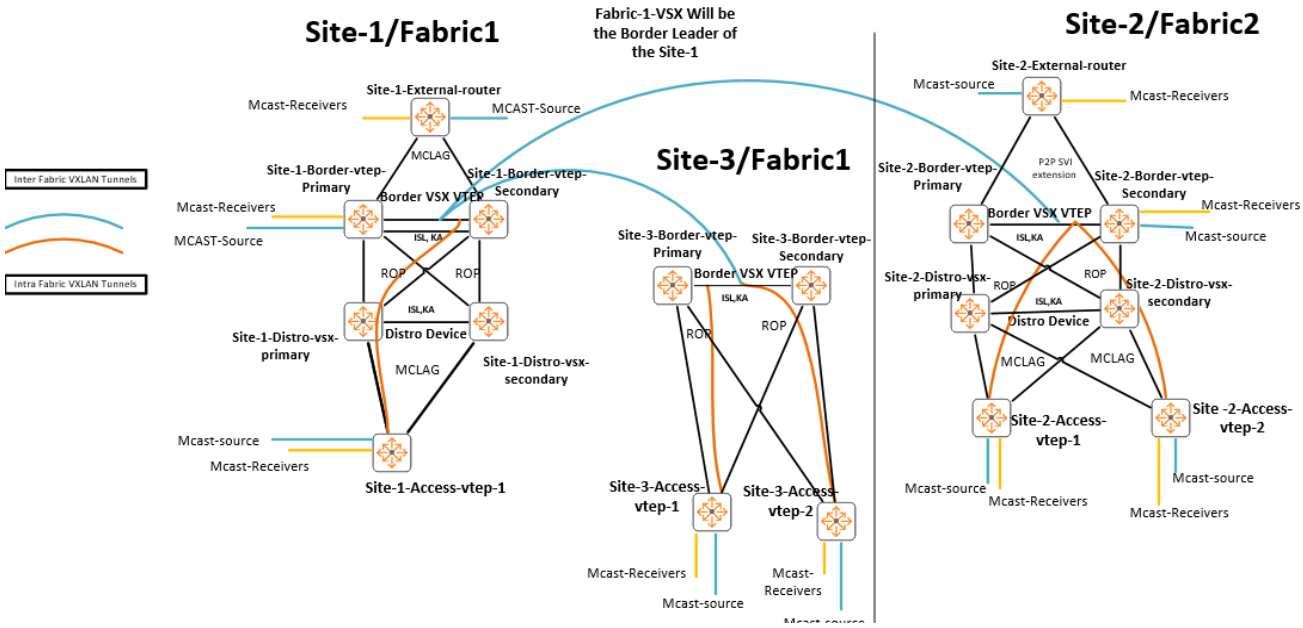
VRF : vrf2

Total number of entries : 1
Group Address                 : 225.1.0.2
Source Address                : 11.1.51.100
Neighbor                      :
Incoming interface            : vlan151
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:32:44
Downstream Interface
Interface       State
```

```
-----------     ----------
vni9002         forwarding
Site-2-Border-vtep-Secondary#
```

Use case 4: multiple fabrics per site (PIM-SSM)

Figure 1 *Use case 4: multiple fabrics per site (PIM-SSM)*



Configuration and verification details for the devices in this use case are provided in the following sections:

[Site-1-Access-vtep-1]

[Site-1-Border-vtep-Primary]

[Site-1-Border-vtep-Secondary]

[Site-1-Distro-vsx-primary]

[Site-1-Distro-vsx-secondary]

[Site-1-External-router]

[Site-2-Access-vtep-1]

[Site-2-Access-vtep-2]

[Site-2-Border-vtep-Primary]

[Site-2-Border-vtep-Secondary]

[Site-2-Distro-vsx-primary]

[Site-2-Distro-vsx-secondary]

[Site-2-External-router]

[Site-3-Access-vtep-1]

[Site-3-Access-vtep-2]

[Site-3-Border-vtep-Primary]

[Site-3-Border-vtep-Secondary]

Site-1-Access-vtep-1

```
hostname Site-1-Access-vtep-1
vrf vrf1
        rd 31:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 32:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
ssh server vrf default
ssh server vrf mgmt
access-list ip pim-ssm-range-acl-vrf2
        10 permit any any 225.1.0.0/255.255.0.0
        20 permit any any 225.2.1.0/255.255.255.0
        30 permit any any 225.2.2.0/255.255.255.0
        40 permit any any 232.0.0.0/255.0.0.0
vlan 1,4
vlan 101
        ip igmp snooping enable
vlan 102
        ip igmp snooping enable
virtual-mac 00:01:20:11:56:20
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
        vlan 101
                rd auto
                route-target export 101:141
                route-target import 101:141
                redistribute host-route
        vlan 102
                rd auto
                route-target export 102:142
                route-target import 102:142
                redistribute host-route
interface lag 37
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 4
        lacp mode active
        lacp rate fast
interface 1/1/1
        description port_to_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 101-102
interface 1/1/49
        description port_Site-1-Distro-VSX-Primary
        no shutdown
        lag 37
interface 1/1/50
        description port_Site-1-Distro-VSX-Secondary
        no shutdown
        lag 37
```

```
interface loopback 1
        ip address 192.168.1.5/32
        ip ospf 1 area 0.0.0.0
interface loopback 15
        ip address 3.3.3.50/32
        ip ospf 1 area 0.0.0.0
interface vlan 4
        ip address 40.1.1.4/29
        l3-counters
        ip ospf 1 area 0.0.0.0
interface vlan 101
        vrf attach vrf1
        ip address 11.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.1.10
        ip igmp enable
        ip pim-sparse enable
interface vlan 102
        vrf attach vrf2
        ip address 11.1.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.2.10
        ip igmp enable
        ip pim-sparse enable
interface vxlan 1
        source ip 3.3.3.50
        no shutdown
        vni 2100
                vlan 101
        vni 2101
                vlan 102
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
!
!
router ospf 1
        router-id 111.13.1.3
        redistribute local loopback
        area 0.0.0.0
        router bgp 65535
        bgp router-id 111.13.1.3
        neighbor 192.168.1.1 remote-as 65535
        neighbor 192.168.1.1 update-source loopback 1
        neighbor 192.168.1.2 remote-as 65535
        neighbor 192.168.1.2 update-source loopback 1
        address-family l2vpn evpn
                neighbor 192.168.1.1 send-community extended
                neighbor 192.168.1.1 activate
                neighbor 192.168.1.2 send-community extended
                neighbor 192.168.1.2 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                        exit-address-family
```

```
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
router pim vrf vrf1
        enable
        pim-ssm
router pim vrf vrf2
        enable
        pim-ssm
        pim-ssm range-access-list pim-ssm-range-acl-vrf2
https-server vrf default
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================

ite1-access-vtep1# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================
Total Number of Neighbors : 1
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
101.10.10.10     1         FULL/BDR          40.1.1.2           vlan4

site1-access-vtep1# show bgp l2vpn evpn summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.13.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Neighbor      Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
192.168.1.1   65535       11646   1170    15h:51m:27s  Established   Up
192.168.1.2   65535       11941   1177    15h:51m:30s  Established   Up

site1-access-vtep1# show interface vxlan vteps
Source       Destination    Origin   Status         VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
3.3.3.50     2.2.2.2        evpn     operational    9002      enabled   --    vrf2
3.3.3.50     2.2.2.2        evpn     operational    16777214  enabled   --    vrf1
3.3.3.50     4.4.4.50       evpn     operational    2100      disabled  101   --
3.3.3.50     4.4.4.50       evpn     operational    2101      disabled  102   --
3.3.3.50     4.4.4.50       evpn     operational    9002      enabled   --    vrf2
3.3.3.50     4.4.4.50       evpn     operational    16777214  enabled   --    vrf1

site1-access-vtep1# show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
VRF : vrf1                             Total number of neighbors : 3
-------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR         Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority  (HH:MM:SS)  Address (IPV4)
-------------------------------------------------------------------------------
vni16777214 2.2.2.2     05:09:17  00:03:14    1         00:03:30
vni16777214 4.4.4.50    05:09:06  00:03:29    1         00:03:30
vlan101     11.1.1.10   05:09:20  00:01:28    839123972 00:01:45     Nil
```

```
--------------------------------------------------------------------------------
VRF : vrf2                              Total number of neighbors : 3
--------------------------------------------------------------------------------
vni9002     2.2.2.2     01:43:02  00:03:28    1          00:03:30
vni9002     4.4.4.50    01:42:58  00:03:05    1          00:03:30
vlan102     11.1.2.10   01:43:14  00:01:32    839123972  00:01:45    Nil
--------------------------------------------------------------------------------

site1-access-vtep1# show ip mroute 232.1.5.1 all-vrfs
IP Multicast Route Entries

VRF : vrf1

Total number of entries : 1
Group Address                 : 232.1.5.1
Source Address                : 60.2.1.15
Neighbor                      :
Incoming interface            : vlan101
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:48:13

site1-access-vtep1# show ip mroute 225.1.5.1 all-vrfs
IP Multicast Route Entries

VRF : vrf2

Total number of entries : 1
Group Address                 : 225.1.5.1
Source Address                : 61.2.2.15
Neighbor                      :
Incoming interface            : vlan102
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:43:38
site1-access-vtep1#
```

Site-1-Border-vtep-Primary

```
hostname Site-1-Border-vtep-Primary
router vrrp enable
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 1:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 2:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
!
!
```

```
!
!
ssh server vrf default
ssh server vrf mgmt
access-list ip pim-ssm-range-acl-vrf2
        vsx-sync
        !
        10 permit any any 225.1.0.0/255.255.0.0
        20 permit any any 225.2.1.0/255.255.255.0
        30 permit any any 225.2.1.0/255.255.255.0
        40 permit any any 232.0.0.0/255.0.0.0
vlan 1-2
vlan 101
        ip igmp snooping enable
vlan 102
        ip igmp snooping enable
vlan 1001-1002
vlan 1401
        ip igmp snooping enable
vlan 1402
        ip igmp snooping enable
vlan 3101-3102
virtual-mac 00:01:20:11:56:10
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 101
                rd auto
                route-target export 101:141
                route-target import 101:141
                redistribute host-route
        vlan 102
                rd auto
                route-target export 102:142
                route-target import 102:142
                redistribute host-route
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1001-1002
        lacp mode active
        lacp rate fast
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1-2,101-102,1001-1002,3101-3102
        lacp mode active
interface 1/1/1
        description port_isl
        no shutdown
        lag 120
interface 1/1/2
        description port_isl
        no shutdown
        lag 120
interface 1/1/3
```

```
        description Keepalive
        no shutdown
        ip address 46.1.1.1/29
interface 1/1/8
        description port_Site-1-External-router
        no shutdown
        lag 50
interface 1/1/10
        description port_Site-3-Border-vtep-Primary
        no shutdown
        ip address 48.1.1.2/29
interface 1/1/16
        description port_Site-3-Border-vtep-Secondary
        no shutdown
        ip address 48.1.3.2/29
interface 1/1/32
        description port_Site-1-Distro-VSX-Secondary
        no shutdown
        ip address 30.1.10.1/31
        ip ospf 1 area 0.0.0.0
interface 1/1/36
        description port_Site-1-Distro-VSX-Primary
        no shutdown
        ip address 30.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/46
        description port_to_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1401-1402
interface 1/1/49
        description port_Site-2-Border-vtep-Secondary
        no shutdown
        ip address 40.1.2.1/29
interface 1/1/51
        description port_Site-2-Border-vtep-Primary
        no shutdown
        ip address 40.1.1.1/29
interface loopback 1
        ip address 192.168.1.1/32
interface loopback 5
        ip address 5.5.5.50/32
interface loopback 6
        ip address 193.170.1.255/32
interface loopback 15
        ip address 4.4.4.50/32
interface loopback 100
        ip address 192.168.1.255/32
interface loopback 101
        vrf attach vrf1
        ip address 111.100.101.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 102
        vrf attach vrf2
        ip address 111.100.102.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 2
        ip address 20.1.1.1/29
```

```
        ip ospf 1 area 0.0.0.0
        ip ospf priority 10
        vrrp 1 address-family ipv4
                address 20.1.1.3 primary
                address 20.1.1.4 secondary
                no preempt
                preempt delay minimum 10
                priority 120
                no shutdown
                exit
interface vlan 101
        vrf attach vrf1
        ip address 11.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 102
        vrf attach vrf2
        ip address 11.1.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1001
        vrf attach vrf1
        vsx active-forwarding
        ip address 60.0.1.2/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1002
        vrf attach vrf2
        vsx active-forwarding
        ip address 60.0.2.2/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1401
        vrf attach vrf1
        ip address 60.4.1.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
        ip igmp enable
        ip pim-sparse enable
interface vlan 1402
        vrf attach vrf2
        ip address 60.4.2.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
        ip igmp enable
        ip pim-sparse enable
interface vlan 3101
        vrf attach vrf1
        ip address 60.10.1.2/30
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 3102
```

```
        vrf attach vrf2
        ip address 60.10.2.2/30
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vxlan 1
        source ip 4.4.4.50
        no shutdown
        vni 2100
                vlan 101
        vni 2101
                vlan 102
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
        inter-switch-link lag 120
        role primary
        keepalive peer 46.1.1.2 source 46.1.1.1
        vsx-sync mgmd-global pim
ip prefix-list test_1 seq 20 deny 196.170.1.255/32
ip prefix-list test_1 seq 30 deny 195.170.1.255/32
ip prefix-list test_1 seq 40 deny 197.170.1.255/32
ip prefix-list test_1 seq 50 deny 198.170.1.255/32
ip prefix-list test_1 seq 60 permit 80.80.80.80/32
ip prefix-list test_1 seq 70 permit 8.8.8.8/32
!
!
!
!
route-map tag_bgp_ospf permit seq 10
        set tag 110
route-map tag_ospf_bgp deny seq 10
        match tag 110
route-map tag_ospf_bgp deny seq 20
        match tag 120
route-map tag_ospf_bgp permit seq 30
route-map test_1 permit seq 10
        match ip address prefix-list test_1
!
router ospf 1
        router-id 111.11.1.3
        max-metric router-lsa include-stub on-startup
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map test_1
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 111.11.1.5
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 111.11.2.5
        distance 250
```

```
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router bgp 65535
        bgp router-id 111.11.1.3
        neighbor 40.1.1.2 remote-as 65536
        neighbor 40.1.2.2 remote-as 65536
        neighbor 48.1.1.1 remote-as 65537
        neighbor 48.1.3.1 remote-as 65537
        neighbor 192.168.1.5 remote-as 65535
        neighbor 192.168.1.5 update-source loopback 1
        neighbor 195.170.1.255 remote-as 65536
        neighbor 195.170.1.255 ebgp-multihop 5
        neighbor 195.170.1.255 update-source loopback 6
        neighbor 196.170.1.255 remote-as 65536
        neighbor 196.170.1.255 ebgp-multihop 5
        neighbor 196.170.1.255 update-source loopback 6
        neighbor 197.170.1.255 remote-as 65537
        neighbor 197.170.1.255 ebgp-multihop 5
        neighbor 197.170.1.255 update-source loopback 6
        neighbor 198.170.1.255 remote-as 65537
        neighbor 198.170.1.255 ebgp-multihop 5
        neighbor 198.170.1.255 update-source loopback 6
        address-family ipv4 unicast
                neighbor 40.1.1.2 activate
                neighbor 40.1.2.2 activate
                neighbor 48.1.1.1 activate
                neighbor 48.1.3.1 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 192.168.1.5 next-hop-self
                neighbor 192.168.1.5 route-reflector-client
                neighbor 192.168.1.5 send-community extended
                neighbor 192.168.1.5 activate
                neighbor 195.170.1.255 send-community extended
                neighbor 195.170.1.255 activate
                neighbor 196.170.1.255 send-community extended
                neighbor 196.170.1.255 activate
                neighbor 197.170.1.255 send-community extended
                neighbor 197.170.1.255 activate
                neighbor 198.170.1.255 send-community extended
                neighbor 198.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf vrf1
```

```
        enable
        pim-ssm
router pim vrf vrf2
        enable
        pim-ssm
        pim-ssm range-access-list pim-ssm-range-acl-vrf2
https-server vrf default
https-server vrf mgmt

=======================================
Show command outputs for  validation
=======================================

Site-1-Border-vtep-Primary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================
Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
101.10.10.10     n/a       FULL              30.1.1.0           1/1/36
111.12.1.3       0         FULL/DROther      20.1.1.2           vlan2
VRF : vrf1                             Process : 1
================================================
Total Number of Neighbors : 3
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.1.5       1         FULL/BDR          60.0.1.1           vlan1001
111.12.1.5       1         FULL/DROther      60.0.1.3           vlan1001
111.12.1.5       n/a       FULL              60.10.1.1          vlan3101
VRF : vrf2                             Process : 1
================================================
Total Number of Neighbors : 3
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.2.5       1         FULL/BDR          60.0.2.1           vlan1002
111.12.2.5       1         FULL/DROther      60.0.2.3           vlan1002
111.12.2.5       n/a       FULL              60.10.2.1          vlan3102

Site-1-Border-vtep-Primary# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.11.1.3
Peers                  : 10           Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
40.1.1.2      65536       1113    1104    01h:05m:28s  Established   Up
40.1.2.2      65536       1110    1111    15h:50m:39s  Established   Up
48.1.1.1      65537       1103    1103    15h:49m:34s  Established   Up
48.1.3.1      65537       1104    1104    15h:49m:35s  Established   Up

Address-family : IPv6 Unicast
------------------------------
Address-family : L2VPN EVPN
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
2.2.2.2       65535       1220    11737   15h:50m:22s  Established   Up
192.168.1.5   65535       1162    11639   15h:44m:43s  Established   Up
```

```
195.170.1.255 65536       8645    8680    01h:05m:14s  Established   Up
196.170.1.255 65536       8929    8593    15h:50m:37s  Established   Up
197.170.1.255 65537       10449   8395    15h:49m:28s  Established   Up
198.170.1.255 65537       9508    8766    15h:49m:28s  Established   Up
Codes: * Dynamic Neighbor

VRF : vrf1
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.100.101.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------
Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.100.102.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------
Site-1-Border-vtep-Primary# show interface vxlan vteps
Source       Destination   Origin    Status         VNI       Routing   VLAN  VRF
-------------------------------------------- ----------------------------------
-
4.4.4.50     2.2.2.2       evpn      operational    9002      enabled   --    vrf2
4.4.4.50     2.2.2.2       evpn      operational    16777214  enabled   --
vrf1
4.4.4.50     3.3.3.50      evpn      operational    2100      disabled  101    --
4.4.4.50     3.3.3.50      evpn      operational    2101      disabled  102    --
4.4.4.50     3.3.3.50      evpn      operational    9002      enabled   --
vrf2
4.4.4.50     3.3.3.50      evpn      operational    16777214  enabled   --
vrf1
4.4.4.50     8.8.8.8       evpn      operational    9002      enabled   --
vrf2
4.4.4.50     8.8.8.8       evpn      operational    16777214  enabled   --
vrf1
4.4.4.50     80.80.80.80   evpn      operational    9002      enabled   --
vrf2
4.4.4.50     80.80.80.80   evpn      operational    16777214  enabled   --
vrf1

Site-1-Border-vtep-Primary# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 8
--------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires    DR        Hold Time  Secondary
           (IPV4)       (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  Address (IPV4)
--------------------------------------------------------------------------------
vni16777214 2.2.2.2      05:03:27   00:03:05   1         00:03:30
vni16777214 3.3.3.50     05:03:16   00:03:22   1         00:03:30
vni16777214 8.8.8.8      05:03:29   00:03:18   1         00:03:30
```

```
vlan101     11.1.1.10    05:03:32   00:01:22   839123972 00:01:45   Nil
vlan1001    60.0.1.1     04:34:02   00:01:45   1         00:01:45   Nil
vlan1001    60.0.1.3     04:34:13   00:01:15   839123972 00:01:45   Nil
vlan3101    60.10.1.1    01:42:09   00:01:36   839123972 00:01:45   Nil
vni16777214 80.80.80.80  05:03:34   00:03:18   1         00:03:30
------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 8
------------------------------------------------------------------------------
-
vni9002     2.2.2.2      01:52:12   00:03:19   1         00:03:30
vni9002     3.3.3.50     01:52:10   00:03:25   1         00:03:30
vni9002     8.8.8.8      01:52:09   00:03:24   1         00:03:30
vlan102     11.1.2.10    01:52:25   00:01:25   839123972 00:01:45   Nil
vlan1002    60.0.2.1     01:52:26   00:01:29   1         00:01:45   Nil
vlan1002    60.0.2.3     01:52:27   00:01:24   839123972 00:01:45   Nil
vlan3102    60.10.2.1    01:42:12   00:01:33   839123972 00:01:45   Nil
vni9002     80.80.80.80  01:52:10   00:03:26   1         00:03:30
------------------------------------------------------------------------------
-
Site-1-Border-vtep-Primary# show ip mroute 232.1.5.1 all-vrfs
IP Multicast Route Entries
VRF : vrf1
Total number of entries : 1
Group Address                 : 232.1.5.1
Source Address                : 60.2.1.15
Neighbor                      : 60.0.1.1
Incoming interface            : vlan1001
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 01:41:04
Downstream Interface
Interface       State
-----------     ----------
vlan101         forwarding

Site-1-Border-vtep-Primary# show ip mroute 232.1.6.1 all-vrfs
IP Multicast Route Entries
VRF : vrf1
Total number of entries : 1
Group Address                 : 232.1.6.1
Source Address                : 60.2.1.15
Neighbor                      : 60.0.1.1
Incoming interface            : vlan1001
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 01:41:08
Downstream Interface
Interface       State
-----------     ----------
vni16777214     forwarding

Site-1-Border-vtep-Primary# show ip mroute 225.1.5.1 all-vrfs
IP Multicast Route Entries
VRF : vrf2
Group Address                 : 225.1.5.1
```

```
Source Address                : 61.2.2.15
Neighbor                      : 80.80.80.80
Incoming interface            : vni9002
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 01:52:45
Downstream Interface
Interface       State
-----------     ----------
vlan102         forwarding
vlan3102        forwarding

Group Address                 : 225.1.5.1
Source Address                : 61.2.2.15
Neighbor                      : 60.10.2.1
Incoming interface            : vlan3102
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 01:42:48
Downstream Interface
Interface       State
-----------     ----------
vlan102         forwarding

Group Address                 : 225.1.5.1
Source Address                : 61.2.2.15
Neighbor                      :
Incoming interface            : vlan102
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 01:53:03

Site-1-Border-vtep-Primary# show ip pim all-vrfs
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
PIM Global Parameters
VRF                               :  vrf1
PIM Status                        :  Enabled
PIM SSM Status                    :  Enabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
VRF                               :  vrf2
PIM Status                        :  Enabled
PIM SSM Status                    :  Enabled
PIM SSM Range ACL                 :  pim-ssm-range-acl-vrf2
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
Site-1-Border-vtep-Primary#
```

Site-1-Border-vtep-Secondary

```
hostname Site-1-Border-vtep-Secondary
router vrrp enable
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 1:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 2:11
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
timeout 0
!
!
ssh server vrf mgmt
access-list ip pim-ssm-range-acl-vrf2
        vsx-sync
        !
        10 permit any any 225.1.0.0/255.255.0.0
        20 permit any any 225.2.1.0/255.255.255.0
        30 permit any any 225.2.1.0/255.255.255.0
        40 permit any any 232.0.0.0/255.0.0.0
vlan 1-2
vlan 101
        ip igmp snooping enable
vlan 102
        ip igmp snooping enable
vlan 1001-1002,3101-3102
virtual-mac 00:01:20:11:56:10
evpn
        arp-suppression
        nd-suppression
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
       dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 101
                rd auto
                route-target export 101:141
                route-target import 101:141
                redistribute host-route
        vlan 102
                rd auto
                route-target export 102:142
                route-target import 102:142
                redistribute host-route
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1001-1002
        lacp mode active
        lacp rate fast
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1-2,101-102,1001-1002,3101-3102
        lacp mode active
interface 1/1/1
```

```
        description port_isl
        no shutdown
        lag 120
interface 1/1/2
        description port_isl
        no shutdown
        lag 120
interface 1/1/3
        description Keepalive
        no shutdown
        ip address 46.1.1.2/29
interface 1/1/19
        description port_Site-1-External-router
        no shutdown
        lag 50
interface 1/1/34
        description port_Site-3-Border-vtep-Primary
        no shutdown
        ip address 48.1.2.2/29
interface 1/1/35
        description port_Site-3-Border-vtep-Secondary
        no shutdown
        ip address 48.1.4.2/29
interface 1/1/40
        description port_Site-1-Distro-VSX-Secondary
        no shutdown
        ip address 30.1.11.1/31
        ip ospf 1 area 0.0.0.0
interface 1/1/43
        description port_Site-1-Distro-VSX-Primary
        no shutdown
        ip address 30.1.2.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/53
        description port_Site-2-Border-VSX-Primary
        no shutdown
        ip address 40.1.3.1/29
interface 1/1/54
        description port_Site-2-Border-VSX-Secondary
        no shutdown
        ip address 40.1.4.1/29
interface loopback 1
        ip address 192.168.1.2/32
interface loopback 5
        ip address 5.5.5.50/32
interface loopback 6
        ip address 194.170.1.255/32
interface loopback 15
        ip address 4.4.4.50/32
interface loopback 100
        ip address 192.168.1.255/32
interface loopback 101
        vrf attach vrf1
        ip address 112.100.101.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 102
        vrf attach vrf2
        ip address 112.100.102.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
```

```
interface vlan 2
        ip address 20.1.1.2/29
        ip ospf 1 area 0.0.0.0
        ip ospf priority 0
        vrrp 1 address-family ipv4
        address 20.1.1.3 primary
        address 20.1.1.4 secondary
        no shutdown
        exit
interface vlan 101
        vrf attach vrf1
        ip address 11.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 102
        vrf attach vrf2
        ip address 11.1.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 11.1.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1001
        vrf attach vrf1
        vsx active-forwarding
        ip address 60.0.1.3/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1002
        vrf attach vrf2
        vsx active-forwarding
        ip address 60.0.2.3/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 3101
        vrf attach vrf1
        ip address 60.10.1.1/30
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vlan 3102
        vrf attach vrf2
        ip address 60.10.2.1/30
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
        ip pim-sparse enable
        ip pim-sparse datapath-auto-include
interface vxlan 1
        source ip 4.4.4.50
        no shutdown
        vni 2100
                vlan 101
        vni 2101
                vlan 102
        vni 9002
                vrf vrf2
```

```
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
        system-mac 00:01:20:11:56:10
        inter-switch-link lag 120
        role secondary
        keepalive peer 46.1.1.1 source 46.1.1.2
        vsx-sync mgmd-global pim
ip prefix-list test_1 seq 20 deny 196.170.1.255/32
ip prefix-list test_1 seq 30 deny 195.170.1.255/32
ip prefix-list test_1 seq 40 deny 197.170.1.255/32
ip prefix-list test_1 seq 50 deny 198.170.1.255/32
ip prefix-list test_1 seq 60 permit 80.80.80.80/32
ip prefix-list test_1 seq 70 permit 8.8.8.8/32sa
!
!
!
!
route-map tag_bgp_ospf permit seq 10
        set tag 120
route-map tag_ospf_bgp deny seq 10
        match tag 110
route-map tag_ospf_bgp deny seq 20
        match tag 120
route-map tag_ospf_bgp permit seq 30
route-map test_1 permit seq 10
        match ip address prefix-list test_1
!
router ospf 1
        router-id 111.12.1.3
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map test_1
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 111.12.1.5
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 111.12.2.5
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router bgp 65535
        bgp router-id 111.12.1.3
        neighbor 40.1.3.2 remote-as 65536
        neighbor 40.1.4.2 remote-as 65536
        neighbor 48.1.2.1 remote-as 65537
        neighbor 48.1.4.1 remote-as 65537
        neighbor 192.168.1.5 remote-as 65535
        neighbor 192.168.1.5 update-source loopback 1
        neighbor 195.170.1.255 remote-as 65536
        neighbor 195.170.1.255 ebgp-multihop 5
        neighbor 195.170.1.255 update-source loopback 6
```

```
        neighbor 196.170.1.255 remote-as 65536
        neighbor 196.170.1.255 ebgp-multihop 5
        neighbor 196.170.1.255 update-source loopback 6
        neighbor 197.170.1.255 remote-as 65537
        neighbor 197.170.1.255 ebgp-multihop 5
        neighbor 197.170.1.255 update-source loopback 6
        neighbor 198.170.1.255 remote-as 65537
        neighbor 198.170.1.255 ebgp-multihop 5
        neighbor 198.170.1.255 update-source loopback 6
        address-family ipv4 unicast
                neighbor 40.1.3.2 activate
                neighbor 40.1.4.2 activate
                neighbor 48.1.2.1 activate
                neighbor 48.1.4.1 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 192.168.1.5 next-hop-self
                neighbor 192.168.1.5 route-reflector-client
                neighbor 192.168.1.5 send-community extended
                neighbor 192.168.1.5 activate
                neighbor 195.170.1.255 send-community extended
                neighbor 195.170.1.255 activate
                neighbor 196.170.1.255 send-community extended
                neighbor 196.170.1.255 activate
                neighbor 197.170.1.255 send-community extended
                neighbor 197.170.1.255 activate
                neighbor 198.170.1.255 send-community extended
                neighbor 198.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf vrf1
        enable
        pim-ssm
router pim vrf vrf2
        enable
        pim-ssm
        pim-ssm range-access-list pim-ssm-range-acl-vrf2
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================

Site-1-Border-vtep-Secondary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
=================================================
Total Number of Neighbors : 2
```

```
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
101.10.10.10     n/a       FULL              30.1.2.0           1/1/43
111.11.1.3       10        FULL/DR           20.1.1.1           vlan2
VRF : vrf1                              Process : 1
=================================================
Total Number of Neighbors : 3

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.1.5       1         FULL/BDR          60.0.1.1           vlan1001
111.11.1.5       1         FULL/DR           60.0.1.2           vlan1001
111.11.1.5       n/a       FULL              60.10.1.2          vlan3101
VRF : vrf2                              Process : 1
=================================================
Total Number of Neighbors : 3

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.10.2.5       1         FULL/BDR          60.0.2.1           vlan1002
111.11.2.5       1         FULL/DR           60.0.2.2           vlan1002
111.11.2.5       n/a       FULL              60.10.2.2          vlan3102

Site-1-Border-vtep-Secondary# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 111.12.1.3
Peers                  : 10           Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
40.1.3.2      65536       1110    1108    01h:06m:50s  Established   Up
40.1.4.2      65536       1102    1111    15h:52m:01s  Established   Up
48.1.2.1      65537       1104    1105    15h:50m:57s  Established   Up
48.1.4.1      65537       1112    1107    15h:50m:59s  Established   Up

Address-family : IPv6 Unicast
------------------------------
Address-family : L2VPN EVPN
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
2.2.2.2       65535       1221    12044   15h:51m:49s  Established   Up
192.168.1.5   65535       1171    11934   15h:46m:09s  Established   Up
195.170.1.255 65536       8746    9065    01h:06m:38s  Established   Up
196.170.1.255 65536       8968    8885    15h:52m:04s  Established   Up
197.170.1.255 65537       10395   8840    15h:50m:54s  Established   Up
198.170.1.255 65537       9391    9183    15h:50m:54s  Established   Up
Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 112.100.101.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
```

```
Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------
Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65535        BGP Router Identifier  : 112.100.102.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------

Site-1-Border-vtep-Secondary# show interface vxlan vteps
Source     Destination  Origin  Status             VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
4.4.4.50   2.2.2.2      evpn    operational        9002      enabled   --    vrf2
4.4.4.50   2.2.2.2      evpn    operational        16777214  enabled   --    vrf1
4.4.4.50   3.3.3.50     evpn    operational        2100      disabled  101   --
4.4.4.50   3.3.3.50     evpn    operational        2101      disabled  102   --
4.4.4.50   3.3.3.50     evpn    operational        9002      enabled   --    vrf2
4.4.4.50   3.3.3.50     evpn    operational        16777214  enabled   --    vrf1
4.4.4.50   8.8.8.8      evpn    operational        9002      enabled   --    vrf2
4.4.4.50   8.8.8.8      evpn    operational        16777214  enabled   --    vrf1
4.4.4.50   80.80.80.80  evpn    operational        9002      enabled   --    vrf2
4.4.4.50   80.80.80.80  evpn    operational        16777214  enabled   --    vrf1
Site-1-Border-vtep-Secondary# show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 8
-------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires    DR        Hold Time  Secondary
            (IPV4)       (HH:MM:SS) (HH:MM:SS) Priority (HH:MM:SS) Address (IPV4)
-------------------------------------------------------------------------------
vni16777214 2.2.2.2      05:04:49   00:03:13   1         00:03:30
vni16777214 3.3.3.50     05:04:38   00:03:00   1         00:03:30
vni16777214 8.8.8.8      05:04:51   00:03:26   1         00:03:30
vlan101     11.1.1.10    05:04:54   00:01:30   839123972 00:01:45   Nil
vlan1001    60.0.1.1     04:35:24   00:01:23   1         00:01:45   Nil
vlan1001    60.0.1.2     04:35:30   00:01:23   839123972 00:01:45   Nil
vlan3101    60.10.1.2    01:43:34   00:01:19   839123972 00:01:45   Nil
vni16777214 80.80.80.80  05:04:55   00:03:27   1         00:03:30
-------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 8
-------------------------------------------------------------------------------
-
vni9002     2.2.2.2      01:53:33   00:03:27   1         00:03:30
vni9002     3.3.3.50     01:53:32   00:03:03   1         00:03:30
vni9002     8.8.8.8      01:53:31   00:03:03   1         00:03:30
vlan102     11.1.2.10    01:53:45   00:01:33   839123972 00:01:45   Nil
vlan1002    60.0.2.1     01:53:48   00:01:37   1         00:01:45   Nil
vlan1002    60.0.2.2     01:53:47   00:01:28   839123972 00:01:45   Nil
vlan3102    60.10.2.2    01:43:34   00:01:43   839123972 00:01:45   Nil
vni9002     80.80.80.80  01:53:32   00:03:05   1         00:03:30
-------------------------------------------------------------------------------
-
Site-1-Border-vtep-Secondary# show ip pim all-vrfs
```

```
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
PIM Global Parameters

VRF                              :  vrf1

PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive

VRF                              :  vrf2

PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  pim-ssm-range-acl-vrf2
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive

Site-1-Border-vtep-Secondary# show ip mroute 232.1.5.1 all-vrfs
IP Multicast Route Entries

VRF : vrf1

Total number of entries : 2
Group Address                 : 232.1.5.1
Source Address                : 60.2.1.15
Neighbor                      : 60.0.1.1
Incoming interface            : vlan101
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 01:42:17
Group Address                 : 232.1.5.1
Source Address                : 60.2.1.15
Neighbor                      : 60.0.1.1
Incoming interface            : vlan1001
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 01:42:17
Downstream Interface
Interface       State
-----------     ----------
vlan101         forwarding

Site-1-Border-vtep-Secondary# show ip mroute 232.1.6.1 all-vrfs
IP Multicast Route Entries
VRF : vrf1
Total number of entries : 1
Group Address                 : 232.1.6.1
Source Address                : 60.2.1.15
Neighbor                      : 60.0.1.1
```

```
Incoming interface            : vlan1001
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 01:42:22
Downstream Interface
Interface       State
-----------     ----------
vni16777214     forwarding
Site-1-Border-vtep-Secondary#
```

Site-1-Distro-vsx-primary

```
!
!Version ArubaOS-CX TL.10.12.0001U
!export-password: default
hostname Site-1-Distro-vsx-primary
no ip icmp redirect
!
!
!
!
!
ssh server vrf mgmt
vlan 1-5
vlan 2001
        ip igmp snooping enable
interface mgmt
        no shutdown
        ip dhcp
interface lag 2
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface lag 35 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 2
        lacp mode active
        lacp rate fast
interface lag 37 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 4
        lacp mode active
        lacp rate fast
interface 1/1/4
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
interface 1/1/5
        no shutdown
        no routing
```

```
        vlan trunk native 1
        vlan trunk allowed all
interface 1/1/18
        description ISL
        no shutdown
        lag 2
interface 1/1/19
        description ISL
        no shutdown
        lag 2
interface 1/1/22
        description KA
        no shutdown
        ip address 2.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/27
        description port_site1_access-vtep1
        no shutdown
        lag 37
interface 1/1/33
        description port_Site-1-Border-vtep-secondary
        no shutdown
        ip address 30.1.2.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/36
        description port_Site-1-Border-vtep-primary
        no shutdown
        ip address 30.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface vlan 3
        vsx active-forwarding
        ip address 33.1.1.1/29
        ip ospf 1 area 0.0.0.0
interface vlan 4
        vsx active-forwarding
        ip address 40.1.1.2/29
        ip ospf 1 area 0.0.0.0
interface vlan 5
        vsx active-forwarding
        ip address 50.1.1.2/29
        ip ospf 1 area 0.0.0.0
vsx
        inter-switch-link lag 2
        role primary
        keepalive peer 2.1.1.0 source 2.1.1.1
!
!
!
!
!
router ospf 1
        router-id 101.10.10.10
        area 0.0.0.0
https-server rest access-mode read-only
https-server vrf mgmt
```

Site-1-Distro-vsx-secondary

```
!
!export-password: default
hostname Site-1-Distro-vsx-secondary
no ip icmp redirect
profile l3-core
!
!
!
!
!
ssh server vrf mgmt
vlan 1-5
interface mgmt
        no shutdown
        ip dhcp
interface lag 2
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface lag 37 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 4
        lacp mode active
        lacp rate fast
interface 1/1/17
        no shutdown
        description port_isl
        lag 2
interface 1/1/20
        no shutdown
        description port_isl
        lag 2
interface 1/1/22
        no shutdown
        description port_ka
        ip address 2.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/27
        no shutdown
        description port_site1_access-vtep1
        lag 37
interface 1/1/31
        no shutdown
        description port_Site-1-Border-vtep-secondary
        ip address 30.1.11.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/32
        no shutdown
        description port_Site-1-Border-vtep-primary
        ip address 30.1.10.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface vlan 3
        vsx active-forwarding
        ip address 33.1.1.2/29
```

```
        ip ospf 1 area 0.0.0.0
interface vlan 4
        vsx active-forwarding
        ip address 40.1.1.3/29
        ip ospf 1 area 0.0.0.0
interface vlan 5
        ip address 50.1.1.3/29
        ip ospf 1 area 0.0.0.0
vsx
        inter-switch-link lag 2
        role secondary
        keepalive peer 2.1.1.1 source 2.1.1.0
!
!
!
!
!
router ospf 1
        router-id 101.10.10.11
        area 0.0.0.0
https-server rest access-mode read-only
https-server vrf mgmt
```

Site-1-External-router

```
hostname Site-1-External-router
vrf vrf1
vrf vrf2
cli-session
        timeout 0
!
!
ssh server vrf default
ssh server vrf mgmt
access-list ip pim-ssm-range-acl-vrf2
        10 permit any any 225.1.0.0/255.255.0.0
        20 permit any any 225.2.1.0/255.255.255.0
        30 permit any any 225.2.2.0/255.255.255.0
        40 permit any any 232.0.0.0/255.0.0.0
vlan 1,1001-1002
vlan 1201
        ip igmp snooping enable
vlan 1202
        ip igmp snooping enable
interface mgmt
        no shutdown
        ip dhcp
interface lag 50
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1001-1002
        lacp mode active
        lacp rate fast
interface 1/1/8
        description port_Site-1-Border-vtep-Primary
        no shutdown
        lag 50
interface 1/1/9
        description port_ixia
        no shutdown
```

```
        no routing
        vlan trunk native 1
        vlan trunk allowed 1201-1202
interface 1/1/16
        description port_Site-1-Border-vtep-Secondary
        no shutdown
        lag 50
interface loopback 101
        vrf attach vrf1
        ip address 110.100.101.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 102
        vrf attach vrf2
        ip address 110.100.102.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1001
        vrf attach vrf1
        ip address 60.0.1.1/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1002
        vrf attach vrf2
        ip address 60.0.2.1/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1201
        vrf attach vrf1
        ip address 60.2.1.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf passive
        ip ospf network point-to-point
        ip pim-sparse enable
interface vlan 1202
        vrf attach vrf2
        ip address 60.2.2.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf passive
        ip ospf network point-to-point
        ip pim-sparse enable
!
!
router ospf 1 vrf vrf1
        router-id 111.10.1.5
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 111.10.2.5
        area 0.0.0.0
router pim vrf vrf1
        enable
        pim-ssm
router pim vrf vrf2
        enable
        pim-ssm
        pim-ssm range-access-list pim-ssm-range-acl-vrf2
https-server vrf mgmt
========
outputs
========

Site1-External-router# show ip ospf neighbors all-vrfs
```

```
VRF : vrf1                              Process : 1
================================================
Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.11.1.5       1         FULL/DR           60.0.1.2           vlan1001
111.12.1.5       1         FULL/DROther      60.0.1.3           vlan1001
VRF : vrf2                              Process : 1
================================================

Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
111.11.2.5       1         FULL/DR           60.0.2.2           vlan1002
111.12.2.5       1         FULL/DROther      60.0.2.3           vlan1002

Site1-External-router# show ip mroute 232.1.5.1 all-vrfs
IP Multicast Route Entries
VRF : vrf1
Total number of entries : 1
Group Address                 : 232.1.5.1
Source Address                : 60.2.1.15
Neighbor                      :
Incoming interface            : vlan1201
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 01:37:38
Downstream Interface
Interface       State
-----------     ----------
vlan1001        forwarding

Site1-External-router# show ip pim all-vrfs
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
PIM Global Parameters

VRF                             :  vrf1

PIM Status                      :  Enabled
PIM SSM Status                  :  Enabled
PIM SSM Range ACL               :  Not Configured
Join/Prune Interval (sec)       :  60
SPT Threshold                   :  Enabled
State Refresh Interval (sec)    :  60
PIM NSF Status                  :  Inactive

VRF                             :  vrf2

PIM Status                      :  Enabled
PIM SSM Status                  :  Enabled
PIM SSM Range ACL               :  pim-ssm-range-acl-vrf2
Join/Prune Interval (sec)       :  60
SPT Threshold                   :  Enabled
State Refresh Interval (sec)    :  60
PIM NSF Status                  :  Inactive

Site1-External-router#
Site1-External-router# show ip pim neighbor brief all-vrfs
```

```
-------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 2
-------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires    DR        Hold Time  Secondary
           (IPV4)       (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  Address (IPV4)
-------------------------------------------------------------------------------
vlan1001    60.0.1.2     05:02:51   00:01:30   839123972 00:01:45   Nil
vlan1001    60.0.1.3     05:03:10   00:01:30   839123972 00:01:45   Nil
-------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 2
-------------------------------------------------------------------------------
-------------------------------------------------------------
vlan1002    60.0.2.2     01:35:10   00:01:35   839123972 00:01:45   Nil
vlan1002    60.0.2.3     01:35:06   00:01:39   839123972 00:01:45   Nil
-------------------------------------------------------------------------------
-
Site1-External-router#
```

Site-2-Access-vtep-1

```
hostname Site-2-Access-vtep-1
vrf vrf1
        rd 104:11
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 32:14
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
ssh server vrf default
ssh server vrf mgmt
vsf secondary-member 2
vsf member 1
        type r8s90a
        link 1 1/1/51
        link 2 1/1/50
vsf member 2
        type r8s89a
        link 1 2/1/25
        link 2 2/1/26
vsf member 3
        type r8s89a
        link 1 3/1/27
        link 2 3/1/28
access-list ip pim-ssm-range-acl-vrf2
        10 permit any any 225.1.0.0/255.255.0.0
        20 permit any any 225.2.1.0/255.255.255.0
        30 permit any any 225.2.2.0/255.255.255.0
        40 permit any any 232.0.0.0/255.0.0.0
vlan 1,6
vlan 501
        ip igmp snooping enable
vlan 502
        ip igmp snooping enable
virtual-mac 00:07:08:09:09:00
```

```
evpn
        redistribute local-mac
        redistribute local-svi
        vlan 501
                rd auto
                route-target export 501:141
                route-target import 501:141
                redistribute host-route
        vlan 502
        rd auto
                route-target export 502:142
                route-target import 502:142
                redistribute host-route
interface lag 36
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 6
        lacp mode active
        lacp rate fast
interface 1/1/48
        description port_Site-2-Distro-VSX-Primary
        no shutdown
        lag 36
interface 1/1/49
        description port_Site-2-Distro-VSX-Secondary
        no shutdown
        lag 36
interface 1/1/50
        no shutdown
interface 1/1/51
        no shutdown
interface 1/1/52
        description port_to_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 501-502
interface 2/1/25
        no shutdown
interface 2/1/26
        no shutdown
interface 3/1/27
        no shutdown
interface 3/1/28
        no shutdown
interface loopback 1
        ip address 85.85.85.85/32
interface vlan 6
        ip address 60.1.5.3/29
        ip ospf 1 area 0.0.0.0
interface vlan 501
        vrf attach vrf1
        ip address 12.5.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 12.5.1.10
        ip igmp enable
        ip pim-sparse enable
interface vlan 502
        vrf attach vrf2
        ip address 12.5.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
```

```
        active-gateway ip 12.5.2.10
        ip igmp enable
        ip pim-sparse enable
interface vxlan 1
        source ip 85.85.85.85
        no shutdown
        vni 2100
                vlan 501
        vni 2101
                vlan 502
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
!
!
!
!
!
router ospf 1
        router-id 112.14.1.3
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65536
        bgp router-id 112.14.1.3
        neighbor 192.168.1.3 remote-as 65536
        neighbor 192.168.1.3 update-source loopback 1
        neighbor 192.168.1.4 remote-as 65536
        neighbor 192.168.1.4 update-source loopback 1
        address-family ipv4 unicast
                redistribute connected
                redistribute ospf
        exit-address-family
        address-family l2vpn evpn
                neighbor 192.168.1.3 send-community extended
                neighbor 192.168.1.3 activate
                neighbor 192.168.1.4 send-community extended
                neighbor 192.168.1.4 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
router pim vrf vrf1
        enable
        pim-ssm
router pim vrf vrf2
        enable
```

```
        pim-ssm
        pim-ssm range-access-list pim-ssm-range-acl-vrf2
https-server vrf default
https-server vrf mgmt

=======================================
Show command outputs for  validation
=======================================

Site-2-Access-vtep-1# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================
Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
120.10.10.11     1         FULL/BDR          60.1.5.1           vlan6
120.10.10.15     1         FULL/DR           60.1.5.2           vlan6

Site-2-Access-vtep-1# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65536       BGP Router Identifier  : 112.14.1.3
Peers                  : 2           Log Neighbor Changes   : No
Cfg. Hold Time         : 180         Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------
Address-family : VPNv4 Unicast
------------------------------
Address-family : L2VPN EVPN
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
192.168.1.3   65536       11239   1124    01h:23m:21s  Established   Up
192.168.1.4   65536       11400   1100    15h:48m:53s  Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
Local AS               : 65536       BGP Router Identifier  : 12.5.1.10
Peers                  : 0           Log Neighbor Changes   : No
Cfg. Hold Time         : 180         Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------
Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65536       BGP Router Identifier  : 12.5.2.10
Peers                  : 0           Log Neighbor Changes   : No
Cfg. Hold Time         : 180         Cfg. Keep Alive        : 60
```

```
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------

Site-2-Access-vtep-1# show interface vxlan vteps
Source      Destination  Origin  Status             VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
85.85.85.85 4.4.4.4      evpn    operational        9002      enabled   --
vrf2
85.85.85.85 4.4.4.4      evpn    operational        16777214  enabled   --
vrf1
85.85.85.85 80.80.80.80  evpn    operational        2100      disabled  501    --
85.85.85.85 80.80.80.80  evpn    operational        2101      disabled  502    --
85.85.85.85 80.80.80.80  evpn    operational        9002      enabled   --
vrf2
85.85.85.85 80.80.80.80  evpn    operational        16777214  enabled   --
vrf1

Site-2-Access-vtep-1# show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 3
-------------------------------------------------------------------------------
Interface   Neighbor    Uptime     Expires    DR          Hold Time  Secondary
           (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority   (HH:MM:SS)  Address
(IPV4)
-------------------------------------------------------------------------------
vni16777214 4.4.4.4      05:19:29   00:03:09   1          00:03:30
vlan501     12.5.1.10    01:23:25   00:01:23   1347440720 00:01:45   Nil
vni16777214 80.80.80.80  05:19:29   00:03:15   1          00:03:30
-------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 3
-------------------------------------------------------------------------------
-
vni9002     4.4.4.4      01:53:42   00:03:21   1          00:03:30
vlan502     12.5.2.10    01:41:40   00:01:39   1347440720 00:01:45   Nil
vni9002     80.80.80.80  01:53:40   00:03:23   1          00:03:30
-------------------------------------------------------------------------------
-
Site-2-Access-vtep-1# show ip pim all-vrfs
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
PIM Global Parameters

VRF                              :  vrf1

PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive

VRF                              :  vrf2

PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
```

```
PIM SSM Range ACL                 :  pim-ssm-range-acl-vrf2
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive

Site-2-Access-vtep-1# show ip mroute 232.1.6.1 all-vrfs
IP Multicast Route Entries

VRF : vrf1

Group Address                 : 232.1.6.1
Source Address                : 60.2.1.15
Neighbor                      : 80.80.80.80
Incoming interface            : vni16777214
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:59:00
Downstream Interface
Interface       State
-----------     ----------
vlan501         forwarding

Site-2-Access-vtep-1# show ip mroute 225.1.6.1 all-vrfs
IP Multicast Route Entries

VRF : vrf2

Group Address                 : 225.1.6.1
Source Address                : 61.2.2.15
Neighbor                      : 80.80.80.80
Incoming interface            : vni9002
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:52:52
Downstream Interface
Interface       State
-----------     ----------
vlan502         forwarding
Site-2-Access-vtep-1#
```

Site-2-Access-vtep-2

```
hostname Site-2-Access-vtep-2
vrf vrf1
    rd 31:15
    route-target export 1:100 evpn
    route-target import 1:100 evpn
vrf vrf2
    rd 32:15
    route-target export 2:100 evpn
    route-target import 2:100 evpn
cli-session
    timeout 0
!
ssh server vrf default
ssh server vrf mgmt
```

```
access-list ip pim-ssm-range-acl-vrf2
    10 permit any any 225.1.0.0/255.255.0.0
    20 permit any any 225.2.1.0/255.255.255.0
    30 permit any any 225.2.2.0/255.255.255.0
    40 permit any any 232.0.0.0/255.0.0.0
vlan 1,7
vlan 701
    ip igmp snooping enable
vlan 702
    ip igmp snooping enable
virtual-mac 00:00:00:00:00:06
evpn
    arp-suppression
    nd-suppression
    redistribute local-mac
    redistribute local-svi
    vlan 701
        rd auto
        route-target export 701:141
        route-target import 701:141
        redistribute host-route
    vlan 702
        rd auto
        route-target export 702:142
        route-target import 702:142
        redistribute host-route
interface lag 36
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 7
    lacp mode active
    lacp rate fast
interface 1/1/5
    description port_to_ixia
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 701-702
interface 1/1/27
    description port_Site-2-Distro-VSX-Primary
    no shutdown
    lag 36
interface 1/1/28
    description port_Site-2-Distro-VSX-Secondary
    no shutdown
    lag 36
interface loopback 1
    ip address 4.4.4.4/32
interface vlan 7
    ip address 60.1.6.3/29
    ip ospf 1 area 0.0.0.0
interface vlan 701
    vrf attach vrf1
    ip address 12.7.1.10/24
    active-gateway ip mac 00:00:11:16:16:00
    active-gateway ip 12.7.1.10
    ip igmp enable
    ip pim-sparse enable
interface vlan 702
    vrf attach vrf2
    ip address 12.7.2.10/24
```

```
    active-gateway ip mac 00:00:11:16:16:00
    active-gateway ip 12.7.2.10
    ip igmp enable
    ip pim-sparse enable
interface vxlan 1
    source ip 4.4.4.4
    no shutdown
    vni 2300
        vlan 701
    vni 2301
        vlan 702
    vni 9002
        vrf vrf2
        routing
    vni 16777214
        vrf vrf1
        routing
!
!
!
!
!
router ospf 1
    router-id 112.15.1.3
    redistribute connected
    redistribute local loopback
    area 0.0.0.0
router bgp 65536
    bgp router-id 112.15.1.3
    neighbor 192.168.1.3 remote-as 65536
    neighbor 192.168.1.3 update-source loopback 1
    neighbor 192.168.1.4 remote-as 65536
    neighbor 192.168.1.4 update-source loopback 1
    address-family l2vpn evpn
        neighbor 192.168.1.3 send-community extended
        neighbor 192.168.1.3 activate
        neighbor 192.168.1.4 send-community extended
        neighbor 192.168.1.4 activate
    exit-address-family
!
    vrf vrf1
        address-family ipv4 unicast
            redistribute connected
            redistribute local loopback
            redistribute ospf
        exit-address-family
!
    vrf vrf2
        address-family ipv4 unicast
            redistribute connected
            redistribute local loopback
            redistribute ospf
        exit-address-family
!
router pim vrf vrf1
    enable
    pim-ssm
router pim vrf vrf2
    enable
    pim-ssm
    pim-ssm range-access-list pim-ssm-range-acl-vrf2
https-server vrf default
```

```
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================



Site-2-Access-vtep-2# show ip ospf neighbors
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
120.10.10.11     1         FULL/BDR          60.1.6.1           vlan7

120.10.10.15     1         FULL/DR           60.1.6.2           vlan7

Site-2-Access-vtep-2# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
 Local AS               : 65536        BGP Router Identifier  : 112.15.1.3
 Peers                  : 2            Log Neighbor Changes   : No
 Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
 Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
 Neighbor     Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
 192.168.1.3  65536       10619   1103    01h:25m:27s  Established   Up
 192.168.1.4  65536       10735   1085    15h:27m:55s  Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
 Local AS               : 65536        BGP Router Identifier  : 12.7.1.10
 Peers                  : 0            Log Neighbor Changes   : No
 Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
 Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
```

```
-----------
 Local AS               : 65536        BGP Router Identifier  : 12.7.2.10
 Peers                  : 0            Log Neighbor Changes   : No
 Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
 Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Site-2-Access-vtep-2# show interface vxlan vt
Source     Destination  Origin  Status             VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
4.4.4.4    80.80.80.80  evpn    operational        2300      disabled  701    --
4.4.4.4    80.80.80.80  evpn    operational        2301      disabled  702    --
4.4.4.4    80.80.80.80  evpn    operational        9002      enabled   --     vrf2
4.4.4.4    80.80.80.80  evpn    operational        16777214  enabled   --     vrf1
4.4.4.4    85.85.85.85  evpn    operational        9002      enabled   --     vrf2
4.4.4.4    85.85.85.85  evpn    operational        16777214  enabled   --     vrf1
Site-2-Access-vtep-2# show ip pim neighbor brief all-vrfs

-------------------------------------------------------------------------------
-VRF : vrf1                              Total number of neighbors : 3
-------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires    DR        Hold Time  Secondary
            (IPV4)       (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  Address
(IPV4)
-------------------------------------------------------------------------------
vlan701     12.7.1.10    01:25:34   00:01:42   1347440720 00:01:45  Nil
vni16777214 80.80.80.80  05:21:25   00:03:08   1          00:03:30
vni16777214 85.85.85.85  05:21:04   00:03:28   1          00:03:30
-------------------------------------------------------------------------------
-
VRF : vrf2                               Total number of neighbors : 3
-------------------------------------------------------------------------------
-
vlan702     12.7.2.10    01:43:53   00:01:29   1347440720 00:01:45  Nil
vni9002     80.80.80.80  01:55:47   00:03:16   1          00:03:30
vni9002     85.85.85.85  01:55:47   00:03:15   1          00:03:30
-------------------------------------------------------------------------------
-
Site-2-Access-vtep-2# show ip pim all-vrfs
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt

PIM Global Parameters

VRF                              :  vrf1
PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive

VRF                              :  vrf2
PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  pim-ssm-range-acl-vrf2
```

```
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
Site-2-Access-vtep-2# show ip pim rp-set all-vrfs
Site-2-Access-vtep-2# show ip mroute 232.1.7.1 all-vrfs

IP Multicast Route Entries

VRF : vrf1
Total number of entries : 1

Group Address                 : 232.1.7.1
Source Address                : 60.2.1.15
Neighbor                      :
Incoming interface            : vlan701
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 02:01:20

Site-2-Access-vtep-2# show ip mroute 225.1.7.1 all-vrfs

IP Multicast Route Entries

VRF : vrf2
Total number of entries : 1

Group Address                 : 225.1.7.1
Source Address                : 61.2.2.15
Neighbor                      :
Incoming interface            : vlan702
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:55:43
```

Site-2-Border-vtep-Primary

```
hostname Site-2-Border-vtep-Primary
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
    rd 1:12
    route-target export 1:100 evpn
    route-target import 1:100 evpn
vrf vrf2
    rd 2:12
    route-target export 2:100 evpn
    route-target import 2:100 evpn
cli-session
    timeout 0
!
!
ssh server vrf mgmt
access-list ip pim-ssm-range-acl-vrf2
    vsx-sync
    !
```

```
    10 permit any any 225.1.0.0/255.255.0.0
    20 permit any any 225.2.1.0/255.255.255.0
    30 permit any any 225.2.2.0/255.255.255.0
    40 permit any any 232.0.0.0/255.0.0.0
vlan 1
vlan 501
    ip igmp snooping enable
vlan 502
    ip igmp snooping enable
vlan 701
    ip igmp snooping enable
vlan 702
    ip igmp snooping enable
vlan 752,1001-1002
vlan 1301
    ip igmp snooping enable
vlan 1302
    ip igmp snooping enable
vlan 3001-3002
virtual-mac 00:11:00:00:00:11
evpn
    redistribute local-mac
    redistribute local-svi
       !! this command is specific to evpn multi-site on Border-vtep
    dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
    vlan 501
        rd auto
        route-target export 501:141
        route-target import 501:141
        redistribute host-route
    vlan 502
        rd auto
        route-target export 502:142
        route-target import 502:142
        redistribute host-route
    vlan 701
        rd auto
        route-target export 701:141
        route-target import 701:141
        redistribute host-route
    vlan 702
        rd auto
        route-target export 702:142
        route-target import 702:142
        redistribute host-route
interface mgmt
    no shutdown
    ip dhcp
interface lag 120
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 1,501-502,701-702,752,3001-3002
    lacp mode active
interface 1/1/1
    description port_isl
    no shutdown
    lag 120
interface 1/1/2
    description port_isl
    no shutdown
    lag 120
```

```
interface 1/1/5
    description Keepalive
    no shutdown
    ip address 45.1.1.1/24
interface 1/1/17
    description port_Site-2-External-router
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 1001-1002
interface 1/1/47
    description port_to_ixia
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 1301-1302
interface 1/1/49
    description port_Site-1-Border-vtep-Secondary
    no shutdown
    ip address 40.1.3.2/29
interface 1/1/50
    description port_Site-1-Border-vtep-Primary
    no shutdown
    ip address 40.1.1.2/29
interface 1/1/51
    description port_Site-2-Distro-VSX-Primary
    no shutdown
    ip address 60.1.1.1/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/52
    description port_Site-2-Distro-VSX-Secondary
    no shutdown
    ip address 60.1.2.1/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface loopback 1
    ip address 80.80.80.80/32
interface loopback 105
    vrf attach vrf1
    ip address 104.104.104.104/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface loopback 106
    vrf attach vrf2
    ip address 105.105.105.105/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface loopback 113
    ip address 195.170.1.255/32
interface loopback 114
    ip address 192.168.1.3/32
interface loopback 201
    vrf attach vrf1
    ip address 121.100.101.100/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface loopback 202
    vrf attach vrf2
    ip address 121.100.102.100/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
```

```
interface vlan 501
    vrf attach vrf1
    ip address 12.5.1.10/24
    active-gateway ip mac 00:00:11:16:16:00
    active-gateway ip 12.5.1.10
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 502
    vrf attach vrf2
    ip address 12.5.2.10/24
    active-gateway ip mac 00:00:11:16:16:00
    active-gateway ip 12.5.2.10
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 701
    vrf attach vrf1
    ip address 12.7.1.10/24
    active-gateway ip mac 00:00:11:16:16:00
    active-gateway ip 12.7.1.10
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 702
    vrf attach vrf2
    ip address 12.7.2.10/24
    active-gateway ip mac 00:00:11:16:16:00
    active-gateway ip 12.7.2.10
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 752
    no shutdown
    ip address 172.1.1.1/30
    ips opsf 1 area 0.0.0.0
interface vlan 1001
    vrf attach vrf1
    ip address 61.0.1.2/24
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface vlan 1002
    vrf attach vrf2
    ip address 61.0.2.2/24
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface vlan 1301
    vrf attach vrf1
    ip address 61.3.1.2/24
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip ospf network point-to-point
    ip igmp enable
    ip pim-sparse enable
interface vlan 1302
    vrf attach vrf2
    ip address 61.3.2.2/24
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip ospf network point-to-point
    ip igmp enable
    ip pim-sparse enable
```

```
interface vlan 3001
    vrf attach vrf1
    ip address 61.10.1.1/30
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
    ip pim-sparse datapath-auto-include
interface vlan 3002
    vrf attach vrf2
    ip address 61.10.2.1/30
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
    ip pim-sparse datapath-auto-include
interface vxlan 1
    source ip 80.80.80.80
    no shutdown
    vni 2100
        vlan 501
    vni 2101
        vlan 502
    vni 2300
        vlan 701
    vni 2301
        vlan 702
    vni 9002
        vrf vrf2
        routing
    vni 16777214
        vrf vrf1
        routing
vsx
    system-mac 00:11:00:00:00:11
    inter-switch-link lag 120
    role primary
    keepalive peer 45.1.1.2 source 45.1.1.1
ip prefix-list test_1 seq 10 deny 192.170.1.255/32
ip prefix-list test_1 seq 20 deny 193.170.1.255/32
ip prefix-list test_1 seq 40 deny 197.170.1.255/32
ip prefix-list test_1 seq 50 deny 198.170.1.255/32
ip prefix-list test_1 seq 60 permit 4.4.4.50/32
ip prefix-list test_1 seq 70 permit 8.8.8.8/32
!
!
!
!
route-map tag_bgp_ospf permit seq 10
     set tag 210
route-map tag_ospf_bgp deny seq 10
     match tag 210
route-map tag_ospf_bgp deny seq 20
     match tag 220
route-map tag_ospf_bgp permit seq 30
route-map test_1 permit seq 10
     match ip address prefix-list test_1
!
router ospf 1
    router-id 112.12.1.3
    distance 250
    redistribute connected
    redistribute local loopback
    redistribute bgp route-map test_1
    area 0.0.0.0
router ospf 1 vrf vrf1
```

```
    router-id 112.12.1.5
    distance 250
    redistribute connected
    redistribute bgp route-map tag_bgp_ospf
    area 0.0.0.0
router ospf 1 vrf vrf2
    router-id 112.12.2.5
    distance 250
    redistribute connected
    redistribute bgp route-map tag_bgp_ospf
    area 0.0.0.0
router bgp 65536
    bgp router-id 112.12.1.3
    neighbor 4.4.4.4 remote-as 65536
    neighbor 4.4.4.4 update-source loopback 114
    neighbor 40.1.1.1 remote-as 65535
    neighbor 40.1.3.1 remote-as 65535
    neighbor 45.1.1.2 remote-as 65536
    neighbor 85.85.85.85 remote-as 65536
    neighbor 85.85.85.85 update-source loopback 114
    neighbor 193.170.1.255 remote-as 65535
    neighbor 193.170.1.255 ebgp-multihop 5
    neighbor 193.170.1.255 update-source loopback 113
    neighbor 194.170.1.255 remote-as 65535
    neighbor 194.170.1.255 ebgp-multihop 5
    neighbor 194.170.1.255 update-source loopback 113
    neighbor 197.170.1.255 remote-as 65537
    neighbor 197.170.1.255 ebgp-multihop 5
    neighbor 197.170.1.255 update-source loopback 113
    neighbor 198.170.1.255 remote-as 65537
    neighbor 198.170.1.255 ebgp-multihop 5
    neighbor 198.170.1.255 update-source loopback 113
    address-family ipv4 unicast
        neighbor 40.1.1.1 activate
        neighbor 40.1.3.1 activate
        neighbor 45.1.1.2 activate
        redistribute connected
        redistribute local loopback
    exit-address-family
    address-family l2vpn evpn
        neighbor 4.4.4.4 next-hop-self
        neighbor 4.4.4.4 route-reflector-client
        neighbor 4.4.4.4 send-community extended
        neighbor 4.4.4.4 activate
        neighbor 85.85.85.85 next-hop-self
        neighbor 85.85.85.85 route-reflector-client
        neighbor 85.85.85.85 send-community extended
                neighbor 85.85.85.85 activate
        neighbor 193.170.1.255 send-community extended
        neighbor 193.170.1.255 activate
        neighbor 194.170.1.255 send-community extended
        neighbor 194.170.1.255 activate
        neighbor 197.170.1.255 send-community extended
        neighbor 197.170.1.255 activate
        neighbor 198.170.1.255 send-community extended
        neighbor 198.170.1.255 activate
    exit-address-family
!
    vrf vrf1
        address-family ipv4 unicast
            redistribute connected
            redistribute local loopback
```

```
            redistribute ospf route-map tag_ospf_bgp
        exit-address-family
!
    vrf vrf2
        address-family ipv4 unicast
            redistribute connected
            redistribute local loopback
            redistribute ospf route-map tag_ospf_bgp
        exit-address-family
!
router pim vrf vrf1
    enable
    pim-ssm
router pim vrf vrf2
    enable
    pim-ssm
    pim-ssm range-access-list pim-ssm-range-acl-vrf2
https-server vrf mgmt

=======================================
Show command outputs for  validation
=======================================
Site-2-Border-vtep-Primary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
120.10.10.11     n/a       FULL              60.1.1.0           1/1/51

120.10.10.15     n/a       FULL              60.1.2.0           1/1/52

VRF : vrf1                             Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.1.5       1         FULL/BDR          61.0.1.1           vlan1001

112.13.1.5       1         FULL/DR           61.10.1.2          vlan3001

VRF : vrf2                             Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.2.5       1         FULL/BDR          61.0.2.1           vlan1002

112.13.1.5       1         FULL/DR           61.10.2.2          vlan3002

Site-2-Border-vtep-Primary# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
 Local AS               : 65536        BGP Router Identifier  : 112.12.1.3
```

```
 Peers                  : 9           Log Neighbor Changes   : No
 Cfg. Hold Time         : 180         Cfg. Keep Alive        : 60
 Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
 Neighbor                                Remote-AS   MsgRcvd MsgSent Up/Down Time
State         AdminStatus
 40.1.1.1                                65535       93      102     01h:15m:57s
Established   Up
 40.1.3.1                                65535       92      97      01h:15m:57s
Established   Up
 45.1.1.2                                65536       98      97      01h:15m:58s
Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
 Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
 4.4.4.4       65536       102     375     01h:15m:47s  Established   Up
 85.85.85.85   65536       102     374     01h:15m:47s  Established   Up
 193.170.1.255 65535       243     244     01h:15m:44s  Established   Up
 194.170.1.255 65535       247     371     01h:15m:44s  Established   Up
 197.170.1.255 65537       232     242     01h:15m:53s  Established   Up
 198.170.1.255 65537       228     487     01h:15m:45s  Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
 Local AS               : 65536       BGP Router Identifier  : 121.100.101.100
 Peers                  : 0           Log Neighbor Changes   : No
 Cfg. Hold Time         : 180         Cfg. Keep Alive        : 60
 Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
 Local AS               : 65536       BGP Router Identifier  : 121.100.102.100
 Peers                  : 0           Log Neighbor Changes   : No
 Cfg. Hold Time         : 180         Cfg. Keep Alive        : 60
 Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Site-2-Border-vtep-Primary# show ip pim neighbor brief all-vrfs
```

```
--------------------------------------------------------------------------------
-VRF : vrf1                              Total number of neighbors : 8
--------------------------------------------------------------------------------
-Interface   Neighbor    Uptime     Expires    DR         Hold Time  Secondary
             (IPV4)      (HH:MM:SS) (HH:MM:SS)  Priority  (HH:MM:SS)  Address
(IPV4)
--------------------------------------------------------------------------------
vni16777214 4.4.4.4     01:15:45   00:03:15   1          00:03:30
vni16777214 4.4.4.50    01:16:08   00:03:22   1          00:03:30
vni16777214 8.8.8.8     01:15:41   00:03:21   1          00:03:30
vlan501     12.5.1.10   01:15:50   00:01:29   1431655765 00:01:45   Nil
vlan701     12.7.1.10   01:15:52   00:01:28   1347440720 00:01:45   Nil
vlan1001    61.0.1.1    01:16:05   00:01:40   1          00:01:45   Nil
vlan3001    61.10.1.2   01:16:10   00:01:38   1347440720 00:01:45   Nil
vni16777214 85.85.85.85 01:15:50   00:03:11   1          00:03:30
--------------------------------------------------------------------------------
-VRF : vrf2                              Total number of neighbors : 8
--------------------------------------------------------------------------------
-
vni9002     4.4.4.4     01:16:05   00:03:25   1          00:03:30
vni9002     4.4.4.50    01:15:37   00:03:26   1          00:03:30
vni9002     8.8.8.8     01:15:36   00:03:25   1          00:03:30
vlan502     12.5.2.10   01:16:06   00:01:43   1431655765 00:01:45   Nil
vlan702     12.7.2.10   01:16:11   00:01:40   1347440720 00:01:45   Nil
vlan1002    61.0.2.1    01:16:16   00:01:29   1          00:01:45   Nil
vlan3002    61.10.2.2   01:16:09   00:01:36   1347440720 00:01:45   Nil
vni9002     85.85.85.85 01:16:05   00:03:26   1          00:03:30
--------------------------------------------------------------------------------
-
Site-2-Border-vtep-Primary#  show interface vxlan vteps
Source       Destination  Origin  Status           VNI       Routing   VLAN  VRF
-------------------------------------------- ----------------------------------
-
80.80.80.80  4.4.4.4      evpn    operational      2300      disabled  701    --
80.80.80.80  4.4.4.4      evpn    operational      2301      disabled  702    --
80.80.80.80  4.4.4.4      evpn    operational      9002      enabled   --     vrf2
80.80.80.80  4.4.4.4      evpn    operational      16777214  enabled   --     vrf1
80.80.80.80  4.4.4.50     evpn    operational      9002      enabled   --     vrf2
80.80.80.80  4.4.4.50     evpn    operational      16777214  enabled   --     vrf1
80.80.80.80  8.8.8.8      evpn    operational      9002      enabled   --     vrf2
80.80.80.80  8.8.8.8      evpn    operational      16777214  enabled   --     vrf1
80.80.80.80  85.85.85.85  evpn    operational      2100      disabled  501    --
80.80.80.80  85.85.85.85  evpn    operational      2101      disabled  502    --
80.80.80.80  85.85.85.85  evpn    operational      9002      enabled   --     vrf2
80.80.80.80  85.85.85.85  evpn    operational      16777214  enabled   --     vrf1
Site-2-Border-vtep-Primary# show ip pim all-vrfs
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt

PIM Global Parameters

VRF                              :  vrf1
PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive

VRF                              :  vrf2
```

```
PIM Status                          :  Enabled
PIM SSM Status                      :  Enabled
PIM SSM Range ACL                   :  pim-ssm-range-acl-vrf2
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
Site-2-Border-vtep-Primary# show ip mroute 232.1.6.1 all-vrfs

IP Multicast Route Entries

VRF : vrf1
Total number of entries : 3

Group Address                 : 232.1.6.1
Source Address                : 60.2.1.15
Neighbor                      : 4.4.4.50
Incoming interface            : vlan501
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 01:16:23

Group Address                 : 232.1.6.1
Source Address                : 60.2.1.15
Neighbor                      : 4.4.4.50
Incoming interface            : vni16777214
Intra-Inter Forwarded VTEP(s) : 85.85.85.85
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 01:54:04
Downstream Interface
Interface       State
-----------     ----------
vlan3001        forwarding

Site-2-Border-vtep-Primary# show ip mroute 225.1.6.1 all-vrfs

IP Multicast Route Entries

VRF : vrf2
Total number of entries : 2

Group Address                 : 225.1.6.1
Source Address                : 61.2.2.15
Neighbor                      :
Incoming interface            : vlan502
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 01:16:42

Group Address                 : 225.1.6.1
Source Address                : 61.2.2.15
Neighbor                      : 61.0.2.1
Incoming interface            : vlan1002
```

```
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : OSPF
Metric                        : 200
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 01:16:08
Downstream Interface
Interface       State
-----------     ----------
vni9002         forwarding

Site-2-Border-vtep-Primary#
```

Site-2-Border-vtep-Secondary

```
hostname site-2-Border-vtep-Secondary
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
    rd 1:12
    route-target export 1:100 evpn
    route-target import 1:100 evpn
vrf vrf2
    rd 2:12
    route-target export 2:100 evpn
    route-target import 2:100 evpn
cli-session
    timeout 0
!
!
ssh server vrf mgmt
access-list ip pim-ssm-range-acl-vrf2
    vsx-sync
    !
    10 permit any any 225.1.0.0/255.255.0.0
    20 permit any any 225.2.1.0/255.255.255.0
    30 permit any any 225.2.2.0/255.255.255.0
    40 permit any any 232.0.0.0/255.0.0.0
vlan 1
vlan 501
    ip igmp snooping enable
vlan 502
    ip igmp snooping enable
vlan 701
    ip igmp snooping enable
vlan 702
    ip igmp snooping enable
vlan 1401
    ip igmp snooping enable
vlan 1402
    ip igmp snooping enable
vlan 752,2001-2002,3001-3002
virtual-mac 00:11:00:00:00:11
evpn
    redistribute local-mac
    redistribute local-svi
       !! this command is specific to evpn multi-site on Border-vtep
    dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
    vlan 501
        rd auto
        route-target export 501:141
```

```
        route-target import 501:141
        redistribute host-route
    vlan 502
        rd auto
        route-target export 502:142
        route-target import 502:142
        redistribute host-route
    vlan 701
        rd auto
        route-target export 701:141
        route-target import 701:141
        redistribute host-route
    vlan 702
        rd auto
        route-target export 702:142
        route-target import 702:142
        redistribute host-route
interface mgmt
    no shutdown
    ip dhcp
interface lag 120
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 1,501-502,701-702,752,3001-3002
    lacp mode active
interface 1/1/1
    description port_isl
    no shutdown
    lag 120
interface 1/1/2
    description port_isl
    no shutdown
    lag 120
interface 1/1/5
    description Keepalive
    no shutdown
    ip address 45.1.1.2/24
interface 1/1/32
    description port_Site-2-External-router
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 2001-2002
interface 1/1/47
    description port_to_ixia
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 1401-1402
interface 1/1/49
    description port_Site-1-Border-vtep-Secondary
    no shutdown
    vsx shutdown-on-split
    ip address 40.1.4.2/29
interface 1/1/50
    description port_Site-1-Border-vtep-Primary
    no shutdown
    vsx shutdown-on-split
    ip address 40.1.2.2/29
interface 1/1/51
    description port_Site-2-Distro-VSX-Primary
```

```
    no shutdown
    vsx shutdown-on-split
    ip address 60.1.3.1/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/52
    description port_Site-2-Distro-VSX-Secondary
    no shutdown
    vsx shutdown-on-split
    ip address 60.1.4.1/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface loopback 1
    ip address 80.80.80.80/32
interface loopback 2
    vrf attach vrf1
    ip address 121.121.121.121/32
    ip pim-sparse enable
interface loopback 113
    ip address 196.170.1.255/32
interface loopback 114
    ip address 192.168.1.4/32
interface loopback 201
    vrf attach vrf1
    ip address 122.100.101.100/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface loopback 202
    vrf attach vrf2
    ip address 122.100.102.100/32
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface vlan 501
    vrf attach vrf1
    ip address 12.5.1.10/24
    active-gateway ip mac 00:00:11:16:16:00
    active-gateway ip 12.5.1.10
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 502
    vrf attach vrf2
    ip address 12.5.2.10/24
    active-gateway ip mac 00:00:11:16:16:00
    active-gateway ip 12.5.2.10
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 701
    vrf attach vrf1
    ip address 12.7.1.10/24
    active-gateway ip mac 00:00:11:16:16:00
    active-gateway ip 12.7.1.10
    ip igmp enable
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 702
    vrf attach vrf2
    ip address 12.7.2.10/24
    active-gateway ip mac 00:00:11:16:16:00
    active-gateway ip 12.7.2.10
    ip igmp enable
```

```
    ip pim-sparse enable
    ip pim-sparse vsx-virtual-neighbor
interface vlan 752
   no shutdown
   ip address 172.1.1.2/30
   ip ospf 1 area 0.0.0.0
interface vlan 1401
    vrf attach vrf1
    ip address 61.4.1.2/24
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip ospf network point-to-point
    ip igmp enable
    ip pim-sparse enable
interface vlan 1402
    vrf attach vrf2
    ip address 61.4.2.2/24
    ip ospf 1 area 0.0.0.0
    ip ospf passive
    ip ospf network point-to-point
    ip igmp enable
    ip pim-sparse enable
interface vlan 2001
    vrf attach vrf1
    ip address 61.1.1.2/30
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface vlan 2002
    vrf attach vrf2
    ip address 61.1.2.2/30
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
interface vlan 3001
    vrf attach vrf1
    ip address 61.10.1.2/30
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
    ip pim-sparse datapath-auto-include
interface vlan 3002
    vrf attach vrf2
    ip address 61.10.2.2/30
    ip ospf 1 area 0.0.0.0
    ip pim-sparse enable
    ip pim-sparse datapath-auto-include
interface vxlan 1
    source ip 80.80.80.80
    no shutdown
    vni 2100
        vlan 501
    vni 2101
        vlan 502
    vni 2300
        vlan 701
    vni 2301
        vlan 702
    vni 9002
        vrf vrf2
        routing
    vni 16777214
        vrf vrf1
        routing
vsx
```

```
    system-mac 00:11:00:00:00:11
    inter-switch-link lag 120
    role secondary
    keepalive peer 45.1.1.1 source 45.1.1.2
ip prefix-list test_1 seq 10 deny 192.170.1.255/32
ip prefix-list test_1 seq 20 deny 193.170.1.255/32
ip prefix-list test_1 seq 40 deny 197.170.1.255/32
ip prefix-list test_1 seq 50 deny 198.170.1.255/32
ip prefix-list test_1 seq 60 permit 4.4.4.50/32
ip prefix-list test_1 seq 70 permit 8.8.8.8/32
!
!
!
!
route-map tag_bgp_ospf permit seq 10
     set tag 220
route-map tag_ospf_bgp deny seq 10
     match tag 210
route-map tag_ospf_bgp deny seq 20
     match tag 220
route-map tag_ospf_bgp permit seq 30
route-map test_1 permit seq 10
     match ip address prefix-list test_1
!
router ospf 1
    router-id 112.13.1.3
    distance 250
    redistribute connected
    redistribute local loopback
    redistribute bgp route-map test_1
    area 0.0.0.0
router ospf 1 vrf vrf1
    router-id 112.13.1.5
    distance 250
    redistribute connected
    redistribute local loopback
    redistribute bgp route-map tag_bgp_ospf
    area 0.0.0.0
router ospf 1 vrf vrf2
    router-id 112.13.1.5
    distance 250
    redistribute connected
    redistribute local loopback
    redistribute bgp route-map tag_bgp_ospf
    area 0.0.0.0
router bgp 65536
    bgp router-id 112.13.1.3
    neighbor 4.4.4.4 remote-as 65536
    neighbor 4.4.4.4 update-source loopback 114
    neighbor 40.1.2.1 remote-as 65535
    neighbor 40.1.4.1 remote-as 65535
    neighbor 45.1.1.1 remote-as 65536
    neighbor 85.85.85.85 remote-as 65536
    neighbor 85.85.85.85 update-source loopback 114
    neighbor 193.170.1.255 remote-as 65535
    neighbor 193.170.1.255 ebgp-multihop 5
    neighbor 193.170.1.255 update-source loopback 113
    neighbor 194.170.1.255 remote-as 65535
    neighbor 194.170.1.255 ebgp-multihop 5
    neighbor 194.170.1.255 update-source loopback 113
    neighbor 197.170.1.255 remote-as 65537
    neighbor 197.170.1.255 ebgp-multihop 5
```

```
    neighbor 197.170.1.255 update-source loopback 113
    neighbor 198.170.1.255 remote-as 65537
    neighbor 198.170.1.255 ebgp-multihop 5
    neighbor 198.170.1.255 update-source loopback 113
    address-family ipv4 unicast
        neighbor 40.1.2.1 activate
        neighbor 40.1.4.1 activate
        neighbor 45.1.1.1 activate
        redistribute connected
        redistribute local loopback
    exit-address-family
    address-family l2vpn evpn
        neighbor 4.4.4.4 next-hop-self
        neighbor 4.4.4.4 route-reflector-client
        neighbor 4.4.4.4 send-community extended
        neighbor 4.4.4.4 activate
        neighbor 85.85.85.85 next-hop-self
        neighbor 85.85.85.85 route-reflector-client
        neighbor 85.85.85.85 send-community extended
        neighbor 85.85.85.85 activate
        neighbor 193.170.1.255 send-community extended
        neighbor 193.170.1.255 activate
        neighbor 194.170.1.255 send-community extended
        neighbor 194.170.1.255 activate
        neighbor 197.170.1.255 send-community extended
        neighbor 197.170.1.255 activate
        neighbor 198.170.1.255 send-community extended
        neighbor 198.170.1.255 activate
    exit-address-family
!
    vrf vrf1
        address-family ipv4 unicast
            redistribute connected
            redistribute local loopback
            redistribute ospf route-map tag_ospf_bgp
        exit-address-family
!
    vrf vrf2
        address-family ipv4 unicast
            redistribute connected
            redistribute local loopback
            redistribute ospf route-map tag_ospf_bgp
        exit-address-family
!
router pim vrf vrf1
    enable
    pim-ssm
router pim vrf vrf2
    enable
    pim-ssm
    pim-ssm range-access-list pim-ssm-range-acl-vrf2
https-server vrf mgmt
=======================================
Show command outputs for  validation
=======================================

Site-2-Border-vtep-Secondary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2
```

```
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
120.10.10.11     n/a       FULL              60.1.3.0           1/1/51

120.10.10.15     n/a       FULL              60.1.4.0           1/1/52

VRF : vrf1                               Process : 1
==================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.1.5       1         FULL/BDR          61.1.1.1           vlan2001

112.12.1.5       1         FULL/BDR          61.10.1.1          vlan3001

VRF : vrf2                               Process : 1
==================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.11.2.5       1         FULL/BDR          61.1.2.1           vlan2002

112.12.2.5       1         FULL/BDR          61.10.2.1          vlan3002

Site-2-Border-vtep-Secondary# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
 Local AS               : 65536        BGP Router Identifier  : 112.13.1.3
 Peers                  : 9            Log Neighbor Changes   : No
 Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
 Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
 Neighbor                                Remote-AS   MsgRcvd MsgSent Up/Down Time
State         AdminStatus
 40.1.2.1                                65535       1136    1139    16h:03m:41s
Established   Up
 40.1.4.1                                65535       1135    1135    16h:03m:41s
Established   Up
 45.1.1.1                                65536       1170    1173    01h:18m:32s
Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
Neighbor         Remote-AS   MsgRcvd MsgSent Up/Down Time State
AdminStatus 4.4.4.4          65536       1076    10727   15h:20m:47s  Established
 Up 85.85.85.85      65536       1133    12291   15h:43m:51s  Established   Up
193.170.1.255    65535       8778    9179    16h:03m:39s  Established   Up
194.170.1.255    65535       9076    9287    16h:03m:43s  Established   Up
```

```
197.170.1.255    65537       10721   9372    16h:02m:21s  Established   Up
198.170.1.255    65537       9756    9720    16h:02m:22s  Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
 Local AS               : 65536        BGP Router Identifier  : 122.100.101.100
 Peers                  : 0            Log Neighbor Changes   : No
 Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
 Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
 Local AS               : 65536        BGP Router Identifier  : 122.100.102.100
 Peers                  : 0            Log Neighbor Changes   : No
 Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
 Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Site-2-Border-vtep-Secondary# show interface vxlan vteps
Source        Destination   Origin Status        VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
80.80.80.80   4.4.4.4       evpn   operational   2300      disabled  701    --
80.80.80.80   4.4.4.4       evpn   operational   2301      disabled  702    --
80.80.80.80   4.4.4.4       evpn   operational   9002      enabled   --     vrf2
80.80.80.80   4.4.4.4       evpn   operational   16777214  enabled   --     vrf1
80.80.80.80   4.4.4.50      evpn   operational   9002      enabled   --     vrf2
80.80.80.80   4.4.4.50      evpn   operational   16777214  enabled   --     vrf1
80.80.80.80   8.8.8.8       evpn   operational   9002      enabled   --     vrf2
80.80.80.80   8.8.8.8       evpn   operational   16777214  enabled   --     vrf1
80.80.80.80   85.85.85.85   evpn   operational   2100      disabled  501    --
80.80.80.80   85.85.85.85   evpn   operational   2101      disabled  502    --
80.80.80.80   85.85.85.85   evpn   operational   9002      enabled   --     vrf2
80.80.80.80   85.85.85.85   evpn   operational   16777214  enabled   --     vrf1
Site-2-Border-vtep-Secondary# show ip pim neighbor brief all-vrfs

-------------------------------------------------------------------------------
VRF : vrf1                              Total number of neighbors : 8
-------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires   DR         Hold Time  Secondary
           (IPV4)       (HH:MM:SS) (HH:MM:SS) Priority  (HH:MM:SS)  Address (IPV4)
-------------------------------------------------------------------------------
vni16777214 4.4.4.4      05:14:29   00:03:07  1          00:03:30
vni16777214 4.4.4.50     05:14:20   00:03:15  1          00:03:30
vni16777214 8.8.8.8      05:14:31   00:03:13  1          00:03:30
vlan501     12.5.1.10    01:18:27   00:01:21  1431655765 00:01:45   Nil
vlan701     12.7.1.10    01:18:30   00:01:20  1347440720 00:01:45   Nil
vlan2001    61.1.1.1     01:13:11   00:01:34  1          00:01:45   Nil
```

```
vlan3001    61.10.1.1    01:18:46   00:01:29  1347440720 00:01:45   Nil
vni16777214 85.85.85.85  05:14:29   00:03:03  1          00:03:30
------------------------------------------------------------------------------
VRF : vrf2                              Total number of neighbors : 8
------------------------------------------------------------------------------
vni9002     4.4.4.4      01:36:41   00:03:19  1          00:03:30
vni9002     4.4.4.50     01:36:42   00:03:21  1          00:03:30
vni9002     8.8.8.8      01:36:41   00:03:19  1          00:03:30
vlan502     12.5.2.10    01:18:38   00:01:37  1431655765 00:01:45   Nil
vlan702     12.7.2.10    01:18:46   00:01:30  1347440720 00:01:45   Nil
vlan2002    61.1.2.1     01:13:11   00:01:34  1          00:01:45   Nil
vlan3002    61.10.2.1    01:18:47   00:01:32  1347440720 00:01:45   Nil
vni9002     85.85.85.85  01:36:41   00:03:20  1          00:03:30
------------------------------------------------------------------------------
Site-2-Border-vtep-Secondary# show ip pim all-vrfs
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt

PIM Global Parameters

VRF                              :  vrf1
PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive

VRF                              :  vrf2
PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  pim-ssm-range-acl-vrf2
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
Site-2-Border-vtep-Secondary# show ip mroute 232.1.6.1 all-vrfs

IP Multicast Route Entries

VRF : vrf1
Total number of entries : 2

Group Address                : 232.1.6.1
Source Address               : 60.2.1.15
Neighbor                     : 4.4.4.50
Incoming interface           : vlan501
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol   : PIM-SSM
Unicast Routing Protocol     : BGP
Metric                       : 0
Metric  Pref                 : 20
Uptime (HH:MM:SS)            : 01:54:04

Group Address                : 232.1.6.1
Source Address               : 60.2.1.15
Neighbor                     : 4.4.4.50
Incoming interface           : vni16777214
Intra-Inter Forwarded VTEP(s) : 85.85.85.85
Multicast Routing Protocol   : PIM-SSM
Unicast Routing Protocol     : BGP
```

```
Metric                          : 0
Metric  Pref                    : 20
Uptime (HH:MM:SS)               : 01:54:04
Downstream Interface
Interface       State
-----------     ----------
vlan3001        forwarding

Site-2-Border-vtep-Secondary# show ip mroute 225.1.6.1 all-vrfs

IP Multicast Route Entries

VRF : vrf2
Total number of entries : 2

Group Address                   : 225.1.6.1
Source Address                  : 61.2.2.15
Neighbor                        : 61.1.2.1
Incoming interface              : vlan2002
Intra-Inter Forwarded VTEP(s)   :
Multicast Routing Protocol      : PIM-SSM
Unicast Routing Protocol        : OSPF
Metric                          : 200
Metric  Pref                    : 250
Uptime (HH:MM:SS)               : 01:12:53
Downstream Interface
Interface       State
-----------     ----------
vni9002         forwarding

Group Address                   : 225.1.6.1
Source Address                  : 61.2.2.15
Neighbor                        :
Incoming interface              : vlan502
Intra-Inter Forwarded VTEP(s)   :
Multicast Routing Protocol      : PIM-SSM
Unicast Routing Protocol        : OSPF
Metric                          : 300
Metric  Pref                    : 250
Uptime (HH:MM:SS)               : 01:36:55

Site-2-Border-vtep-Secondary#
```

Site-2-Distro-vsx-primary

```
!
!export-password: default
hostname Site-2-Distro-vsx-primary
no ip icmp redirect
!
!
!
!
!
ssh server vrf mgmt
vlan 1,6-7
interface mgmt
        no shutdown
        ip dhcp
interface lag 2
        no shutdown
```

```
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface lag 35 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 6
        lacp mode active
        lacp rate fast
interface lag 36 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 7
        lacp mode active
        lacp rate fast
interface 1/1/15
        description port_Site-2-access-vtep-2
        no shutdown
        lag 36
interface 1/1/33
        description port_Site-2-access-vtep-1
        no shutdown
        lag 35
interface 1/1/46
        description port_isl
        no shutdown
        lag 2
interface 1/1/47
        description port_isl
        no shutdown
        lag 2
interface 1/1/48
        description port_ka
        no shutdown
        ip address 11.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/51
        description port_Site-2_Border-vtep-primary
        no shutdown
        ip address 60.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/52
        description port_Site-2_Border-vtep-secondary
        no shutdown
        ip address 60.1.3.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface vlan 6
        vsx active-forwarding
        ip address 60.1.5.1/29
        ip ospf 1 area 0.0.0.0
interface vlan 7
        vsx active-forwarding
        ip address 60.1.6.1/29
        ip ospf 1 area 0.0.0.0
vsx
```

```
        inter-switch-link lag 2
        role primary
        keepalive peer 11.1.1.0 source 11.1.1.1
!
!
!
!
!
router ospf 1
        router-id 120.10.10.11
        area 0.0.0.0
https-server vrf mgmt
```

Site-2-Distro-vsx-secondary

```
!
!export-password: default
hostname Site-2-Distro-vsx-secondary
no ip icmp redirect
profile l3-core
!
!
!
!
!
ssh server vrf mgmt
vlan 1,6-7
interface mgmt
        no shutdown
        ip dhcp
interface lag 2
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface lag 35 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 6
        lacp mode active
        lacp rate fast
interface lag 36 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 7
        lacp mode active
        lacp rate fast
interface 1/1/15
        description port_Site-2-access-vtep-2
        no shutdown
        lag 36
interface 1/1/34
        description port_Site-2-access-vtep-1
        no shutdown
        lag 35
interface 1/1/46
        description port_isl
```

```
        no shutdown
        lag 2
interface 1/1/47
        description port_isl
        no shutdown
        lag 2
interface 1/1/48
        description port_ka
        no shutdown
        ip address 11.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/51
        description port_Site-2_Border-vtep-primary
        no shutdown
        ip address 60.1.2.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/52
        description port_Site-2_Border-vtep-secondary
        no shutdown
        ip address 60.1.4.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface vlan 6
        vsx active-forwarding
        ip address 60.1.5.2/29
        ip ospf 1 area 0.0.0.0
interface vlan 7
        vsx active-forwarding
        ip address 60.1.6.2/29
        ip ospf 1 area 0.0.0.0
vsx
        inter-switch-link lag 2
        role secondary
        keepalive peer 11.1.1.1 source 11.1.1.0
!
!
!
!
!
router ospf 1
        router-id 120.10.10.15
        area 0.0.0.0
https-server vrf mgmt
```

Site-2-External-router

```
hostname Site-2-External-router
profile leaf
vrf vrf1
vrf vrf2
cli-session
        timeout 0
!
!
ssh server vrf mgmt
access-list ip pim-ssm-range-acl-vrf2
        10 permit any any 225.1.0.0/255.255.0.0
        20 permit any any 225.2.1.0/255.255.255.0
        30 permit any any 225.2.2.0/255.255.255.0
```

```
        40 permit any any 232.0.0.0/255.0.0.0
vlan 1,1001-1002
vlan 1201
        ip igmp snooping enable
vlan 1202
        ip igmp snooping enable
vlan 2001-2002
interface 1/1/25
        description port_to_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1201-1202
interface 1/1/43
        description port_Site-2_Border-vtep-primary
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1001-1002
interface 1/1/44
        description port_Site-2_Border-vtep-secondary
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 2001-2002
interface vlan 1001
        vrf attach vrf1
        ip address 61.0.1.1/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1002
        vrf attach vrf2
        ip address 61.0.2.1/24
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1201
        vrf attach vrf1
        ip address 61.2.1.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf passive
        ip ospf network point-to-point
        ip igmp enable
        ip pim-sparse enable
interface vlan 1202
        vrf attach vrf2
        ip address 61.2.2.2/24
        ip ospf 1 area 0.0.0.0
        ip ospf passive
        ip ospf network point-to-point
        ip igmp enable
        ip pim-sparse enable
interface vlan 2001
        vrf attach vrf1
        ip address 61.1.1.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 2002
        vrf attach vrf2
        ip address 61.1.2.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
!
```

```
!
!
!
!
router ospf 1 vrf vrf1
        router-id 112.11.1.5
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 112.11.2.5
        area 0.0.0.0
router pim vrf vrf1
        enable
        pim-ssm
router pim vrf vrf2
        enable
        pim-ssm
        pim-ssm range-access-list pim-ssm-range-acl-vrf2
https-server vrf mgmt

========================================
Show command outputs for  validation
========================================
Site-2-External-router# show ip ospf neighbors all-vrfs
VRF : vrf1                              Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.12.1.5       1         FULL/DR           61.0.1.2           vlan1001
112.13.1.5       1         FULL/DR           61.1.1.2           vlan2001

VRF : vrf2                              Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
112.12.2.5       1         FULL/DR           61.0.2.2           vlan1002
112.13.1.5       1         FULL/DR           61.1.2.2           vlan2002
Site-2-External-router# show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 2
-------------------------------------------------------------------------------
Interface Neighbor     Uptime     Expires    DR          Hold Time  Secondary
          (IPV4)       (HH:MM:SS) (HH:MM:SS) Priority    (HH:MM:SS)  Address (IPV4)
-------------------------------------------------------------------------------
vlan1001   61.0.1.2     01:14:10  00:01:41   1347440720  00:01:45   Nil
vlan2001   61.1.1.2     01:08:37  00:01:17   1347440720  00:01:45   Nil
-------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 2
-------------------------------------------------------------------------------
-
vlan1002   61.0.2.2     01:14:15  00:01:35   1347440720  00:01:45   Nil
vlan2002   61.1.2.2     01:08:36  00:01:16   1347440720  00:01:45   Nil
-------------------------------------------------------------------------------
-
```

```
Site-2-External-router# show ip mroute 232.1.5.1 all-vrfs
Site-2-External-router# show ip mroute 225.1.5.1 all-vrfs
IP Multicast Route Entries

VRF : vrf2
Total number of entries : 1
Group Address                  : 225.1.5.1
Source Address                 : 61.2.2.15
Neighbor                       :
Incoming interface             : vlan1202
Multicast Routing Protocol     : PIM-SSM
Unicast Routing Protocol       : connected
Metric                         : 0
Metric  Pref                   : 0
Uptime (HH:MM:SS)              : 01:44:34
Downstream Interface
Interface       State
-----------     ----------
vlan1002        forwarding
vlan2002        forwarding
Site-2-External-router#
```

Site-3-Access-vtep-1

```
hostname Site-3-Access-vtep-1
route-redistribute active-routes-only
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vsf member 1
        type r8s89a
vlan 1
vlan 1501
        ip igmp snooping enable
vlan 1502
        ip igmp snooping enable
virtual-mac 00:01:80:41:56:40
evpn
        redistribute local-mac
        redistribute local-svi
        vlan 1501
                rd auto
                route-target export 1501:141
                route-target import 1501:141
                redistribute host-route
        vlan 1502
                rd auto
                route-target export 1502:142
                route-target import 1502:142
                redistribute host-route
interface 1/1/25
        description port_Site-3-Border-vtep-Primary
        no shutdown
        routing
```

```
        ip address 80.1.1.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/26
        description port_Site-3-Border-vtep-Secondary
        no shutdown
        routing
        ip address 80.1.4.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/28
        description port_to_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1501-1502
interface loopback 1
        ip address 13.13.13.13/32
interface vxlan 1
        source ip 13.13.13.13
        no shutdown
        vni 2100
                vlan 1501
        vni 2101
                vlan 1502
!
!
!
!
!
router ospf 1
        router-id 113.13.1.3
        redistribute local loopback
        area 0.0.0.0
router bgp 65537
        bgp router-id 113.13.1.3
        neighbor 197.170.1.255 remote-as 65537
        neighbor 197.170.1.255 update-source loopback 1
        neighbor 198.170.1.255 remote-as 65537
        neighbor 198.170.1.255 update-source loopback 1
        address-family l2vpn evpn
                neighbor 197.170.1.255 send-community extended
                neighbor 197.170.1.255 activate
                neighbor 198.170.1.255 send-community extended
                neighbor 198.170.1.255 activate
        exit-address-family
!
https-server vrf default
https-server vrf mgmt

=======================================
Show command outputs for  validation
=======================================

Site-3-Access-vtep-1# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
```

```
113.11.1.3       n/a       FULL              80.1.1.1          1/1/25
113.12.1.3       n/a       FULL              80.1.4.1          1/1/26

Site-3-Access-vtep-1# show bgp l2vpn evpn summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 113.13.1.3
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Neighbor       Remote-AS MsgRcvd MsgSent  Up/Down Time State        AdminStatus
197.170.1.255  65537       15990   1152   16h:36m:25s  Established  Up
198.170.1.255  65537       14903   1150   16h:36m:24s  Established  Up

Site-3-Access-vtep-1# show interface vxlan vteps
Source       Destination   Origin    Status       VNI     Routing   VLAN  VRF
-------------------------------------------- ------------------------------
13.13.13.13  8.8.8.8       evpn      operational  2100    disabled  1501  --
13.13.13.13  8.8.8.8       evpn      operational  2101    disabled  1502  --

Site-3-Access-vtep-1# show ip pim neighbor brief all-vrfs
Site-3-Access-vtep-1# show ip igmp snooping
IGMP Snooping Protocol Info
Total VLANs with IGMP enabled             : 2
Current count of multicast groups joined  : 30
IGMP Drop Unknown Multicast               : Global
VLAN ID : 1501
VLAN Name : VLAN1501
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 15.1.1.10
Querier Port : vxlan1(8.8.8.8)
Querier UpTime :16h 36m
Querier Expiration Time :2m 51s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
232.1.9.1              Filter    3    INC  3h 4m     3m 3s
232.1.9.2              Filter    3    INC  3h 4m     3m 3s
232.1.9.3              Filter    3    INC  3h 4m     3m 2s
232.1.9.4              Filter    3    INC  3h 4m     3m 3s
232.1.9.5              Filter    3    INC  3h 4m     2m 59s
232.1.9.6              Filter    3    INC  3h 4m     3m 1s
232.1.9.7              Filter    3    INC  3h 4m     3m 1s
232.1.9.8              Filter    3    INC  3h 4m     2m 59s
232.1.9.9              Filter    3    INC  3h 4m     2m 59s
232.1.9.10             Filter    3    INC  3h 4m     3m 1s
232.1.9.11             Filter    3    INC  3h 4m     2m 57s
232.1.9.12             Filter    3    INC  3h 4m     3m 1s
232.1.9.13             Filter    3    INC  3h 4m     2m 58s
232.1.9.14             Filter    3    INC  3h 4m     2m 58s
232.1.9.15             Filter    3    INC  3h 4m     2m 58s

VLAN ID : 1502
VLAN Name : VLAN1502
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 15.1.2.10
Querier Port : vxlan1(8.8.8.8)
```

```
Querier UpTime :16h 36m
Querier Expiration Time :2m 51s

Active Group Address   Tracking  Vers Mode Uptime    Expires
---------------------- ---------- ---- ---- --------- ----------
225.1.9.1              Filter    3    INC  3h 4m     2m 58s
225.1.9.2              Filter    3    INC  3h 4m     3m 0s
225.1.9.3              Filter    3    INC  3h 4m     2m 57s
225.1.9.4              Filter    3    INC  3h 4m     3m 7s
225.1.9.5              Filter    3    INC  3h 4m     3m 5s
225.1.9.6              Filter    3    INC  3h 4m     3m 5s
225.1.9.7              Filter    3    INC  3h 4m     3m 3s
225.1.9.8              Filter    3    INC  3h 4m     2m 57s
225.1.9.9              Filter    3    INC  3h 4m     3m 0s
225.1.9.10             Filter    3    INC  3h 4m     2m 59s
225.1.9.11             Filter    3    INC  3h 4m     2m 57s
225.1.9.12             Filter    3    INC  3h 4m     3m 3s
225.1.9.13             Filter    3    INC  3h 4m     2m 57s
225.1.9.14             Filter    3    INC  3h 4m     2m 57s
225.1.9.15             Filter    3    INC  3h 4m     3m 1s
Site-3-Access-vtep-1#
```

Site-3-Access-vtep-2

```
hostname Site-3-Access-vtep-2
cli-session
        timeout 0
!
!
ssh server vrf default
ssh server vrf mgmt
vsf member 1
        type r8s89a
vlan 1
vlan 1701
        ip igmp snooping enable
vlan 1702
        ip igmp snooping enable
virtual-mac 00:01:90:41:56:40
evpn
        redistribute local-mac
        redistribute local-svi
        vlan 1701
                rd auto
                route-target export 1701:141
                route-target import 1701:141
                redistribute host-route
        vlan 1702
                rd auto
                route-target export 1702:142
                route-target import 1702:142
                redistribute host-route
interface 1/1/25
        description port_Site-3-Border-vtep-Secondary
        no shutdown
        routing
        ip address 80.1.3.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/26
        description port_Site-3-Border-vtep-Primary
```

```
        no shutdown
        routing
        ip address 80.1.2.0/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/28
        description port_to_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1701-1702
interface loopback 1
        ip address 14.14.14.14/32
interface vxlan 1
        source ip 14.14.14.14
        no shutdown
        vni 2300
                vlan 1701
        vni 2301
                vlan 1702
!
!
router ospf 1
        router-id 113.14.1.3
        redistribute local loopback
        area 0.0.0.0
router bgp 65537
        bgp router-id 113.14.1.3
        neighbor 197.170.1.255 remote-as 65537
        neighbor 197.170.1.255 update-source loopback 1
        neighbor 198.170.1.255 remote-as 65537
        neighbor 198.170.1.255 update-source loopback 1
        address-family l2vpn evpn
                neighbor 197.170.1.255 send-community extended
                neighbor 197.170.1.255 activate
                neighbor 198.170.1.255 send-community extended
                neighbor 198.170.1.255 activate
        exit-address-family
!
https-server vrf default
https-server vrf mgmt

=======================================
Show command outputs for  validation
=======================================

Site-3-Access-vtep-2# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================
Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
113.12.1.3       n/a       FULL              80.1.3.1           1/1/25
113.11.1.3       n/a       FULL              80.1.2.1           1/1/26

Site-3-Access-vtep-2# show bgp l2vpn evpn summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS              : 65537        BGP Router Identifier  : 113.14.1.3
Peers                 : 2            Log Neighbor Changes   : No
```

```
Cfg. Hold Time          : 180          Cfg. Keep Alive        : 60
Confederation Id        : 0

Neighbor        Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
197.170.1.255   65537       15987   1156    16h:38m:44s  Established   Up
198.170.1.255   65537       14911   1150    16h:38m:45s  Established   Up

Site-3-Access-vtep-2# show interface vxlan vteps
Source       Destination   Origin  Status       VNI     Routing   VLAN  VRF
-------------------------------------------------------------------------------
14.14.14.14  8.8.8.8       evpn    operational  2300    disabled  1701   --
14.14.14.14  8.8.8.8       evpn    operational  2301    disabled  1702   --

Site-3-Access-vtep-2# show ip pim all-vrfs
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt

Site-3-Access-vtep-2# show ip igmp snooping
IGMP Snooping Protocol Info
Total VLANs with IGMP enabled             : 2
Current count of multicast groups joined  : 0
IGMP Drop Unknown Multicast               : Global
VLAN ID : 1701
VLAN Name : VLAN1701
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 15.3.1.10
Querier Port : vxlan1(8.8.8.8)
Querier UpTime :16h 38m
Querier Expiration Time :2m 54s
VLAN ID : 1702
VLAN Name : VLAN1702
IGMP Configured Version : 3
IGMP Operating Version : 3
Querier Address : 15.3.2.10
Querier Port : vxlan1(8.8.8.8)
Querier UpTime :16h 38m
Querier Expiration Time :2m 54s
Site-3-Access-vtep-2#
```

Site-3-Border-vtep-Primary

```
hostname Site-3-Border-vtep-Primary
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 1:15
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 2:15
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
ssh server vrf default
ssh server vrf mgmt
access-list ip pim-ssm-range-acl-vrf2
vsx-sync
```

```
        !
        10 permit any any 225.1.0.0/255.255.0.0
        20 permit any any 225.2.1.0/255.255.255.0
        30 permit any any 225.2.2.0/255.255.255.0
        40 permit any any 232.0.0.0/255.0.0.0
vlan 1-2,1001-1002
vlan 1501
        ip igmp snooping enable
vlan 1502
        ip igmp snooping enable
vlan 1701
        ip igmp snooping enable
vlan 1702
        ip igmp snooping enable
virtual-mac 00:01:70:41:56:40
evpn
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 1501
                rd auto
                route-target export 1501:141
                route-target import 1501:141
                redistribute host-route
        vlan 1502
                rd auto
                route-target export 1502:142
                route-target import 1502:142
                redistribute host-route
        vlan 1701
                rd auto
                route-target export 1701:141
                route-target import 1701:141
                redistribute host-route
        vlan 1702
                rd auto
                route-target export 1702:142
                route-target import 1702:142
                redistribute host-route
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
interface 1/1/7
        description port_Site-1-Border-vtep-Secondary
        no shutdown
        ip address 48.1.2.1/29
interface 1/1/10
        description port_Site-1-Border-vtep-Primary
        no shutdown
        ip address 48.1.1.1/29
interface 1/1/19
        description port_isl
        no shutdown
        lag 120
interface 1/1/22
        description port_isl
        no shutdown
        lag 120
```

```
interface 1/1/25
        description Keepalive
        no shutdown
        ip address 47.1.1.1/29
interface 1/1/31
        description port_Site-3-Access-vtep-1
        no shutdown
        ip address 80.1.1.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface 1/1/34
        description port_Site-3-Access-vtep-2
        no shutdown
        ip address 80.1.2.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface loopback 1
        ip address 192.168.100.1/32
interface loopback 100
        ip address 192.168.100.255/32
interface loopback 112
        ip address 8.8.8.8/32
interface loopback 113
        ip address 197.170.1.255/32
interface loopback 201
        vrf attach vrf1
        ip address 131.100.101.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 202
        vrf attach vrf2
        ip address 131.100.102.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 2
        ip address 21.1.1.1/29
        ip ospf 1 area 0.0.0.0
interface vlan 1001
        vrf attach vrf1
        ip address 63.0.1.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1002
        vrf attach vrf2
        ip address 63.0.2.1/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1501
        vrf attach vrf1
        ip address 15.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.1.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1502
        vrf attach vrf2
        ip address 15.1.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.1.2.10
        ip igmp enable
        ip pim-sparse enable
```

```
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1701
        vrf attach vrf1
        ip address 15.3.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.3.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1702
        vrf attach vrf2
        ip address 15.3.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.3.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vxlan 1
        source ip 8.8.8.8
        no shutdown
        vni 2100
                vlan 1501
        vni 2101
                vlan 1502
        vni 2300
                vlan 1701
        vni 2301
                vlan 1702
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
        system-mac 00:01:70:41:56:40
        inter-switch-link lag 120
        role primary
        keepalive peer 47.1.1.2 source 47.1.1.1
ip prefix-list test_1 seq 20 deny 193.170.1.255/32
ip prefix-list test_1 seq 30 deny 194.170.1.255/32
ip prefix-list test_1 seq 40 deny 195.170.1.255/32
ip prefix-list test_1 seq 50 deny 196.170.1.255/32
ip prefix-list test_1 seq 60 permit 4.4.4.50/32
ip prefix-list test_1 seq 70 permit 80.80.80.80/32
!
!
!
!
route-map test_1 permit seq 10
        match ip address prefix-list test_1
!
router ospf 1
        router-id 113.11.1.3
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map test_1
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 113.11.1.5
        distance 250
```

```
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 113.11.2.5
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65537
        bgp router-id 113.11.1.3
        neighbor 13.13.13.13 remote-as 65537
        neighbor 13.13.13.13 update-source loopback 113
        neighbor 14.14.14.14 remote-as 65537
        neighbor 14.14.14.14 update-source loopback 113
        neighbor 48.1.1.2 remote-as 65535
        neighbor 48.1.2.2 remote-as 65535
        neighbor 193.170.1.255 remote-as 65535
        neighbor 193.170.1.255 ebgp-multihop 5
        neighbor 193.170.1.255 update-source loopback 113
        neighbor 194.170.1.255 remote-as 65535
        neighbor 194.170.1.255 ebgp-multihop 5
        neighbor 194.170.1.255 update-source loopback 113
        neighbor 195.170.1.255 remote-as 65536
        neighbor 195.170.1.255 ebgp-multihop 5
        neighbor 195.170.1.255 update-source loopback 113
        neighbor 196.170.1.255 remote-as 65536
        neighbor 196.170.1.255 ebgp-multihop 5
        neighbor 196.170.1.255 update-source loopback 113
        address-family ipv4 unicast
                neighbor 48.1.1.2 activate
                neighbor 48.1.2.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 13.13.13.13 next-hop-self
                neighbor 13.13.13.13 route-reflector-client
                neighbor 13.13.13.13 send-community extended
                neighbor 13.13.13.13 activate
                neighbor 14.14.14.14 next-hop-self
                neighbor 14.14.14.14 route-reflector-client
                neighbor 14.14.14.14 send-community extended
                neighbor 14.14.14.14 activate
                neighbor 193.170.1.255 send-community extended
                neighbor 193.170.1.255 activate
                neighbor 194.170.1.255 send-community extended
                neighbor 194.170.1.255 activate
                neighbor 195.170.1.255 send-community extended
                neighbor 195.170.1.255 activate
                neighbor 196.170.1.255 send-community extended
                neighbor 196.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
        vrf vrf2
```

```
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
router pim vrf vrf1
        enable
        pim-ssm
router pim vrf vrf2
        enable
        pim-ssm
        pim-ssm range-access-list pim-ssm-range-acl-vrf2
https-server vrf default
https-server vrf mgmt

=======================================
Show command outputs for  validation
=======================================

Site-3-Border-vtep-Primary# show ip ospf neighbors all-vrfs
VRF : default                           Process : 1
================================================
Total Number of Neighbors : 3
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
113.13.1.3       n/a       FULL              80.1.1.0           1/1/31
113.14.1.3       n/a       FULL              80.1.2.0           1/1/34
113.12.1.3       1         FULL/DR           21.1.1.2           vlan2
VRF : vrf1                              Process : 1
================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
113.12.1.5       1         FULL/DR           63.0.1.2           vlan1001
VRF : vrf2                              Process : 1
================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
113.12.1.5       1         FULL/DR           63.0.2.2           vlan1002

Site-3-Border-vtep-Primary# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 113.11.1.3
Peers                  : 8            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------

Neighbor   Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
48.1.1.2   65535       1152    1152    16h:32m:08s  Established   Up
48.1.2.2   65535       1153    1151    16h:32m:08s  Established   Up
```

```
Address-family : IPv6 Unicast
------------------------------
Address-family : L2VPN EVPN
------------------------------

Neighbor        Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
13.13.13.13     65537       1145    15983   16h:30m:52s  Established   Up
14.14.14.14     65537       1147    15978   16h:30m:53s  Established   Up
193.170.1.255   65535       8444    10497   16h:32m:02s  Established   Up
194.170.1.255   65535       8887    10442   16h:32m:04s  Established   Up
195.170.1.255   65536       8549    10517   01h:47m:57s  Established   Up
196.170.1.255   65536       8999    10466   16h:31m:53s  Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 131.100.101.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------
Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 131.100.102.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------

Site-3-Border-vtep-Primary# show interface vxlan vteps
Source   Destination  Origin Status       VNI      Routing   VLAN  VRF
-------------------------------------------------------------------------
8.8.8.8  4.4.4.50     evpn   operational  9002     enabled   --     vrf2
8.8.8.8  4.4.4.50     evpn   operational  16777214 enabled   --     vrf1
8.8.8.8  13.13.13.13  evpn   operational  2100     disabled  1501   --
8.8.8.8  13.13.13.13  evpn   operational  2101     disabled  1502   --
8.8.8.8  14.14.14.14  evpn   operational  2300     disabled  1701   --
8.8.8.8  14.14.14.14  evpn   operational  2301     disabled  1702   --
8.8.8.8  80.80.80.80  evpn   operational  9002     enabled   --     vrf2
8.8.8.8  80.80.80.80  evpn   operational  16777214 enabled   --     vrf1

Site-3-Border-vtep-Primary# show ip pim all-vrfs
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
PIM Global Parameters
VRF                              :  vrf1
PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
```

```
VRF                               :  vrf2
PIM Status                        :  Enabled
PIM SSM Status                    :  Enabled
PIM SSM Range ACL                 :  pim-ssm-range-acl-vrf2
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive

Site-3-Border-vtep-Primary# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
VRF : vrf1                              Total number of neighbors : 5
--------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires    DR        Hold Time  Secondary
            (IPV4)       (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  Address
(IPV4)
--------------------------------------------------------------------------------
vni16777214 4.4.4.50     05:43:22   00:03:14   1         00:03:30
vlan1501    15.1.1.10    05:43:33   00:01:16   134744072 00:01:45   Nil
vlan1701    15.3.1.10    05:43:31   00:01:16   134744072 00:01:45   Nil
vlan1001    63.0.1.2     05:43:30   00:01:17   134744072 00:01:45   Nil
vni16777214 80.80.80.80  05:43:32   00:03:12   1         00:03:30
--------------------------------------------------------------------------------
VRF : vrf2                              Total number of neighbors : 5
--------------------------------------------------------------------------------
vni9002     4.4.4.50     02:17:44   00:03:20   1         00:03:30
vlan1502    15.1.2.10    02:17:59   00:01:23   134744072 00:01:45   Nil
vlan1702    15.3.2.10    02:17:55   00:01:21   134744072 00:01:45   Nil
vlan1002    63.0.2.2     02:17:59   00:01:17   134744072 00:01:45   Nil
vni9002     80.80.80.80  02:17:43   00:03:20   1         00:03:30
--------------------------------------------------------------------------------

Site-3-Border-vtep-Primary# show ip pim rp-set all-vrfs
Site-3-Border-vtep-Primary# show ip mroute 232.1.9.1 all-vrfs
IP Multicast Route Entries
VRF : vrf1
Group Address                 : 232.1.9.1
Source Address                : 60.2.1.15
Neighbor                      : 4.4.4.50
Incoming interface            : vni16777214
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 02:23:41
Downstream Interface
Interface       State
-----------     ----------
vlan1501        forwarding
Site-3-Border-vtep-Primary# show ip mroute 225.1.9.2 all-vrfs
IP Multicast Route Entries
VRF : vrf2
Total number of entries : 2
Group Address                 : 225.1.9.2
Source Address                : 61.2.2.15
Neighbor                      : 80.80.80.80
Incoming interface            : vlan1502
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
```

```
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:00:23
Group Address                 : 225.1.9.2
Source Address                : 61.2.2.15
Neighbor                      : 80.80.80.80
Incoming interface            : vni9002
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:00:23
Downstream Interface
Interface       State
-----------     ----------
vlan1502        forwarding
Site-3-Border-vtep-Primary#
```

Site-3-Border-vtep-Secondary

```
hostname Site-3-Border-vtep-Secondary
no ip icmp redirect
route-redistribute active-routes-only
vrf vrf1
        rd 1:15
        route-target export 1:100 evpn
        route-target import 1:100 evpn
vrf vrf2
        rd 2:15
        route-target export 2:100 evpn
        route-target import 2:100 evpn
cli-session
        timeout 0
!
!
ssh server vrf default
ssh server vrf mgmt
access-list ip pim-ssm-range-acl-vrf2
        vsx-sync
        !
        10 permit any any 225.1.0.0/255.255.0.0
        20 permit any any 225.2.1.0/255.255.255.0
        30 permit any any 225.2.2.0/255.255.255.0
        40 permit any any 232.0.0.0/255.0.0.0
vlan 1-2,1001-1002
vlan 1501
        ip igmp snooping enable
vlan 1502
        ip igmp snooping enable
vlan 1701
        ip igmp snooping enable
vlan 1702
        ip igmp snooping enable
virtual-mac 00:01:70:41:56:40
evpn
        redistribute local-mac
        redistribute local-svi
                !! this command is specific to evpn multi-site on Border-vtep
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 1501
                rd auto
```

```
                route-target export 1501:141
                route-target import 1501:141
                redistribute host-route
        vlan 1502
                rd auto
                route-target export 1502:142
                route-target import 1502:142
                redistribute host-route
        vlan 1701
                rd auto
                route-target export 1701:141
                route-target import 1701:141
                redistribute host-route
        vlan 1702
                rd auto
                route-target export 1702:142
                route-target import 1702:142
                redistribute host-route
interface mgmt
        no shutdown
        ip dhcp
system interface-group 1 speed 10g
        !interface group 1 contains ports 1/1/1-1/1/12
system interface-group 2 speed 10g
        !interface group 2 contains ports 1/1/13-1/1/24
system interface-group 3 speed 10g
        !interface group 3 contains ports 1/1/25-1/1/36
system interface-group 4 speed 10g
        !interface group 4 contains ports 1/1/37-1/1/48
interface lag 120
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
        lacp rate fast
interface 1/1/7
        description port_Site-1-Border-vtep-Secondary
        no shutdown
        ip address 48.1.4.1/29
interface 1/1/10
        description port_Site-1-Border-vtep-Primary
        no shutdown
        ip address 48.1.3.1/29
interface 1/1/19
        description port_isl
        no shutdown
        lag 120
interface 1/1/22
        description port_isl
        no shutdown
        lag 120
interface 1/1/25
        description Keepalive
        no shutdown
        ip address 47.1.1.2/29
interface 1/1/31
        description port_Site-3-Access-vtep-2
        no shutdown
        ip address 80.1.3.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
```

```
interface 1/1/34
        description port_Site-3-Access-vtep-1
        no shutdown
        ip address 80.1.4.1/31
        ip ospf 1 area 0.0.0.0
        ip ospf network point-to-point
interface loopback 1
        ip address 192.168.100.2/32
interface loopback 100
        ip address 192.168.100.255/32
interface loopback 112
        ip address 8.8.8.8/32
interface loopback 113
        ip address 198.170.1.255/32
interface loopback 201
        vrf attach vrf1
        ip address 132.100.101.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface loopback 202
        vrf attach vrf2
        ip address 132.100.102.100/32
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 2
        ip address 21.1.1.2/29
        ip ospf 1 area 0.0.0.0
interface vlan 1001
        vrf attach vrf1
        ip address 63.0.1.2/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1002
        vrf attach vrf2
        ip address 63.0.2.2/30
        ip ospf 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 1501
        vrf attach vrf1
        ip address 15.1.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.1.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1502
        vrf attach vrf2
        ip address 15.1.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.1.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1701
        vrf attach vrf1
        ip address 15.3.1.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.3.1.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vlan 1702
```

```
        vrf attach vrf2
        ip address 15.3.2.10/24
        active-gateway ip mac 00:00:11:16:16:00
        active-gateway ip 15.3.2.10
        ip igmp enable
        ip pim-sparse enable
        ip pim-sparse vsx-virtual-neighbor
interface vxlan 1
        source ip 8.8.8.8
        no shutdown
        vni 2100
                vlan 1501
        vni 2101
                vlan 1502
        vni 2300
                vlan 1701
        vni 2301
                vlan 1702
        vni 9002
                vrf vrf2
                routing
        vni 16777214
                vrf vrf1
                routing
vsx
        system-mac 00:01:70:41:56:40
        inter-switch-link lag 120
        role secondary
        keepalive peer 47.1.1.1 source 47.1.1.2
ip prefix-list test_1 seq 20 deny 193.170.1.255/32
ip prefix-list test_1 seq 30 deny 194.170.1.255/32
ip prefix-list test_1 seq 40 deny 195.170.1.255/32
ip prefix-list test_1 seq 50 deny 196.170.1.255/32
ip prefix-list test_1 seq 60 permit 4.4.4.50/32
ip prefix-list test_1 seq 70 permit 80.80.80.80/32
!
!
!
!
route-map test_1 permit seq 10
        match ip address prefix-list test_1
!
router ospf 1
        router-id 113.12.1.3
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map test_1
        area 0.0.0.0
router ospf 1 vrf vrf1
        router-id 113.12.1.5
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf vrf2
        router-id 113.12.1.5
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65537
```

```
        bgp router-id 113.12.1.3
        neighbor 13.13.13.13 remote-as 65537
        neighbor 13.13.13.13 update-source loopback 113
        neighbor 14.14.14.14 remote-as 65537
        neighbor 14.14.14.14 update-source loopback 113
        neighbor 48.1.3.2 remote-as 65535
        neighbor 48.1.4.2 remote-as 65535
        neighbor 193.170.1.255 remote-as 65535
        neighbor 193.170.1.255 ebgp-multihop 5
        neighbor 193.170.1.255 update-source loopback 113
        neighbor 194.170.1.255 remote-as 65535
        neighbor 194.170.1.255 ebgp-multihop 5
        neighbor 194.170.1.255 update-source loopback 113
        neighbor 195.170.1.255 remote-as 65536
        neighbor 195.170.1.255 ebgp-multihop 5
        neighbor 195.170.1.255 update-source loopback 113
        neighbor 196.170.1.255 remote-as 65536
        neighbor 196.170.1.255 ebgp-multihop 5
        neighbor 196.170.1.255 update-source loopback 113
        address-family ipv4 unicast
                neighbor 48.1.3.2 activate
                neighbor 48.1.4.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 13.13.13.13 next-hop-self
                neighbor 13.13.13.13 route-reflector-client
                neighbor 13.13.13.13 send-community extended
                neighbor 13.13.13.13 activate
                neighbor 14.14.14.14 next-hop-self
                neighbor 14.14.14.14 route-reflector-client
                neighbor 14.14.14.14 send-community extended
                neighbor 14.14.14.14 activate
                neighbor 193.170.1.255 send-community extended
                neighbor 193.170.1.255 activate
                neighbor 194.170.1.255 send-community extended
                neighbor 194.170.1.255 activate
                neighbor 195.170.1.255 send-community extended
                neighbor 195.170.1.255 activate
                neighbor 196.170.1.255 send-community extended
                neighbor 196.170.1.255 activate
        exit-address-family
!
        vrf vrf1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
        vrf vrf2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf
                exit-address-family
!
router pim vrf vrf1
        enable
        pim-ssm
router pim vrf vrf2
```

```
        enable
        pim-ssm
        pim-ssm range-access-list pim-ssm-range-acl-vrf2
https-server vrf default
https-server vrf mgmt

=======================================
Show command outputs for  validation
=======================================

Site-3-Border-vtep-Secondary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 3

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
113.14.1.3       n/a       FULL              80.1.3.0           1/1/31
113.13.1.3       n/a       FULL              80.1.4.0           1/1/34
113.11.1.3       1         FULL/BDR          21.1.1.1           vlan2
VRF : vrf1                             Process : 1
================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
113.11.1.5       1         FULL/BDR          63.0.1.1           vlan1001
VRF : vrf2                             Process : 1
================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
113.11.2.5       1         FULL/BDR          63.0.2.1           vlan1002

Site-3-Border-vtep-Secondary# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 113.12.1.3
Peers                  : 8            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------
Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
48.1.3.2      65535       1157    1155    16h:35m:00s  Established   Up
48.1.4.2      65535       1157    1162    16h:35m:00s  Established   Up

Address-family : IPv6 Unicast
------------------------------
Address-family : L2VPN EVPN
------------------------------

Neighbor      Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
13.13.13.13   65537       1147    14900   16h:33m:42s  Established   Up
14.14.14.14   65537       1145    14906   16h:33m:45s  Established   Up
193.170.1.255 65535       8819    9561    16h:34m:53s  Established   Up
```

```
194.170.1.255 65535       9234    9441    16h:34m:56s  Established   Up
195.170.1.255 65536       9127    9585    01h:50m:40s  Established   Up
196.170.1.255 65536       9271    9501    16h:34m:46s  Established   Up

Codes: * Dynamic Neighbor
VRF : vrf1
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 132.100.101.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : vrf2
BGP Summary
-----------
Local AS               : 65537        BGP Router Identifier  : 132.100.102.100
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------

Site-3-Border-vtep-Secondary# show interface vxlan vteps
Source       Destination    Origin   Status         VNI       Routing   VLAN  VRF
-------------------------------------------------------------------------------
-
8.8.8.8      4.4.4.50       evpn     operational    9002      enabled   --
vrf2
8.8.8.8      4.4.4.50       evpn     operational    16777214  enabled   --
vrf1
8.8.8.8      13.13.13.13    evpn     operational    2100      disabled  1501   --
8.8.8.8      13.13.13.13    evpn     operational    2101      disabled  1502   --
8.8.8.8      14.14.14.14    evpn     operational    2300      disabled  1701   --
8.8.8.8      14.14.14.14    evpn     operational    2301      disabled  1702   --
8.8.8.8      80.80.80.80    evpn     operational    9002      enabled   --
vrf2
8.8.8.8      80.80.80.80    evpn     operational    16777214  enabled   --
vrf1

Site-3-Border-vtep-Secondary# show ip pim all-vrfs
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
PIM Global Parameters
VRF                              :  vrf1
PIM Status                       :  Enabled
PIM SSM Status                   :  Enabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
VRF                              :  vrf2
```

```
PIM Status                          :  Enabled
PIM SSM Status                      :  Enabled
PIM SSM Range ACL                   :  pim-ssm-range-acl-vrf2
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive

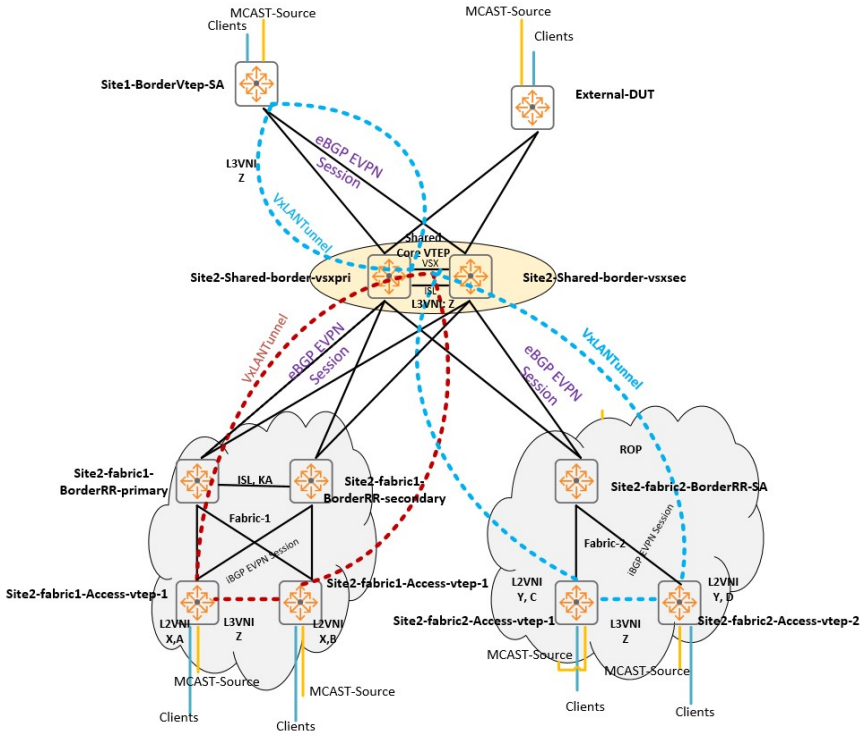
Site-3-Border-vtep-Secondary# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : vrf1                              Total number of neighbors : 5
--------------------------------------------------------------------------------
Interface   Neighbor     Uptime     Expires    DR        Hold Time  Secondary
           (IPV4)       (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)  Address (IPV4)
--------------------------------------------------------------------------------
vni16777214 4.4.4.50     05:46:11   00:03:24   1         00:03:30
vlan1501    15.1.1.10    05:46:23   00:01:28   134744072 00:01:45   Nil
vlan1701    15.3.1.10    05:46:21   00:01:30   134744072 00:01:45   Nil
vlan1001    63.0.1.1     05:46:20   00:01:30   134744072 00:01:45   Nil
vni16777214 80.80.80.80  05:46:22   00:03:23   1         00:03:30
--------------------------------------------------------------------------------
-
VRF : vrf2                              Total number of neighbors : 5
--------------------------------------------------------------------------------
-
vni9002     4.4.4.50     02:20:33   00:03:28   1         00:03:30
vlan1502    15.1.2.10    02:20:44   00:01:32   134744072 00:01:45   Nil
vlan1702    15.3.2.10    02:20:48   00:01:35   134744072 00:01:45   Nil
vlan1002    63.0.2.1     02:20:49   00:01:29   134744072 00:01:45   Nil
vni9002     80.80.80.80  02:20:32   00:03:01   1         00:03:30
--------------------------------------------------------------------------------
-

Site-3-Border-vtep-Secondary# show ip mroute 232.1.9.1 all-vrfs
IP Multicast Route Entries
VRF : vrf1
Total number of entries : 2
Group Address                 : 232.1.9.1
Source Address                : 60.2.1.15
Neighbor                      : 4.4.4.50
Incoming interface            : vlan1501
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 02:26:23
Group Address                 : 232.1.9.1
Source Address                : 60.2.1.15
Neighbor                      : 4.4.4.50
Incoming interface            : vni16777214
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SSM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 02:26:23
Downstream Interface
Interface       State
-----------     ----------
vlan1501        forwarding
```

```
Site-3-Border-vtep-Secondary#
```

Use case 5: Shared Border (PIM-SM)

Figure 1 *Use case 5: Shard Border (PIM-SM)*



Configuration and verification details for the devices in this use case are provided in the following sections:

External DUT

Site-1-BorderVtep-SA

Site-2-fabric1-Access-vtep-1

Site-2-Fabric1-Access-vtep-2

Site-2-Fabric1-BorderRR-primary

Site-2-Fabric1-BorderRR-secondary

Site-2-Fabric2-Access-vtep-1

Site-2-Fabric2-Access-vtep-2

Site-2-Fabric2-BorderRR-SA

Site-2-Shared-Border-vsx-primary

Site-2-Shared-Border-vsx-secondary

External DUT

```
hostname External-DUT
user admin group administrators password ciphertext
AQBapXi8KoSVO0t7Hg689KjC/oe5s5Pmld2AFpsLzI7SwAUYYgAAAH0tqVbSXafDC9Y1pVVQP1qpRKrZ4O
FtZbM0f5gP1hxfqhLsv7YVptsv/4l8ixZaegU6HXW7ECRUhzJtdHRyARs+ruxh6IcHCoaNgMCiAygBA97K
P3OSMtOzuvgEIFxDlyK5
```

```
no ip icmp redirect
profile leaf
route-redistribute active-routes-only
vrf Test_1
vrf Test_2
vrf Test_3
vrf Test_4
ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst
ntp enable
ntp vrf mgmt
cli-session
        timeout 0
!
!
!
!
!
!
aruba-central
        disable
ssh server vrf mgmt
vlan 1-2
vlan 701
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 702
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 703
        ip igmp snooping enable
                ipv6 mld snooping enable
vlan 704
ip igmp snooping enable
        ipv6 mld snooping enable
vlan 1101-1104,2101-2104
interface mgmt
        no shutdown
        ip dhcp
system interface-group 1 speed 10g
        !interface group 1 contains ports 1/1/1-1/1/4
system interface-group 2 speed 10g
        !interface group 2 contains ports 1/1/5-1/1/8
system interface-group 3 speed 10g
        !interface group 3 contains ports 1/1/9-1/1/12
system interface-group 5 speed 10g
        !interface group 5 contains ports 1/1/17-1/1/20
system interface-group 8 speed 10g
        !interface group 8 contains ports 1/1/29-1/1/32
system interface-group 12 speed 10g
        !interface group 12 contains ports 1/1/45-1/1/48
interface 1/1/1
        no shutdown
interface 1/1/3
                        description port_Site2-Shared-border-vsxpri
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1101-1104
interface 1/1/4
                description port_Site2-Shared-border-vsxsec
        no shutdown
        no routing
```

```
        vlan trunk native 1
        vlan trunk allowed 2101-2104
interface 1/1/45
                description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 701-704
interface loopback 101
        vrf attach Test_1
        ip address 18.0.101.1/32
        ipv6 address 18:0:101::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 102
        vrf attach Test_2
        ip address 18.0.102.1/32
        ipv6 address 18:0:102::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 103
        vrf attach Test_3
        ip address 18.0.103.1/32
        ipv6 address 18:0:103::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 104
        vrf attach Test_4
        ip address 18.0.104.1/32
        ipv6 address 18:0:104::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 701
        vrf attach Test_1
        ip address 18.11.1.1/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 18.11.1.1
        ipv6 address 18:11:1::1/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 18:11:1::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vlan 702
        vrf attach Test_2
        ip address 18.11.2.1/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 18.11.2.1
        ipv6 address 18:11:2::1/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 18:11:2::1
```

```
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vlan 703
        vrf attach Test_3
        ip address 18.11.3.1/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 18.11.3.1
        ipv6 address 18:11:3::1/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 18:11:3::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vlan 704
        vrf attach Test_4
        ip address 18.11.4.1/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 18.11.4.1
        ipv6 address 18:11:4::1/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 18:11:4::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vlan 1101
        vrf attach Test_1
        ip address 60.1.1.1/30
        ipv6 address 60:1:1::1/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 1102
        vrf attach Test_2
        ip address 60.1.2.1/30
        ipv6 address 60:1:2::1/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        interface vlan 1103
        vrf attach Test_3
        ip address 60.1.3.1/30
        ipv6 address 60:1:3::1/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 1104
        vrf attach Test_4
        ip address 60.1.4.1/30
        ipv6 address 60:1:4::1/124
```

```
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 2101
        vrf attach Test_1
        ip address 61.1.1.1/30
        ipv6 address 61:1:1::1/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 2102
        vrf attach Test_2
        ip address 61.1.2.1/30
        ipv6 address 61:1:2::1/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 2103
        vrf attach Test_3
        ip address 61.1.3.1/30
        ipv6 address 61:1:3::1/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 2104
        vrf attach Test_4
        ip address 61.1.4.1/30
        ipv6 address 61:1:4::1/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
!
router ospf 1 vrf Test_1
        router-id 20.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_2
        router-id 20.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_3
        router-id 20.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_4
        router-id 20.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_1
```

```
        router-id 20.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_2
router-id 20.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_3
        router-id 20.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_4
        router-id 20.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
        router ospfv3 1
        router-id 20.0.10.1
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router pim vrf Test_1
        enable
router pim vrf Test_2
        enable
router pim vrf Test_3
        enable
router pim vrf Test_4
        enable
router pim6 vrf Test_1
        enable
router pim6 vrf Test_2
        enable
router pim6 vrf Test_3
        enable
router pim6 vrf Test_4
        enable
https-server vrf mgmt
External-DUT#
External-DUT#
===========
Outputs:
==========
External-DUT#
External-DUT# show ip ospf neighbors all-vrfs
VRF : Test_1                            Process : 1
==================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
11.1.10.1        1         FULL/BDR          60.1.1.2           vlan1101
```

```
12.1.10.1         1          FULL/BDR          61.1.1.2           vlan2101
VRF : Test_2                              Process : 1
================================================


Total Number of Neighbors : 2
Neighbor ID       Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
11.2.10.1         1         FULL/BDR          60.1.2.2           vlan1102
12.2.10.1         1         FULL/BDR          61.1.2.2           vlan2102
VRF : Test_3                              Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID       Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
11.3.10.1         1         FULL/BDR          60.1.3.2           vlan1103
12.3.10.1         1         FULL/BDR          61.1.3.2           vlan2103
VRF : Test_4                              Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID       Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
11.4.10.1         1         FULL/BDR          60.1.4.2           vlan1104
12.4.10.1         1         FULL/BDR          61.1.4.2           vlan2104
External-DUT# show ipv6 ospfv3 neighbors all-vrfs
VRF : Test_1                              Process : 1
================================================

Total Number of Neighbors: 2

Neighbor ID       Priority  State             Interface
---------------------------------------------------------
11.1.10.1         1         FULL/BDR          vlan1101
Neighbor address fe80::b8d4:e784:4d40:8700
12.1.10.1         1         FULL/BDR          vlan2101
Neighbor address fe80::9020:c288:35be:3700
VRF : Test_2                              Process : 1
================================================

Total Number of Neighbors: 2

Neighbor ID       Priority  State             Interface
---------------------------------------------------------
11.2.10.1         1         FULL/BDR          vlan1102
Neighbor address fe80::b8d4:e784:4e40:8700
12.2.10.1         1         FULL/BDR          vlan2102
Neighbor address fe80::9020:c288:36be:3700
VRF : Test_3                              Process : 1
================================================

Total Number of Neighbors: 2

Neighbor ID       Priority  State             Interface
---------------------------------------------------------
11.3.10.1         1         FULL/BDR          vlan1103
Neighbor address fe80::b8d4:e784:4f40:8700
12.3.10.1         1         FULL/BDR          vlan2103
Neighbor address fe80::9020:c288:37be:3700
```

```
VRF : Test_4                            Process : 1
================================================

Total Number of Neighbors: 2

Neighbor ID      Priority  State             Interface
-------------------------------------------------------
11.4.10.1        1         FULL/BDR          vlan1104
Neighbor address fe80::b8d4:e784:5040:8700
12.4.10.1        1         FULL/BDR          vlan2104
Neighbor address fe80::9020:c288:38be:3700
External-DUT# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : Test_1                            Total number of neighbors : 2
--------------------------------------------------------------------------------
-
Interface  Neighbor   Uptime     Expires     DR       Hold Time  Secondary Address
          (IPV4)     (HH:MM:SS) (HH:MM:SS) Priority  (HH:MM:SS)     (IPV4)
--------- ----------  --------  ---------  ---------  --------  ------------------
vlan1101  60.1.1.2    15:07:54   00:01:25  16843019   00:01:45         Nil
vlan2101  61.1.1.2    15:07:54   00:01:27  16843019   00:01:45         Nil
--------------------------------------------------------------------------------
-
VRF : Test_2                            Total number of neighbors : 2
--------------------------------------------------------------------------------
-------------------------------------------------------------
vlan1102  60.1.2.2    17:53:52   00:01:29  16843019   00:01:45         Nil
vlan2102  61.1.2.2    18:01:49   00:01:31  16843019   00:01:45         Nil
--------------------------------------------------------------------------------
-
VRF : Test_3                            Total number of neighbors : 2
--------------------------------------------------------------------------------
-
vlan1103  60.1.3.2    13:10:23   00:01:27  16843019   00:01:45         Nil
vlan2103  61.1.3.2    13:10:09   00:01:39  16843019   00:01:45         Nil
--------------------------------------------------------------------------------
-
VRF : Test_4                            Total number of neighbors : 2
--------------------------------------------------------------------------------
-
vlan1104  60.1.4.2    17:53:52   00:01:26  16843019   00:01:45         Nil
vlan2104  61.1.4.2    18:01:49   00:01:33  16843019   00:01:45         Nil
--------------------------------------------------------------------------------
-
External-DUT# show ipv6 pim6 neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : Test_1                            Total number of neighbors : 2
--------------------------------------------------------------------------------
-
Interface  Neighbor   Uptime     Expires     DR       Hold Time  Secondary Address
          (IPV4)     (HH:MM:SS) (HH:MM:SS) Priority  (HH:MM:SS)     (IPV4)
--------- ----------  --------  ---------  ---------  --------  ------------------
vlan2101fe80::9020:c288:35be:3700  18:01:52 00:01:40  16843019   00:01:45       61:1:1::2
vlan1101fe80::b8d4:e784:4d40:870017:53:5700:01:30 16843019  00:01:45       60:1:1::2
--------------------------------------------------------------------------------
-
VRF : Test_2                            Total number of neighbors : 2
--------------------------------------------------------------------------------
-
vlan2102 fe80::9020:c288:36be:3700  18:01:5000:01:28  16843019   00:01:45       61:1:2::2
```

```
vlan1102 fe80::b8d4:e784:4e40:8700  17:53:5700:01:25  16843019   00:01:45       60:1:2::2
------------------------------------------------------------------------------
-
VRF : Test_3                              Total number of neighbors : 2
------------------------------------------------------------------------------
-
vlan2103 fe80::9020:c288:37be:3700  18:01:5300:01:44  16843019   00:01:45       61:1:3::2
vlan1103 fe80::b8d4:e784:4f40:8700  17:53:5700:01:35  16843019   00:01:45       60:1:3::2
------------------------------------------------------------------------------
-
VRF : Test_4                              Total number of neighbors : 2
------------------------------------------------------------------------------
-
vlan2104 fe80::9020:c288:38be:3700  18:01:5100:01:27  16843019   00:01:45       61:1:4::2
vlan1104 fe80::b8d4:e784:5040:8700  17:53:5700:01:24  16843019   00:01:45       60:1:4::2
------------------------------------------------------------------------------
-
External-DUT#  show ip mroute brief all-vrfs
------------------------------------------------------------------------------
-
VRF : Test_1                              Total number of entries : 1
------------------------------------------------------------------------------
-
Group Address    Source Address     Neighbor    Interface      Uptime     State
                                                             (HH:MM:SS)
---------------  ---------------    ---------   -----------    --------- ---------

230.1.1.1        11.11.1.100        60.1.1.2     vlan1101     02:38:15    route
------------------------------------------------------------------------------
-
VRF : Test_2                              Total number of entries : 622
------------------------------------------------------------------------------
-
225.2.1.1        18.11.2.100                       vlan702     03:16:21    route
225.2.2.2        18.11.2.100                       vlan702     03:16:21    route
225.2.3.3        18.11.2.100                       vlan702     03:16:21    route
225.2.4.4        18.11.2.100                       vlan702     03:16:12    route
225.2.5.5        18.11.2.100                       vlan702     03:16:12    route
225.2.6.6        18.11.2.100                       vlan702     03:16:12    route
225.2.7.7        18.11.2.100                       vlan702     03:16:21    route
225.2.8.8        18.11.2.100                       vlan702     03:16:12    route
225.2.9.9        18.11.2.100                       vlan702     03:16:12    route
225.2.10.10      18.11.2.100                       vlan702     03:16:12    route
225.2.11.11      18.11.2.100                       vlan702     03:16:12    route
225.2.12.12      18.11.2.100                       vlan702     03:16:12    route
225.2.13.13      18.11.2.100                       vlan702     03:16:21    route
225.2.14.14      18.11.2.100                       vlan702     03:16:12    route
225.2.15.15      18.11.2.100                       vlan702     03:16:21    route
225.2.16.16      18.11.2.100                       vlan702     03:16:12    route
225.2.17.17      18.11.2.100                       vlan702     03:16:21    route
225.2.18.18      18.11.2.100                       vlan702     03:16:12    route
225.2.19.19      18.11.2.100                       vlan702     03:16:12    route
225.2.20.20      18.11.2.100                       vlan702     03:16:12    route
225.2.21.21      18.11.2.100                       vlan702     03:16:21    route
225.2.22.22      18.11.2.100                       vlan702     03:16:12    route
225.2.23.23      18.11.2.100                       vlan702     03:16:12    route
225.2.24.24      18.11.2.100                       vlan702     03:16:12    route
225.2.25.25      18.11.2.100                       vlan702     03:16:12    route
225.2.26.26      18.11.2.100                       vlan702     03:16:12    route
225.2.27.27      18.11.2.100                       vlan702     03:16:21    route
225.2.28.28      18.11.2.100                       vlan702     03:16:12    route
225.2.29.29      18.11.2.100                       vlan702     03:16:12    route
```

```
225.2.30.30      18.11.2.100                      vlan702     03:16:12    route
225.2.31.31      18.11.2.100                      vlan702     03:16:21    route
225.2.32.32      18.11.2.100                      vlan702     03:16:12    route
225.2.33.33      18.11.2.100                      vlan702     03:16:12    route
External-DUT# show ip mroute  225.2.1.1 all-vrfs

IP Multicast Route Entries

VRF : Test_2
Total number of entries : 1

Group Address                 : 225.2.1.1
Source Address                : 18.11.2.100
Neighbor                      :
Incoming interface            : vlan702
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 0
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 03:16:27
Downstream Interface
Interface       State
-----------     ----------
vlan2102        forwarding

External-DUT# show ipv6 mroute brief all-vrfs

--------------------------------------------------------------------------------
-
VRF : Test_1                           Total number of entries : 6
--------------------------------------------------------------------------------
-Group Address  Source Address     Neighbor    Interface      Uptime     State
                                                                 (HH:MM:SS)
----------     ---------------    ---------   -----------    --------- ---------
ff03:1::1     11:11:1::100  fe80::b8d4:e784:4d40:8700 vlan1101    02:38:04   route
ff03:1::1     11:11:1::100  fe80::b8d4:e784:4d40:8700 vlan2101    02:38:32   bridge
ff03:6::1     11:11:1::100  fe80::b8d4:e784:4d40:8700 vlan1101    02:38:04   route
ff03:6::1     11:11:1::100  fe80::b8d4:e784:4d40:8700 vlan2101    02:38:32   bridge
ff03:b::1     11:11:1::100  fe80::b8d4:e784:4d40:8700 vlan2101    02:38:32   bridge
ff03:b::1     11:11:1::100  fe80::b8d4:e784:4d40:8700 vlan1101    02:38:04   route
--------------------------------------------------------------------------------
-
External-DUT# show ipv6  mroute ff03:1::1 all-vrfs

IP Multicast Route Entries

VRF : Test_1
Total number of entries : 2

Group Address                 : ff03:1::1
Source Address                : 11:11:1::100
Neighbor                      : fe80::b8d4:e784:4d40:8700
Incoming interface            : vlan1101
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 25
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 02:38:14
Downstream Interface
Interface       State
-----------     ----------
vlan701         forwarding
```

```
Group Address                 : ff03:1::1
Source Address                : 11:11:1::100
Neighbor                      : fe80::b8d4:e784:4d40:8700
Incoming interface            : vlan2101
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 25
Metric  Pref                  : 250
Uptime (HH:MM:SS)             : 02:38:42

External-DUT# show ip igmp all-vrfs
VRF Name   : Test_1
Interface  : vlan701
IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Querier
Querier IP [this switch]   : 18.11.1.1
Querier Uptime             : 5d 2h 40m
Querier Expiration Time    : 1m 3s
IGMP Snoop Enabled on VLAN : True

Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
230.1.1.1              2         3h 40m    3m 26s

VRF Name   : Test_2
Interface  : vlan702
IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Querier
Querier IP [this switch]   : 18.11.2.1
Querier Uptime             : 5d 2h 40m
Querier Expiration Time    : 1m 3s
IGMP Snoop Enabled on VLAN : True

Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
230.1.1.2              2         3h 40m    3m 23s

VRF Name   : Test_3
Interface  : vlan703
IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Querier
Querier IP [this switch]   : 18.11.3.1
Querier Uptime             : 5d 2h 40m
Querier Expiration Time    : 1m 3s
IGMP Snoop Enabled on VLAN : True
Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
230.1.1.3              2         3h 40m    3m 20s

VRF Name   : Test_4
Interface  : vlan704
IGMP Configured Version  : 3
IGMP Operating Version   : 3
Querier State              : Querier
Querier IP [this switch]   : 18.11.4.1
Querier Uptime             : 5d 2h 40m
Querier Expiration Time    : 1m 2s
IGMP Snoop Enabled on VLAN : True
```

```
Active Group Address   Vers Mode Uptime    Expires
---------------------- ---- ---- --------- ---------
230.1.1.4              2         3h 40m    3m 27s

External-DUT# show ipv6 mld all-vrfs
VRF Name   : Test_1
Interface  : vlan701
MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Querier
Querier IP [this switch]   : fe80::ec50:aa82:bda4:3060
Querier Uptime             : 5d 2h 40m
Querier Expiration Time    : 0m 58s
MLD Snoop Enabled on VLAN  : True

Active Group Address                          Vers Mode Uptime    Expires
--------------------------------------------- ---- ---- --------- ---------
ff03:1::1                                     1         3h 40m    3m 22s
ff03:6::1                                     1         3h 40m    3m 22s
ff03:b::1                                     1         3h 40m    3m 22s

VRF Name   : Test_2
Interface  : vlan702
MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Querier
Querier IP [this switch]   : fe80::ec50:aa82:bea4:3060
Querier Uptime             : 5d 2h 40m
Querier Expiration Time    : 0m 58s
MLD Snoop Enabled on VLAN  : True

Active Group Address                          Vers Mode Uptime    Expires
--------------------------------------------- ---- ---- --------- ---------
ff03:1::2                                     1         3h 40m    3m 13s
ff03:6::2                                     1         3h 40m    3m 13s
ff03:b::2                                     1         3h 40m    3m 13s

VRF Name   : Test_3
Interface  : vlan703
MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Querier
Querier IP [this switch]   : fe80::ec50:aa82:bfa4:3060
Querier Uptime             : 5d 2h 40m
Querier Expiration Time    : 0m 58s
MLD Snoop Enabled on VLAN  : True

Active Group Address                          Vers Mode Uptime    Expires
--------------------------------------------- ---- ---- --------- ---------
ff03:1::3                                     1         3h 40m    3m 21s
ff03:6::3                                     1         3h 40m    3m 21s
ff03:b::3                                     1         3h 40m    3m 21s

VRF Name   : Test_4
Interface  : vlan704
MLD Configured Version   : 2
MLD Operating Version    : 2
Querier State              : Querier
Querier IP [this switch]   : fe80::ec50:aa82:c0a4:3060
Querier Uptime             : 5d 2h 40m
Querier Expiration Time    : 0m 58s
```

```
MLD Snoop Enabled on VLAN  : True
Active Group Address                          Vers Mode Uptime    Expires
--------------------------------------------- ---- ---- --------- ---------
ff03:1::4                                     1         3h 40m    3m 14s
ff03:6::4                                     1         3h 40m    3m 14s
ff03:b::4                                     1         3h 40m    3m 14s

External-DUT#

External-DUT#  show ip pim rp-set all-vrfs

VRF: Test_1
Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.101.1       150        125          192
VRF: Test_2
Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.102.1       150        91           192
VRF: Test_3
Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.103.1       150        113          192
VRF: Test_4
Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.104.1       150        148          192
```

Site-1-BorderVtep-SA

```
Site1-BorderVtep-SA# show run
hostname Site1-BorderVtep-SA
user admin group administrators password ciphertext
AQBapdZw1l+e2CYsViT7oXr9o20lPdT49OjgrAPk+8KlEaF9YgAAAIf/YjHv0idNIbKjqf/QLYe0SfUrK2
e4/EbC+jYnrC9tI/0H1XCsm4a+FehfXlIvTKrV/zBQ3Buxo/1RVpoEh0qYSG0YIWxj2RLwW7GZvlB+nY9A
eHPd14CFf9208wqKK6qN
power consumption-average-period 600
no ip icmp redirect
profile leaf
route-redistribute active-routes-only
vrf Test_1
        rd 10.1.1.1:9001
        route-target export 9001:9001 evpn
        route-target import 9001:9001 evpn
vrf Test_2
        rd 10.1.1.1:9002
        route-target export 9002:9002 evpn
        route-target import 9002:9002 evpn
vrf Test_3
```

```
        rd 10.1.1.1:9003
        route-target export 9003:9003 evpn
        route-target import 9003:9003 evpn
vrf Test_4
        rd 10.1.1.1:9004
        route-target export 9004:9004 evpn
        route-target import 9004:9004 evpn
ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst
ntp enable
ntp vrf mgmt
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1-2,5-6
vlan 101
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 102
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 103
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 104
        ip igmp snooping enable
        ipv6 mld snooping enable
        virtual-mac 00:00:01:00:00:00
evpn
        arp-suppression
        redistribute local-mac
        redistribute local-svi
        dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
        vlan 101
                rd 10.0.1.1:101
                route-target export 101:101
                route-target import 101:101
                redistribute host-route
        vlan 102
                rd 10.0.1.1:102
                route-target export 102:102
                route-target import 102:102
                redistribute host-route
        vlan 103
                rd 10.0.1.1:103
                route-target export 103:103
                route-target import 103:103
                redistribute host-route
        vlan 104
                rd 10.0.1.1:104
                route-target export 104:104
                route-target import 104:104
                redistribute host-route
interface mgmt
        no shutdown
        ip dhcp
system interface-group 1 speed 10g
```

```
        !interface group 1 contains ports 1/1/1-1/1/4
system interface-group 2 speed 10g
        !interface group 2 contains ports 1/1/5-1/1/8
system interface-group 3 speed 10g
        !interface group 3 contains ports 1/1/9-1/1/12
system interface-group 5 speed 10g
        !interface group 5 contains ports 1/1/17-1/1/20
system interface-group 8 speed 10g
        !interface group 8 contains ports 1/1/29-1/1/32
system interface-group 12 speed 10g
        !interface group 12 contains ports 1/1/45-1/1/48
interface 1/1/3
                description port_Site2-Shared-border-vsxpri
        no shutdown
        ip address 50.1.1.1/30
interface 1/1/4
                description port_Site2-Shared-border-vsxsec
        no shutdown
        ip address 50.1.2.1/30
interface 1/1/46
                description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 101-104
interface 1/1/49
        no shutdown
        persona uplink
interface 1/1/50
        no shutdown
        persona uplink
interface 1/1/51
        no shutdown
        persona uplink
interface 1/1/52
        no shutdown
        persona uplink
interface 1/1/53
        no shutdown
        persona uplink
interface 1/1/54
        no shutdown
        persona uplink
interface loopback 0
        ip address 10.0.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 10.1.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 101
        vrf attach Test_1
        ip address 15.0.101.1/32
        ipv6 address 15:0:101::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 102
        vrf attach Test_2
        ip address 15.0.102.1/32
        ipv6 address 15:0:102::1/128
        ip ospf 1 area 0.0.0.0
```

```
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 103
        vrf attach Test_3
        ip address 15.0.103.1/32
        ipv6 address 15:0:103::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 104
        vrf attach Test_4
        ip address 15.0.104.1/32
        ipv6 address 15:0:104::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 101
        vrf attach Test_1
        ip address 11.11.1.1/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 11.11.1.1
        ipv6 address 11:11:1::1/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 11:11:1::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vlan 102
        vrf attach Test_2
        ip address 11.11.2.1/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 11.11.2.1
        ipv6 address 11:11:2::1/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 11:11:2::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vlan 103
        vrf attach Test_3
        ip address 11.11.3.1/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 11.11.3.1
        ipv6 address 11:11:3::1/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 11:11:3::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vlan 104
```

```
        vrf attach Test_4
        ip address 11.11.4.1/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 11.11.4.1
        ipv6 address 11:11:4::1/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 11:11:4::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vxlan 1
        source ip 10.1.1.1
        no shutdown
        vni 9001
                vrf Test_1
                routing
        vni 9002
                vrf Test_2
                routing
        vni 9003
                vrf Test_3
                routing
        vni 9004
                vrf Test_4
                routing
!
!
!
!
!
router ospf 1 vrf Test_1
        router-id 10.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_2
        router-id 10.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_3
        router-id 10.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_4
        router-id 10.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1
        router-id 10.0.10.1
        distance 250
        redistribute bgp
        redistribute connected
```

```
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_1
        router-id 10.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_2
        router-id 10.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_3
        router-id 10.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_4
        router-id 10.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1
        router-id 10.0.10.1
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65000
        bgp router-id 10.0.1.1
        neighbor 10.10.1.1 remote-as 65010
        neighbor 10.10.1.1 ebgp-multihop 5
        neighbor 10.10.1.1 update-source loopback 0
        neighbor 11.0.1.1 remote-as 65001
        neighbor 11.0.1.1 ebgp-multihop 5
        neighbor 11.0.1.1 update-source loopback 0
        neighbor 11.0.1.2 remote-as 65001
        neighbor 11.0.1.2 ebgp-multihop 5
        neighbor 11.0.1.2 update-source loopback 0
        neighbor 50.1.1.2 remote-as 65001
        neighbor 50.1.1.2 ebgp-multihop 5
        neighbor 50.1.2.2 remote-as 65001
        neighbor 50.1.2.2 ebgp-multihop 5
        address-family ipv4 unicast
                neighbor 50.1.1.2 activate
                neighbor 50.1.2.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 10.10.1.1 send-community extended
                neighbor 10.10.1.1 activate
                neighbor 11.0.1.1 send-community extended
                neighbor 11.0.1.1 activate
                neighbor 11.0.1.2 send-community extended
                neighbor 11.0.1.2 activate
        exit-address-family
```

```
!
        vrf Test_1
          address-family ipv4 unicast
                redistribute connected
                redistribute local loopback
          exit-address-family
          address-family ipv6 unicast
                redistribute connected
                redistribute local loopback
          exit-address-family
!
        vrf Test_2
          address-family ipv4 unicast
                redistribute connected
                redistribute local loopback
          exit-address-family
          address-family ipv6 unicast
                redistribute connected
                redistribute local loopback
          exit-address-family
!
        vrf Test_3
          address-family ipv4 unicast
                redistribute connected
                redistribute local loopback
          exit-address-family
          address-family ipv6 unicast
                redistribute connected
                redistribute local loopback
          exit-address-family
!
        vrf Test_4
          address-family ipv4 unicast
                redistribute connected
                redistribute local loopback
          exit-address-family
          address-family ipv6 unicast
                redistribute connected
                redistribute local loopback
          exit-address-family
!
router pim vrf Test_1
        enable
router pim vrf Test_2
        enable
router pim vrf Test_3
        enable
router pim vrf Test_4
        enable
router pim6 vrf Test_1
        enable
router pim6 vrf Test_2
        enable
router pim6 vrf Test_3
        enable
router pim6 vrf Test_4
        enable
https-server vrf mgmt
===========
Outputs:
==========
Site1-BorderVtep-SA#
```

```
Site1-BorderVtep-SA# show ip pim all-vrfs

PIM Global Parameters
VRF                              :  Test_1
PIM Status                       :  Enabled
PIM SSM Status                   :  Disabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
PIM BIDI NSF Status              :  Inactive
Shared Border Status             :  Disabled
Multicast Fabric Identifier      :  65000
VRF                              :  Test_2
PIM Status                       :  Enabled
PIM SSM Status                   :  Disabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
PIM BIDI NSF Status              :  Inactive
Shared Border Status             :  Disabled
Multicast Fabric Identifier      :  65000


VRF                              :  Test_3
PIM Status                       :  Enabled
PIM SSM Status                   :  Disabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
PIM BIDI NSF Status              :  Inactive
Shared Border Status             :  Disabled
Multicast Fabric Identifier      :  65000


VRF                              :  Test_4
PIM Status                       :  Enabled
PIM SSM Status                   :  Disabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
PIM BIDI NSF Status              :  Inactive
Shared Border Status             :  Disabled
Multicast Fabric Identifier      :  65000


PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
Site1-BorderVtep-SA# show ip pim neighbor all-vrfs

PIM Neighbor


VRF                       : Test_1
Total number of neighbors : 2
```

```
IP Address                : 10.10.10.1
Interface                 : vni9001
VTEP IP                   : 10.10.10.1
Up Time (HH:MM:SS)        : 20:12:45
Expire Time (HH:MM:SS)    : 00:03:06
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:03:30


IP Address                : 11.1.1.1
Interface                 : vni9001
VTEP IP                   : 11.1.1.1
Up Time (HH:MM:SS)        : 14:57:59
Expire Time (HH:MM:SS)    : 00:03:27
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:03:30


VRF                       : Test_2
Total number of neighbors : 2
IP Address                : 10.10.10.1
Interface                 : vni9002
VTEP IP                   : 10.10.10.1
Up Time (HH:MM:SS)        : 20:12:45
Expire Time (HH:MM:SS)    : 00:03:22
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:03:30
IP Address                : 11.1.1.1
Interface                 : vni9002
VTEP IP                   : 11.1.1.1
Up Time (HH:MM:SS)        : 17:47:44
Expire Time (HH:MM:SS)    : 00:03:06
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:03:30


VRF                       : Test_3
Total number of neighbors : 2
IP Address                : 10.10.10.1
Interface                 : vni9003
VTEP IP                   : 10.10.10.1
Up Time (HH:MM:SS)        : 20:12:53
Expire Time (HH:MM:SS)    : 00:03:10
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:03:30
IP Address                : 11.1.1.1
Interface                 : vni9003
VTEP IP                   : 11.1.1.1
Up Time (HH:MM:SS)        : 13:00:27
Expire Time (HH:MM:SS)    : 00:03:02
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:03:30


VRF                       : Test_4
Total number of neighbors : 2
IP Address                : 10.10.10.1
Interface                 : vni9004
VTEP IP                   : 10.10.10.1
Up Time (HH:MM:SS)        : 20:13:00
```

```
Expire Time (HH:MM:SS)    : 00:03:20
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:03:30


IP Address                : 11.1.1.1
Interface                 : vni9004
VTEP IP                   : 11.1.1.1
Up Time (HH:MM:SS)        : 17:47:45
Expire Time (HH:MM:SS)    : 00:03:07
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:03:30
Site1-BorderVtep-SA# show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : Test_1                          Total number of neighbors : 2
--------------------------------------------------------------------------------
-
Interface  Neighbor   Uptime     Expires     DR      Hold Time    Secondary
Address
          (IPV4)     (HH:MM:SS) (HH:MM:SS)  Priority (HH:MM:SS)    (IPV4)
---------  ---------  ---------  ---------  -------  ------------  -------
vni9001    10.10.10.1 20:12:51   00:03:00   1         00:03:30
vni9001    11.1.1.1   14:58:05   00:03:21   1         00:03:30
--------------------------------------------------------------------------------
-
VRF : Test_2                          Total number of neighbors : 2

--------------------------------------------------------------------------------
-
vni9002    10.10.10.1 20:12:51   00:03:16   1         00:03:30
vni9002    11.1.1.1   17:47:50   00:03:27   1         00:03:30
--------------------------------------------------------------------------------
-
VRF : Test_3                          Total number of neighbors : 2

--------------------------------------------------------------------------------
-
vni9003    10.10.10.1 20:12:59   00:03:04   1         00:03:30
vni9003    11.1.1.1   13:00:32   00:03:27   1         00:03:30
--------------------------------------------------------------------------------
-
VRF : Test_4                          Total number of neighbors : 2

--------------------------------------------------------------------------------
-
vni9004    10.10.10.1 20:13:05   00:03:15  1          00:03:30
vni9004    11.1.1.1   17:47:50   00:03:02  1          00:03:30
--------------------------------------------------------------------------------
-
Site1-BorderVtep-SA# show ipv6 pim6 neighbor brief all-vrfs

--------------------------------------------------------------------------------
-
VRF : Test_1                          Total number of neighbors :

--------------------------------------------------------------------------------
-
Interface Neighbor   Uptime     Expires    DR        Hold Time    Secondary
Address
         (IPV6)      (HH:MM:SS)  (HH:MM:SS) Priority (HH:MM:SS)    (IPV6)
-------  ----------  -----------   --------- -----  -----------   ---------
```

```
vni9001  fe80::10:10:10:1 20:12:58 00:03:29  1       00:03:30
vni9001  fe80::11:1:1:1   17:48:03 00:03:13  1       00:03:30
------------------------------------------------------------------------------
-
VRF : Test_2                          Total number of neighbors : 2

------------------------------------------------------------------------------
-
vni9002  fe80::10:10:10:1 20:12:56 00:03:10 1       00:03:30
vni9002  fe80::11:1:1:1   17:47:57 00:03:29 1       00:03:30
------------------------------------------------------------------------------
-
------------------------------------------------------------------------------
-
VRF : Test_3                          Total number of neighbors : 2

------------------------------------------------------------------------------
-
vni9003  fe80::10:10:10:1  20:12:56 00:03:09 1      00:03:30
vni9003  fe80::11:1:1:1   17:48:01  00:03:14 1      00:03:30
------------------------------------------------------------------------------
-
VRF : Test_4                          Total number of neighbors : 2

------------------------------------------------------------------------------
-
vni9004  fe80::10:10:10:1 20:13:09 00:03:06 1       00:03:30
vni9004  fe80::11:1:1:1   17:47:58 00:03:20 1       00:03:30
------------------------------------------------------------------------------
-
Site2-Shared-border-vsxpri# show ip mroute 225.15.1.1 all-vrfs detail

IP Multicast Route Entries

VRF : Test_1

Group Address                 : 225.15.1.1
Source Address                : 11.11.1.100
Neighbor                      : 10.1.1.1
Incoming interface            : vni9001
Intra-Inter Forwarded VTEP(s) : 14.1.1.1, 25.1.1.1
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:00:15
Downstream Interface
Interface       State
-----------     ----------
vlan1001        forwarding
Site2-Shared-border-vsxpri# show ipv6 mroute ff25:15:1::1 all-vrfs detail

IP Multicast Route Entries

VRF : Test_1

Group Address                 : ff25:15:1::1
Source Address                : 11:11:1::100
Neighbor                      : fe80::10:1:1:1
Incoming interface            : vni9001
Intra-Inter Forwarded VTEP(s) : 14.1.1.1, 25.1.1.1
Multicast Routing Protocol    : PIM-SM
```

```
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:00:27
Downstream Interface
Interface       State
-----------     ----------
vlan1001        forwarding

Site1-BorderVtep-SA# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65000        BGP Router Identifier  : 10.0.1.1
Peers                  : 5            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor                                Remote-AS   MsgRcvd MsgSent Up/Down Time
State         AdminStatus
50.1.1.2                                65001       8668    8683    05h:04m:08s
Established   Up
50.1.2.2                                65001       8624    8643    05h:04m:03s
Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
Neighbor                                Remote-AS   MsgRcvd MsgSent Up/Down Time
State         AdminStatus
10.10.1.1                               65010       24931   30656   22h:49m:23s
Established   Up
11.0.1.1                                65001       25080   26214   05h:04m:23s
Established   Up
11.0.1.2                                65001       23472   27631   05h:04m:19s
Established   Up

Codes: * Dynamic Neighbor
VRF : Test_1
BGP Summary
-----------
Local AS               : 65000        BGP Router Identifier  : 15.0.101.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : Test_2
BGP Summary
-----------
Local AS               : 65000        BGP Router Identifier  : 15.0.102.1
```

```
Peers                  : 0           Log Neighbor Changes   : No
Cfg. Hold Time         : 180         Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : Test_3
BGP Summary
-----------
Local AS               : 65000       BGP Router Identifier  : 15.0.103.1
Peers                  : 0           Log Neighbor Changes   : No
Cfg. Hold Time         : 180         Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : Test_4
BGP Summary
-----------
Local AS               : 65000       BGP Router Identifier  : 15.0.104.1
Peers                  : 0           Log Neighbor Changes   : No
Cfg. Hold Time         : 180         Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Site1-BorderVtep-SA# show interface vxlan vteps
Source     Destination   Origin    Status         VNI   Routing   VLAN     VRF
------     -----------   ------    --------       ----  -------   -----    ------
10.1.1.1   10.10.10.1     evpn   operational      9001  enabled    --     Test_1
10.1.1.1   10.10.10.1     evpn   operational      9002  enabled    --     Test_2
10.1.1.1   10.10.10.1     evpn   operational      9003  enabled    --     Test_3
10.1.1.1   10.10.10.1     evpn   operational      9004  enabled    --     Test_4
10.1.1.1   11.1.1.1       evpn   operational      9001  enabled    --     Test_1
10.1.1.1   11.1.1.1       evpn   operational      9002  enabled    --     Test_2
10.1.1.1   11.1.1.1       evpn   operational      9003  enabled    --     Test_3
10.1.1.1   11.1.1.1       evpn   operational      9004  enabled    --     Test_4
Site1-BorderVtep-SA#
```

Site-2-fabric1-Access-vtep-1

```
Site2-fabric1-Access-vtep-1# show run
hostname Site2-fabric1-Access-vtep-1
power consumption-average-period 600
profile leaf
route-redistribute active-routes-only
vrf Test_1
```

```
        rd 13.1.1.1:9001
        route-target export 9001:9001 evpn
        route-target import 9001:9001 evpn
vrf Test_2
        rd 13.1.1.1:9002
        route-target export 9002:9002 evpn
        route-target import 9002:9002 evpn
vrf Test_3
        rd 13.1.1.1:9003
        route-target export 9003:9003 evpn
        route-target import 9003:9003 evpn
vrf Test_4
        rd 13.1.1.1:9004
        route-target export 9004:9004 evpn
        route-target import 9004:9004 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
debug pim all
vlan 1
vlan 301
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 302
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 303
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 304
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 401
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 402
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 403
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 404
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 501
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 502
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 503
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 504
        ip igmp snooping enable
        ipv6 mld snooping enable
```

```
vlan 1345
        description I_G
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 1346
        ip igmp snooping enable
        ipv6 mld snooping enable
        virtual-mac 00:00:03:00:00:00
evpn
        arp-suppression
        redistribute local-mac
        redistribute local-svi
vlan 301
        rd 13.1.1.1:301
        route-target export 301:301
        route-target import 301:301
        redistribute host-route
vlan 302
        rd 13.1.1.1:302
        route-target export 302:302
        route-target import 302:302
        redistribute host-route
vlan 303
        rd 13.1.1.1:303
        route-target export 303:303
        route-target import 303:303
        redistribute host-route
vlan 304
        rd 13.1.1.1:304
        route-target export 304:304
        route-target import 304:304
        redistribute host-route
vlan 401
        rd 13.1.1.1:401
        route-target export 301:401
        route-target import 301:401
        redistribute host-route
vlan 402
        rd 13.1.1.1:402
        route-target export 302:402
        route-target import 302:402
        redistribute host-route
vlan 403
        rd 13.1.1.1:403
        route-target export 303:403
        route-target import 303:403
        redistribute host-route
vlan 404
        rd 13.1.1.1:404
        route-target export 304:404
        route-target import 304:404
        redistribute host-route
vlan 1345
        rd 13.1.1.1:1345
        route-target export 308:1345
        route-target import 308:1345
        redistribute host-route
vlan 1346
        rd 13.1.1.1:1346
        route-target export 308:1346
        route-target import 308:1346
        redistribute host-route
```

```
interface mgmt
    no shutdown
    ip dhcp
system interface-group 1 speed 10g
        !interface group 1 contains ports 1/1/1-1/1/12
system interface-group 2 speed 10g
        !interface group 2 contains ports 1/1/13-1/1/24
system interface-group 3 speed 10g
        !interface group 3 contains ports 1/1/25-1/1/36
system interface-group 4 speed 10g
        !interface group 4 contains ports 1/1/37-1/1/48
interface 1/1/16
            description port_Site2-fabric1-BorderRR-secondary
        no shutdown
        ip address 70.2.1.2/30
        ip ospf 1 area 0.0.0.0
interface 1/1/23
            description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 301-304,401-404,501-504,1345-1346
interface 1/1/35
            description port_Site2-fabric1-BorderRR-primary
        no shutdown
        ip address 70.1.1.2/30
        ip ospf 1 area 0.0.0.0
interface loopback 0
        ip address 13.0.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 13.1.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 101
        vrf attach Test_1
        ip address 19.0.101.1/32
        ipv6 address 19:0:101::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 102
        vrf attach Test_2
        ip address 19.0.102.1/32
        ipv6 address 19:0:102::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 103
        vrf attach Test_3
        ip address 19.0.103.1/32
        ipv6 address 19:0:103::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 104
        vrf attach Test_4
        ip address 19.0.104.1/32
        ipv6 address 19:0:104::1/128
        ip ospf 1 area 0.0.0.0
```

```
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 301
        vrf attach Test_1
        ip address 15.11.1.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.11.1.1
        ipv6 address 15:11:1::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:11:1::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 302
        vrf attach Test_2
        ip address 15.11.2.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.11.2.1
        ipv6 address 15:11:2::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:11:2::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 303
        vrf attach Test_3
        ip address 15.11.3.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.11.3.1
        ipv6 address 15:11:3::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:11:3::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 304
        vrf attach Test_4
        ip address 15.11.4.1/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.11.4.1
        ipv6 address 15:11:4::1/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:11:4::1
        ip igmp enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 401
        vrf attach Test_1
        ip address 15.12.1.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.12.1.1
        ipv6 address 15:12:1::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:12:1::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
```

```
interface vlan 402
        vrf attach Test_2
        ip address 15.12.2.2/24
        active-gateway ip mac 00:00:10:00:10:01
active-gateway ip 15.12.2.1
        ipv6 address 15:12:2::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:12:2::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 403
        vrf attach Test_3
        ip address 15.12.3.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.12.3.1
        ipv6 address 15:12:3::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:12:3::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 404
        vrf attach Test_4
        ip address 15.12.4.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.12.4.1
        ipv6 address 15:12:4::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:12:4::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 501
        vrf attach Test_1
        ip address 25.12.1.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 25.12.1.1
        ipv6 address 25:12:1::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 25:12:1::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 502
        vrf attach Test_2
        ip address 25.12.2.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 25.12.2.1
        ipv6 address 25:12:2::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 25:12:2::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 503
        vrf attach Test_3
```

```
        ip address 25.12.3.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 25.12.3.1
        ipv6 address 25:12:3::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 25:12:3::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 504
        vrf attach Test_4
        ip address 25.12.4.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 25.12.4.1
        ipv6 address 25:12:4::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 25:12:4::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 1345
        vrf attach Test_1
        ip address 51.10.1.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 51.10.1.1
        ipv6 address 51:10:1::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 51:10:1::1
        ip igmp enable
        no ip igmp querier
        ipv6 mld enable
interface vlan 1346
        vrf attach Test_1
        ip address 56.10.1.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 56.10.1.1
        ipv6 address 56:10:1::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 56:10:1::1
        ip igmp enable
        ipv6 mld enable
        no ipv6 mld querier
        ip pim-sparse enable
interface vxlan 1
        source ip 13.1.1.1
        no shutdown
        vni 9001
                vrf Test_1
                routing
        vni 9002
                vrf Test_2
                routing
        vni 9003
                vrf Test_3
                routing
        vni 9004
                vrf Test_4
                routing
        vni 150111
                vlan 401
```

```
        vni 150112
                vlan 402
        vni 150113
                vlan 403
        vni 150114
                vlan 404
        vni 150121
                vlan 301
        vni 150122
                vlan 302
        vni 150123
                vlan 303
        vni 150124
                vlan 304
        vni 170128
                vlan 1345
        vni 170129
                vlan 1346
mirror session 1
        destination cpu
        source interface 1/1/35 rx
        enable
  !
!
!
!
!
router ospf 1 vrf Test_1
        router-id 13.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_2
        router-id 13.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_3
        router-id 13.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_4
        router-id 13.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1
        router-id 13.0.10.1
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_1
        router-id 13.1.10.1
        distance 250
        redistribute connected
```

```
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_2
        router-id 13.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_3
        router-id 13.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_4
        router-id 13.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1
        router-id 13.0.10.1
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65002
        bgp router-id 13.0.1.1
        neighbor 12.0.1.1 remote-as 65002
        neighbor 12.0.1.1 update-source loopback 0
        neighbor 12.0.2.1 remote-as 65002
        neighbor 12.0.2.1 update-source loopback 0
        neighbor 70.1.1.1 remote-as 65002
        neighbor 70.2.1.1 remote-as 65002
        address-family ipv4 unicast
                neighbor 70.1.1.1 activate
                neighbor 70.2.1.1 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 12.0.1.1 send-community extended
                neighbor 12.0.1.1 activate
                neighbor 12.0.2.1 send-community extended
                neighbor 12.0.2.1 activate
        exit-address-family
!
vrf Test_1
        address-family ipv4 unicast
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family ipv6 unicast
                redistribute connected
                redistribute local loopback
        exit-address-family
!
vrf Test_2
        address-family ipv4 unicast
                redistribute connected
                redistribute local loopback
```

```
        exit-address-family
        address-family ipv6 unicast
                redistribute connected
                redistribute local loopback
        exit-address-family
!
vrf Test_3
        address-family ipv4 unicast
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family ipv6 unicast
                redistribute connected
                redistribute local loopback
        exit-address-family
!
vrf Test_4
        address-family ipv4 unicast
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family ipv6 unicast
                redistribute connected
                redistribute local loopback
        exit-address-family
!
router pim vrf Test_1
        enable
router pim vrf Test_2
        enable
router pim vrf Test_3
        enable
router pim vrf Test_4
        enable
router pim6 vrf Test_1
        enable
router pim6 vrf Test_2
        enable
router pim6 vrf Test_3
        enable
router pim6 vrf Test_4
        enable
https-server vrf mgmt
===========
Outputs:
==========
Site2-fabric1-Access-vtep-1#        show lldp neighbor-info
LLDP Neighbor Information
=========================
Total Neighbor Entries          : 2
Total Neighbor Entries Deleted  : 0
Total Neighbor Entries Dropped  : 0
Total Neighbor Entries Aged-Out : 0

LOCAL-PORT  CHASSIS-ID   PORT-ID  PORT-DESC  TTL    SYS-NAME
--------------------------------------------------------------------------------
-
1/1/16 00:fd:45:67:0f:c0  1/1/4    1/1/4     120   Site2-fabric1-BorderRR-
secondary
1/1/35 38:10:f0:86:3b:80  1/1/29   1/1/29    120   Site2-fabric1-BorderRR-primary
Site2-fabric1-Access-vtep-1# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
```

```
==================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
12.0.2.1         1         FULL/BDR          70.2.1.1           1/1/16

12.0.1.1         1         FULL/BDR          70.1.1.1           1/1/35

Site2-fabric1-Access-vtep-1# show ipv6 ospfv3 neighbors all-vrfs
No OSPFv3 neighbor found on any vrf.
Site2-fabric1-Access-vtep-1#   show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : Test_1                           Total number of neighbors : 4

-------------------------------------------------------------------------------
-
Interface Neighbor Uptime  Expires       DR       Hold Time       Secondary
Address
          (IPV4)   (HH:MM:SS) (HH:MM:SS) Priority  (HH:MM:SS)           (IPV4)
-------  -------  --------  --------  ----------  ----------      ---------------
vni9001  11.1.1.1 15:12:51 00:03:06       1        00:03:30
vni9001  14.1.1.1 5 days   00:03:16       1        00:03:30
vlan301  15.11.1.3 5 days  00:01:29       16843022 00:01:45               Nil
vlan401  15.12.1.3 5 days  00:01:34       16843022 00:01:45               Nil
-------------------------------------------------------------------------------
-
VRF : Test_2                           Total number of neighbors : 4

-------------------------------------------------------------------------------
-
vni9002  11.1.1.1 18:06:06 00:03:15      1         00:03:30
vni9002  14.1.1.1 5 days   00:03:04      1         00:03:30
vlan302  15.11.2.3 5 days  00:01:30      16843022  00:01:45               Nil
vlan402  15.12.2.3 5 days  00:01:30      16843022  00:01:45               Nil
-------------------------------------------------------------------------------
-
VRF : Test_3                           Total number of neighbors : 4

-------------------------------------------------------------------------------
-
vni9003 11.1.1.1 13:15:17 00:03:12       1         00:03:30
vni9003  14.1.1.1 5 days 02:29:29   00:03:20 1        00:03:30
vlan303  15.11.3.3 5 days 02:29:07  00:01:32 16843022 00:01:45            Nil
vlan403  15.12.3.3 5 days 02:29:08  00:01:29 16843022 00:01:45            Nil
-------------------------------------------------------------------------------
-
VRF : Test_4                           Total number of neighbors : 4

-------------------------------------------------------------------------------
-
vni9004  11.1.1.1     18:06:09 00:03:17       1       00:03:30
vni9004  14.1.1.1 5 days 02:29:29 00:03:04    1       00:03:30
vlan304  15.11.4.1 1 days 00:12:07 00:01:20  16843022 00:01:45            Nil
vlan404  15.12.4.3 5 days 02:29:06 00:01:29  16843022 00:01:45            Nil
-------------------------------------------------------------------------------
-
Site2-fabric1-Access-vtep-1# show ip pim all-vrfs

PIM Global Parameters
```

```
VRF                                 :  Test_1
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Disabled
Multicast Fabric Identifier         :  65002

VRF                                 :  Test_2
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Disabled
Multicast Fabric Identifier         :  65002

VRF                                 :  Test_3
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Disabled
Multicast Fabric Identifier         :  65002

VRF                                 :  Test_4
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Disabled
Multicast Fabric Identifier         :  65002

PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
Site2-fabric1-Access-vtep-1#  show ipv6 pim6 all-vrfs
PIM Global Parameters
VRF                                 :  Test_1
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
```

```
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65002

VRF                               :  Test_2
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65002

VRF                               :  Test_3
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65002

VRF                               :  Test_4
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65002

PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
Site2-fabric1-Access-vtep-1# show ipv6 pim6 neighbor brief all-vrfs

------------------------------------------------------------------------------
-
VRF : Test_1                            Total number of neighbors : 4
------------------------------------------------------------------------------
-
Interface  Neighbor  Uptime    Expires   DR         Hold Time     Secondary
Address
           (IPV6)   (HH:MM:SS) (HH:MM:SS) Priority  (HH:MM:SS)        (IPV6)
-------  ---------  --------   --------  ---------  -----------     ---------------
-
vni9001 fe80::11:1:1:1 18:07:03 00:03:06  1        00:03:30
vni9001 fe80::14:1:1:1 5 days 02:30:25 00:03:06 1   00:03:30
vlan301 fe80::9020:c281:2d1f:ef40 5 days  00:01:41 16843022 00:01:45   15:11:1::3
vlan401 fe80::9020:c281:911f:ef40 5 days 00:01:40  16843022 00:01:45   15:12:1::3
------------------------------------------------------------------------------
-
VRF : Test_2                            Total number of neighbors : 4
```

```
--------------------------------------------------------------------------------
-
vni9002 fe80::11:1:1:1 18:07:27 00:03:16  1 00:03:30
vni9002 fe80::14:1:1:1 5 days   00:03:15  1 00:03:30
vlan302 fe80::9020:c281:2e1f:ef40 5 days 00:01:40 16843022 00:01:45  15:11:2::3
vlan402 fe80::9020:c281:921f:ef40 5 days 00:01:37 16843022 00:01:45  15:12:2::3
--------------------------------------------------------------------------------
-
VRF : Test_3                          Total number of neighbors : 4

--------------------------------------------------------------------------------
-
vni9003 fe80::11:1:1:1 18:07:01 00:03:11  1 00:03:30
vni9003 fe80::14:1:1:1 5 days   00:03:11  1 00:03:30
vlan303 fe80::9020:c281:2f1f:ef40 5 days 00:01:35 16843022  00:01:45   15:11:3::3
vlan403 fe80::9020:c281:931f:ef40 5 days 00:01:38 16843022  00:01:45   15:12:3::3
--------------------------------------------------------------------------------
-
VRF : Test_4                          Total number of neighbors : 4

--------------------------------------------------------------------------------
-
vni9004 fe80::11:1:1:1 18:07:28 00:03:23  1 00:03:30
vni9004 fe80::14:1:1:1 5 days 00:03:10    1 00:03:30
vlan304 fe80::9020:c281:301f:ef40 1 day  00:01:28   16843022  00:01:45 15:11:4::1
vlan404      fe80::9020:c281:941f:ef40                    5 days 02:30:28
00:01:38              16843022    00:01:45              15:12:4::3
--------------------------------------------------------------------------------
-
Site2-fabric1-Access-vtep-1#   show ip pim rp-set all-vrfs

VRF: Test_1
Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.101.1       150        117          192

VRF: Test_2
Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.102.1       150        143          192

VRF: Test_3
Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.103.1       150        105          192

VRF: Test_4
Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.104.1       150        140          192
```

```
Site2-fabric1-Access-vtep-1# show ip mroute 225.15.1.1 all-vrfs detail

IP Multicast Route Entries

VRF : Test_1
Total number of entries : 3

Group Address                 : 225.15.1.1
Source Address                : 11.11.1.100
Neighbor                      :
Incoming interface            : vlan401
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 03:45:26

Group Address                 : 225.15.1.1
Source Address                : 11.11.1.100
Neighbor                      :
Incoming interface            : vlan301
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 03:45:26

Group Address                 : 225.15.1.1
Source Address                : 11.11.1.100
Neighbor                      :
Incoming interface            : vni9001
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 00:34:45

Site2-fabric1-Access-vtep-1# show ipv6 mroute ff25:15:1::1 all-vrfs detail

IP Multicast Route Entries

VRF : Test_1
Total number of entries : 3
Group Address                 : ff25:15:1::1
Source Address                : 11:11:1::100
Neighbor                      :
Incoming interface            : vlan301
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 03:25:07

Group Address                 : ff25:15:1::1
Source Address                : 11:11:1::100
Neighbor                      :
Incoming interface            : vlan401
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
```

```
Uptime (HH:MM:SS)             : 03:25:07

Group Address                 : ff25:15:1::1
Source Address                : 11:11:1::100
Neighbor                      :
Incoming interface            : vni9001
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 00:07:03

Site2-fabric1-Access-vtep-1#

Site2-fabric2-Access-vtep-1# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65003        BGP Router Identifier  : 23.0.1.1
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor                                Remote-AS   MsgRcvd MsgSent Up/Down Time
State         AdminStatus
91.1.1.1                                65003       493     441     06h:19m:33s
Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
Neighbor                                Remote-AS   MsgRcvd MsgSent Up/Down Time
State         AdminStatus
19.0.1.1                                65003       3056    1411    06h:19m:18s
Established   Up
Codes: * Dynamic Neighbor
VRF : Test_1
BGP Summary
-----------
Local AS               : 65003        BGP Router Identifier  : 20.0.101.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------
Codes: * Dynamic Neighbor
VRF : Test_2
BGP Summary
-----------
Local AS               : 65003        BGP Router Identifier  : 20.0.102.1
Peers                  : 0            Log Neighbor Changes   : No
```

```
Cfg. Hold Time          : 180          Cfg. Keep Alive        : 60
Confederation Id        : 0

Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------
Codes: * Dynamic Neighbor
VRF : Test_3
BGP Summary
-----------
Local AS                : 65003        BGP Router Identifier  : 20.0.103.1
Peers                   : 0            Log Neighbor Changes   : No
Cfg. Hold Time          : 180          Cfg. Keep Alive        : 60
Confederation Id        : 0
Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------
Codes: * Dynamic Neighbor
VRF : Test_4
BGP Summary
-----------
Local AS                : 65003        BGP Router Identifier  : 20.0.104.1
Peers                   : 0            Log Neighbor Changes   : No
Cfg. Hold Time          : 180          Cfg. Keep Alive        : 60
Confederation Id        : 0

Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------

Site2-fabric2-Access-vtep-1# show interface vxlan vteps
Source     Destination    Origin     Status       VNI    Routing   VLAN    VRF
-------    ------------  -------   ------------   ---    --------  -----  -----
23.1.1.1    11.1.1.1      evpn     operational    9001    enabled   --    Test_1
23.1.1.1    11.1.1.1      evpn     operational    9002    enabled   --    Test_2
23.1.1.1    11.1.1.1      evpn     operational    9003    enabled   --    Test_3
23.1.1.1    11.1.1.1      evpn     operational    9004    enabled   --    Test_4
23.1.1.1    25.1.1.1      evpn     operational    9001    enabled   --    Test_1
23.1.1.1    25.1.1.1      evpn     operational    9002    enabled   --    Test_2
23.1.1.1    25.1.1.1      evpn     operational    9003    enabled   --    Test_3
23.1.1.1    25.1.1.1      evpn     operational    9004    enabled   --    Test_4
23.1.1.1    25.1.1.1      evpn     operational    150101  disabled  601    --
23.1.1.1    25.1.1.1      evpn     operational    150102  disabled  602    --
23.1.1.1    25.1.1.1      evpn     operational    150103  disabled  603    --
23.1.1.1    25.1.1.1      evpn     operational    150104  disabled  604    --
23.1.1.1    25.1.1.1      evpn     operational    150701  disabled  701    --
23.1.1.1    25.1.1.1      evpn     operational    150702  disabled  702    --
23.1.1.1    25.1.1.1      evpn     operational    150703  disabled  703    --
23.1.1.1    25.1.1.1      evpn     operational    150704  disabled  704    --
```

Site-2-Fabric1-Access-vtep-2

```
Site2-fabric1-Access-vtep-2# show run
hostname Site2-fabric1-Access-vtep-2
user admin group administrators password ciphertext
AQBapVG3UEBNkYI/oLfMDFFd8DbOnpPQrgpNR/RuyHtBup+aYgAAABjFQTvuuZrJXh31OHN1hzBR/HjUah
sDW6wmP5oVes1MVwuUwHyYAKYDoOxsy0Y/4ReBoQ0aI9vQy8hzXSvcdGr5K/OIJjlENyk2Sl7kAaXRro5e
3xhRKGLDgjfQXRnM4R6P
```

```
route-redistribute active-routes-only
vrf Test_1
        rd 14.1.1.1:9001
        route-target export 9001:9001 evpn
        route-target import 9001:9001 evpn
vrf Test_2
        rd 14.1.1.1:9002
        route-target export 9002:9002 evpn
        route-target import 9002:9002 evpn
vrf Test_3
        rd 14.1.1.1:9003
        route-target export 9003:9003 evpn
        route-target import 9003:9003 evpn
vrf Test_4
        rd 14.1.1.1:9004
        route-target export 9004:9004 evpn
        route-target import 9004:9004 evpn
ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst
ntp enable
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vsf member 1
        type jl668a
vlan 1,200,209-210
vlan 301
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 302
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 303
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 304
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 401
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 402
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 403
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 404
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 601
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 602
        ip igmp snooping enable
        ipv6 mld snooping enable
```

```
vlan 603
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 604
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 1345
        description I_G
        ip igmp snooping enable
        ip igmp snooping preprogram-starg-flow enable
        ipv6 mld snooping enable
        ipv6 mld snooping preprogram-starg-flow enable
vlan 1346
        ip igmp snooping enable
        ip igmp snooping preprogram-starg-flow enable
        ipv6 mld snooping enable
        ipv6 mld snooping preprogram-starg-flow enable
virtual-mac 00:00:03:00:00:05
evpn
        arp-suppression
        redistribute local-mac
        redistribute local-svi
        vlan 301
                rd 14.1.1.1:301
                route-target export 301:301
                route-target import 301:301
                redistribute host-route
        vlan 302
                rd 14.1.1.1:302
                route-target export 302:302
                route-target import 302:302
                redistribute host-route
        vlan 303
                rd 14.1.1.1:303
                route-target export 303:303
                route-target import 303:303
                redistribute host-route
        vlan 304
                rd 14.1.1.1:304
                route-target export 304:304
                route-target import 304:304
                redistribute host-route
        vlan 401
                rd 14.1.1.1:401
                route-target export 301:401
                route-target import 301:401
                redistribute host-route
        vlan 402
                rd 14.1.1.1:402
                route-target export 302:402
                route-target import 302:402
                redistribute host-route
        vlan 403
                rd 14.1.1.1:403
                route-target export 303:403
                route-target import 303:403
                redistribute host-route
        vlan 404
                rd 14.1.1.1:404
                route-target export 304:404
                route-target import 304:404
                redistribute host-route
```

```
        vlan 1345
                rd 14.1.1.1:1345
                route-target export 308:1345
                route-target import 308:1345
                redistribute host-route
        vlan 1346
                rd 14.1.1.1:1346
                route-target export 308:1346
                route-target import 308:1346
                redistribute host-route
no spanning-tree
interface mgmt
        no shutdown
        ip dhcp
interface 1/1/1
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 301-304,401-404,601-604,1345-1346
interface 1/1/2
        description port_Site2-fabric1-BorderRR-primary
        no shutdown
        routing
        ip address 70.1.2.2/30
        ip ospf 1 area 0.0.0.0
interface 1/1/9
        description port_Site2-fabric1-BorderRR-secondary
        no shutdown
        routing
        ip address 70.2.2.2/30
        ip ospf 1 area 0.0.0.0
interface loopback 0
        ip address 14.0.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 14.1.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 101
        vrf attach Test_1
        ip address 24.0.101.1/32
        ipv6 address 24:0:101::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 102
        vrf attach Test_2
        ip address 24.0.102.1/32
        ipv6 address 24:0:102::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 103
        vrf attach Test_3
        ip address 24.0.103.1/32
        ipv6 address 24:0:103::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
```

```
interface loopback 104
        vrf attach Test_4
        ip address 24.0.104.1/32
        ipv6 address 24:0:104::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 1
        ip dhcp
interface vlan 301
        vrf attach Test_1
        ip address 15.11.1.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.11.1.1
        ipv6 address 15:11:1::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:11:1::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 302
        vrf attach Test_2
        ip address 15.11.2.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.11.2.1
        ipv6 address 15:11:2::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:11:2::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 303
        vrf attach Test_3
        ip address 15.11.3.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.11.3.1
        ipv6 address 15:11:3::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:11:3::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 304
        vrf attach Test_4
        ip address 15.11.4.1/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.11.4.1
        ipv6 address 15:11:4::1/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:11:4::1
        ip igmp enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 401
        vrf attach Test_1
        ip address 15.12.1.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.12.1.1
```

```
        ipv6 address 15:12:1::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:12:1::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 402
        vrf attach Test_2
        ip address 15.12.2.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.12.2.1
        ipv6 address 15:12:2::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:12:2::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 403
        vrf attach Test_3
        ip address 15.12.3.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.12.3.1
        ipv6 address 15:12:3::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:12:3::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 404
        vrf attach Test_4
        ip address 15.12.4.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 15.12.4.1
        ipv6 address 15:12:4::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 15:12:4::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 601
        vrf attach Test_1
        ip address 26.12.1.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 26.12.1.1
        ipv6 address 26:12:1::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 26:12:1::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 602
        vrf attach Test_2
        ip address 26.12.2.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 26.12.2.1
        ipv6 address 26:12:2::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
```

```
        active-gateway ipv6 26:12:2::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 603
        vrf attach Test_3
        ip address 26.12.3.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 26.12.3.1
        ipv6 address 26:12:3::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 26:12:3::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 604
        vrf attach Test_4
        ip address 26.12.4.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 26.12.4.1
        ipv6 address 26:12:4::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 26:12:4::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 1345
        vrf attach Test_1
        ip address 51.10.1.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 51.10.1.1
        ipv6 address 51:10:1::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 51:10:1::1
        ip igmp enable
        ipv6 mld enable
interface vlan 1346
        vrf attach Test_1
        ip address 56.10.1.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 56.10.1.1
        ipv6 address 56:10:1::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 56:10:1::1
        ip igmp enable
        no ip igmp querier
        ipv6 mld enable
interface vxlan 1
        source ip 14.1.1.1
        no shutdown
        vni 9001
                vrf Test_1
                routing
        vni 9002
                vrf Test_2
                routing
        vni 9003
                vrf Test_3
                routing
```

```
        vni 9004
                vrf Test_4
                routing
        vni 150111
                vlan 401
        vni 150112
                vlan 402
        vni 150113
                vlan 403
        vni 150114
                vlan 404
        vni 150115
        vni 150116
        vni 150117
        vni 150118
        vni 150121
                vlan 301
        vni 150122
                vlan 302
        vni 150123
                vlan 303
        vni 150124
                vlan 304
        vni 150125
        vni 150126
        vni 150127
        vni 150128
        vni 170128
                vlan 1345
        vni 170129
                vlan 1346
!
!
!
!
!
router ospf 1 vrf Test_1
        router-id 14.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_2
        router-id 14.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_3
        router-id 14.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_4
        router-id 14.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1
        router-id 14.0.10.1
```

```
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_1
        router-id 14.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_2
        router-id 14.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_3
        router-id 14.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_4
        router-id 14.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1
        router-id 14.0.10.1
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65002
        bgp router-id 14.0.1.1
        neighbor 12.0.1.1 remote-as 65002
        neighbor 12.0.1.1 update-source loopback 0
        neighbor 12.0.2.1 remote-as 65002
        neighbor 12.0.2.1 update-source loopback 0
        neighbor 70.1.2.1 remote-as 65002
        neighbor 70.2.2.1 remote-as 65002
        address-family ipv4 unicast
                neighbor 70.1.2.1 activate
                neighbor 70.2.2.1 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 12.0.1.1 send-community extended
                neighbor 12.0.1.1 activate
                neighbor 12.0.2.1 send-community extended
                neighbor 12.0.2.1 activate
        exit-address-family
!
        vrf Test_1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
```

```
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
        exit-address-family
!
        vrf Test_2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
!
vrf Test_3
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
!
vrf Test_4
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
!
router pim vrf Test_1
        enable
router pim vrf Test_2
        enable
router pim vrf Test_3
        enable
router pim vrf Test_4
        enable
router pim6 vrf Test_1
        enable
router pim6 vrf Test_2
        enable
router pim6 vrf Test_3
        enable
router pim6 vrf Test_4
        enable
https-server vrf default
https-server vrf mgmt
===========
Outputs:
==========
Site2-fabric1-Access-vtep-2#  show ip ospf neighbors all-vrfs
VRF : default                           Process : 1
================================================
Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
--------------------------------------------------------------------------------
```

```
12.0.1.1         1         FULL/BDR          70.1.2.1          1/1/2
12.0.2.1         1         FULL/BDR          70.2.2.1          1/1/9
Site2-fabric1-Access-vtep-2#  show ip pim neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : Test_1                           Total number of neighbors : 4

--------------------------------------------------------------------------------
-
Interface Neighbor  Uptime   Expires    DR     Hold Time    Secondary Address
          (IPV4)    (HH:MM:SS)(HH:MM:SS)Priority (HH:MM:SS)        (IPV4)
--------  -------  -------  --------  -------  ----------  ------------------------
vni9001 11.1.1.1 15:12:52  00:03:05   1        00:03:30
vni9001 13.1.1.1    5 days 02:29:25   00:03:14   1        00:03:30
vlan301 15.11.1.2  5 days 02:29:0200:01:42 16843021  00:01:45            Nil
vlan401 15.12.1.2 5 days 02:29:0100:01:42 16843021   00:01:45           Nil
--------------------------------------------------------------------------------
-
VRF : Test_2                           Total number of neighbors : 4

--------------------------------------------------------------------------------
-
vni9002 11.1.1.1 18:06:07  00:03:14   1        00:03:30
vni9002 13.1.1.1 5 days 02:28:5800:03:28   1        00:03:30
vlan302 15.11.2.2 5 days 02:29:0400:01:43  16843021 00:01:45             Nil
vlan402 15.12.2.2 5 days 02:29:0200:01:40  16843021 00:01:45             Nil
--------------------------------------------------------------------------------
-
VRF : Test_3                           Total number of neighbors : 4

--------------------------------------------------------------------------------
-
vni9003 11.1.1.1 13:15:15 00:03:11    1         00:03:30
vni9003 13.1.1.1 5 days 02:29:25 00:03:16  1         00:03:30
vlan303 15.11.3.2 5 days 02:29:0300:01:39  16843021  00:01:45             Nil
vlan403 15.12.3.2 5 days 02:29:0400:01:42  16843021  00:01:45             Nil
--------------------------------------------------------------------------------
-
VRF : Test_4                           Total number of neighbors : 4

--------------------------------------------------------------------------------
-
vni9004 11.1.1.1 18:06:07 00:03:16    1         00:03:30
vni9004 13.1.1.1 5 days 02:29:2500:03:25   1         00:03:30
vlan304 15.11.4.1 1 days 00:12:07 00:01:45 16843021  00:01:45              Nil
vlan404 15.12.4.2 5 days 02:29:0200:01:42  16843021  00:01:45              Nil
--------------------------------------------------------------------------------
-
Site2-fabric1-Access-vtep-2# show ip pim all-vrfs

PIM Global Parameters

VRF                              :  Test_1
PIM Status                       :  Enabled
PIM SSM Status                   :  Disabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
PIM BIDI NSF Status              :  Inactive
Shared Border Status             :  Disabled
```

```
Multicast Fabric Identifier       :  65002

VRF                               :  Test_2
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65002

VRF                               :  Test_3
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65002

VRF                               :  Test_4
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65002
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
Site2-fabric1-Access-vtep-2# show ipv6 pim6 all-vrfs

PIM Global Parameters

VRF                               :  Test_1
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65002

VRF                               :  Test_2
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
```

```
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65002

VRF                               :  Test_3
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65002

VRF                               :  Test_4
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65002
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
Site2-fabric1-Access-vtep-2#  show ipv6 pim6 neighbor brief all-vrfs

-------------------------------------------------------------------------------
-
VRF : Test_1                          Total number of neighbors : 4

-------------------------------------------------------------------------------
-
Interface Neighbor        Uptime    Expires    DR      Hold Time  Secondary
Address
          (IPV6)         (HH:MM:SS) (HH:MM:SS)Priority (HH:MM:SS)      (IPV6)
--------- --------       ---------- ------   -------  --------     ---------------
-
vni9001 fe80::11:1:1:1    18:07:04  00:03:05   1       00:03:30
vni9001 fe80::13:1:1:1             5 days 02:30:2100:03:02   1       00:03:30
vlan301fe80::5480:2881:2dfc:600 5 days 02:30:2300:01:20  16843021 00:01:45
15:11:1::2
vlan401 fe80::5480:2881:91fc:600 5 days 02:30:25 00:01:18 16843021 00:01:45
15:12:1::2
-------------------------------------------------------------------------------
-
VRF : Test_2                          Total number of neighbors : 4

-------------------------------------------------------------------------------
-
vni9002 fe80::11:1:1:1  18:07:28     00:03:29   1       00:03:30
vni9002 fe80::13:1:1:1  5 days 02:30:2100:03:07   1      00:03:30
vlan302 fe80::5480:2881:2efc:600 5 days 02:30:2300:01:19 16843021 00:01:45
15:11:2::2
vlan402 fe80::5480:2881:92fc:600 5 days 02:30:2500:01:17 16843021 00:01:45
15:12:2::2
```

```
--------------------------------------------------------------------------------
-
VRF : Test_3                            Total number of neighbors : 4

--------------------------------------------------------------------------------
-
vni9003 fe80::11:1:1:1  18:07:01      00:03:10   1      00:03:30
vni9003 fe80::13:1:1:1 5 days 02:30:45  00:03:06  1       00:03:30
vlan303 fe80::5480:2881:2ffc:600 5 days 02:30:2600:01:17  16843021 00:01:45
15:11:3::2
vlan403 fe80::5480:2881:93fc:600 5 days 02:30:2500:01:20  16843021 00:01:45
15:12:3::2
--------------------------------------------------------------------------------
-
VRF : Test_4                            Total number of neighbors : 4

--------------------------------------------------------------------------------
-
vni9004 fe80::11:1:1:1 18:07:29       00:03:22   1       00:03:30
vni9004 fe80::13:1:1:1 5 days 02:30:20 00:03:10   1        00:03:30
vlan304 fe80::5480:2881:30fc:600 1 days 00:13:3000:01:23 16843021  00:01:45
15:11:4::1
vlan404 fe80::5480:2881:94fc:600 5 days 02:30:2400:01:19 16843021  00:01:45
15:12:4::2
--------------------------------------------------------------------------------
-
Site2-fabric1-Access-vtep-2#   show ip pim rp-set all-vrfs

VRF: Test_1

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  --------
-
224.0.0.0        240.0.0.0        16.0.101.1       150        109          192

VRF: Test_2

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  --------
-
224.0.0.0        240.0.0.0        16.0.102.1       150        135          192

VRF: Test_3

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  --------
-
224.0.0.0        240.0.0.0        16.0.103.1       150        97           192

VRF: Test_4

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  --------
-
```

```
224.0.0.0        240.0.0.0        16.0.104.1       150        132          192
Site2-fabric1-Access-vtep-2# show ip mroute 225.15.1.1 all-vrfs detail

IP Multicast Route Entries

VRF : Test_1

Group Address                 : 225.15.1.1
Source Address                : 11.11.1.100
Neighbor                      : 11.1.1.1
Incoming interface            : vni9001
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 02:46:31
Downstream Interface
Interface       State
-----------     ----------
vlan301         forwarding
vlan401         forwarding

Site2-fabric1-Access-vtep-2# show ipv6 mroute ff25:15:1::1 all-vrfs detail

IP Multicast Route Entries

VRF : Test_1

Group Address                 : ff25:15:1::1
Source Address                : 11:11:1::100
Neighbor                      : fe80::11:1:1:1
Incoming interface            : vni9001
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 02:53:19
Downstream Interface
Interface       State
-----------     ----------
vlan301         forwarding
vlan401         forwarding

Site2-fabric1-Access-vtep-2#
Site2-fabric1-Access-vtep-2# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS              : 65002        BGP Router Identifier  : 14.0.1.1
Peers                 : 4            Log Neighbor Changes   : No
Cfg. Hold Time        : 180          Cfg. Keep Alive        : 60
Confederation Id      : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor                                Remote-AS   MsgRcvd MsgSent Up/Down Time
State         AdminStatus
70.1.2.1                                65002       9152    8596    05d:04h:51m
Established   Up
70.2.2.1                                65002       9070    8615    05d:04h:51m
Established   Up
```

```
Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
Neighbor                                  Remote-AS   MsgRcvd MsgSent Up/Down Time
State         AdminStatus
12.0.1.1                                  65002       19729   11277   05d:04h:51m
Established   Up
12.0.2.1                                  65002       19920   11276   05d:04h:51m
Established   Up

Codes: * Dynamic Neighbor
VRF : Test_1
BGP Summary
-----------
Local AS               : 65002        BGP Router Identifier  : 24.0.101.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : Test_2
BGP Summary
-----------
Local AS               : 65002        BGP Router Identifier  : 24.0.102.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : Test_3
BGP Summary
-----------
Local AS               : 65002        BGP Router Identifier  : 24.0.103.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : Test_4
```

```
BGP Summary
-----------
Local AS               : 65002        BGP Router Identifier  : 24.0.104.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Site2-fabric1-Access-vtep-2#  show interface vxlan vteps
Source     Destination    Origin     Status       VNI     Routing   VLAN    VRF
---------- ------------  --------   ---------   ------- ---------- ------  ------
14.1.1.1   11.1.1.1        evpn    operational   9001     enabled    --    Test_1
14.1.1.1   11.1.1.1        evpn    operational   9002     enabled    --    Test_2
14.1.1.1   11.1.1.1        evpn    operational   9003     enabled    --    Test_3
14.1.1.1   11.1.1.1        evpn    operational   9004     enabled    --    Test_4
14.1.1.1   13.1.1.1        evpn    operational   9001     enabled    --    Test_1
14.1.1.1   13.1.1.1        evpn    operational   9002     enabled    --    Test_2
14.1.1.1   13.1.1.1        evpn    operational   9003     enabled    --    Test_3
14.1.1.1   13.1.1.1        evpn    operational   9004     enabled    --    Test_4
14.1.1.1   13.1.1.1        evpn    operational   150111   disabled  401    --
14.1.1.1   13.1.1.1        evpn    operational   150112   disabled  402    --
14.1.1.1   13.1.1.1        evpn    operational   150113   disabled  403    --
14.1.1.1   13.1.1.1        evpn    operational   150114   disabled  404    --
14.1.1.1   13.1.1.1        evpn    operational   150121   disabled  301    --
14.1.1.1   13.1.1.1        evpn    operational   150122   disabled  302    --
14.1.1.1   13.1.1.1        evpn    operational   150123   disabled  303    -
14.1.1.1   13.1.1.1        evpn    operational   150124   disabled  304    --
14.1.1.1   13.1.1.1        evpn    operational   170128   disabled  1345   --
14.1.1.1   13.1.1.1        evpn    operational   170129   disabled  1346   --
```

Site-2-Fabric1-BorderRR-primary

```
Site2-fabric1-BorderRR-primary# show run
hostname Site2-fabric1-BorderRR-primary
power consumption-average-period 600
profile aggregation-leaf
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
virtual-mac 00:00:10:21:00:03
interface mgmt
        no shutdown
        ip dhcp
interface lag 100
        no shutdown
        no routing
        vlan trunk native 1 tag
        vlan trunk allowed all
        lacp mode active
```

```
interface 1/1/29
        description port_Site2-fabric1-Access-vtep-1
        no shutdown
        ip address 70.1.1.1/30
        ip ospf 1 area 0.0.0.0
interface 1/1/33
        description port_Site2-fabric1-BorderRR-secondary
        no shutdown
        lag 100
interface 1/1/34
        description port_Site2-fabric1-Access-vtep-2
        no shutdown
        ip address 70.1.2.1/30
        ip ospf 1 area 0.0.0.0
interface 1/1/35
        description port_Site2-Shared-border-vsxsec
        no shutdown
        ip address 60.1.2.2/30
interface 1/1/36
        description port_Site2-Shared-border-vsxpri
        no shutdown
        ip address 60.1.1.2/30
interface 1/1/37
        description port_Site2-fabric1-BorderRR-secondary
        no shutdown
        ip address 192.168.100.1/30
interface loopback 0
        ip address 12.0.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 12.1.1.1/32
        ip ospf 1 area 0.0.0.0
interface vxlan 1
vsx
        system-mac 00:00:01:00:00:00
        inter-switch-link lag 100
        role primary
        vsx-sync evpn mgmd-global vsx-global
!
!
!
!
route-map rmap1 permit seq 50
!
router ospf 1
        router-id 12.0.1.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65002
        bgp router-id 12.0.1.1
        neighbor 11.0.1.1 remote-as 65001
        neighbor 11.0.1.1 ebgp-multihop 5
        neighbor 11.0.1.1 update-source loopback 0
        neighbor 11.0.1.2 remote-as 65001
        neighbor 11.0.1.2 ebgp-multihop 5
        neighbor 11.0.1.2 update-source loopback 0
        neighbor 13.0.1.1 remote-as 65002
        neighbor 13.0.1.1 update-source loopback 0
        neighbor 14.0.1.1 remote-as 65002
        neighbor 14.0.1.1 update-source loopback 0
```

```
        neighbor 60.1.1.1 remote-as 65001
        neighbor 60.1.1.1 ebgp-multihop 5
        neighbor 60.1.2.1 remote-as 65001
        neighbor 60.1.2.1 ebgp-multihop 5
        neighbor 70.1.1.2 remote-as 65002
        neighbor 70.1.2.2 remote-as 65002
        address-family ipv4 unicast
                neighbor 60.1.1.1 activate
                neighbor 60.1.2.1 activate
                neighbor 70.1.1.2 activate
                neighbor 70.1.2.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 11.0.1.1 next-hop-unchanged
                neighbor 11.0.1.1 send-community extended
                neighbor 11.0.1.1 activate
                neighbor 11.0.1.2 next-hop-unchanged
                neighbor 11.0.1.2 send-community extended
                neighbor 11.0.1.2 activate
                neighbor 13.0.1.1 route-reflector-client
                neighbor 13.0.1.1 send-community extended
                neighbor 13.0.1.1 activate
                neighbor 14.0.1.1 route-reflector-client
                neighbor 14.0.1.1 send-community extended
                neighbor 14.0.1.1 activate
        exit-address-family
!
https-server vrf mgmt
===========
Outputs:
==========

Site2-fabric1-BorderRR-primary# show ip ospf neighbors all-vrfs
VRF : default                          Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
13.0.10.1        1         FULL/DR           70.1.1.2           1/1/29
14.0.10.1        1         FULL/DR           70.1.2.2           1/1/34

Site2-fabric1-BorderRR-primary#  show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65002        BGP Router Identifier  : 12.0.1.1
Peers                  : 8            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor    Remote-AS   MsgRcvd   MsgSent  Up/Down Time   State     AdminStatus
60.1.1.1    65001       8641      8715     05h:03m:22s  Established      Up
60.1.2.1    65001       8651      8726     05h:03m:02s  Established      Up
70.1.1.2    65002       8618      9146     05d:04h:50m  Established      Up
70.1.2.2    65002       8595      9150     05d:04h:50m  Established      Up
```

```
Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
Neighbor    Remote-AS   MsgRcvd  MsgSent  Up/Down Time   State       AdminStatus
11.0.1.1    65001       21618    21330    05h:03m:07s  Established       Up
11.0.1.2    65001       21002    21563    05h:03m:18s  Established       Up
13.0.1.1    65002       11017    19999    05d:04h:50m  Established       Up
14.0.1.1    65002       11276    19727    05d:04h:50m  Established       Up
```

Site-2-Fabric1-BorderRR-secondary

```
Site2-fabric1-BorderRR-secondary# show run
hostname Site2-fabric1-BorderRR-secondary
power consumption-average-period 600
profile aggregation-leaf
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
virtual-mac 00:00:10:21:00:03
interface mgmt
        no shutdown
        ip dhcp
interface lag 100
        no shutdown
        no routing
        vlan trunk native 1 tag
        vlan trunk allowed all
        lacp mode active
interface 1/1/1
        description port_Site2-Shared-border-vsxpri
        no shutdown
        ip address 60.2.1.2/30
interface 1/1/4
        description port_Site2-fabric1-Access-vtep-1
        no shutdown
        ip address 70.2.1.1/30
        ip ospf 1 area 0.0.0.0
interface 1/1/7
        description port_Site2-fabric1-Access-vtep-2
        no shutdown
        ip address 70.2.2.1/30
        ip ospf 1 area 0.0.0.0
interface 1/1/9
        description port_Site2-fabric1-BorderRR-primary
        no shutdown
        lag 100
interface 1/1/11
        description port_Site2-Shared-border-vsxsec
```

```
        no shutdown
        ip address 60.2.2.2/30
interface 1/1/13
        description port_Site2-fabric1-BorderRR-primary
        no shutdown
        ip address 192.168.100.2/30
interface loopback 0
        ip address 12.0.2.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 12.1.2.1/32
        ip ospf 1 area 0.0.0.0
vsx
        system-mac 00:00:01:00:00:00
        inter-switch-link lag 100
        role secondary
        vsx-sync evpn mgmd-global vsx-global
!
!
!
!
!
router ospf 1
        router-id 12.0.2.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65002
        bgp router-id 12.0.2.1
        neighbor 11.0.1.1 remote-as 65001
        neighbor 11.0.1.1 ebgp-multihop 5
        neighbor 11.0.1.1 update-source loopback 0
        neighbor 11.0.1.2 remote-as 65001
        neighbor 11.0.1.2 ebgp-multihop 5
        neighbor 11.0.1.2 update-source loopback 0
        neighbor 13.0.1.1 remote-as 65002
        neighbor 13.0.1.1 update-source loopback 0
        neighbor 14.0.1.1 remote-as 65002
        neighbor 14.0.1.1 update-source loopback 0
        neighbor 60.2.1.1 remote-as 65001
        neighbor 60.2.1.1 ebgp-multihop 5
        neighbor 60.2.2.1 remote-as 65001
        neighbor 60.2.2.1 ebgp-multihop 5
        neighbor 70.2.1.2 remote-as 65002
        neighbor 70.2.2.2 remote-as 65002
        address-family ipv4 unicast
                neighbor 60.2.1.1 activate
                neighbor 60.2.2.1 activate
                neighbor 70.2.1.2 activate
                neighbor 70.2.2.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 11.0.1.1 next-hop-unchanged
                neighbor 11.0.1.1 send-community extended
                neighbor 11.0.1.1 activate
                neighbor 11.0.1.2 next-hop-unchanged
                neighbor 11.0.1.2 send-community extended
                neighbor 11.0.1.2 activate
                neighbor 13.0.1.1 route-reflector-client
```

```
                neighbor 13.0.1.1 send-community extended
                neighbor 13.0.1.1 activate
                neighbor 14.0.1.1 route-reflector-client
                neighbor 14.0.1.1 send-community extended
                neighbor 14.0.1.1 activate
        exit-address-family
!
https-server vrf mgmt
===========
Outputs:
==========
Site2-fabric1-BorderRR-secondary# show ip ospf neighbors all-vrfs
VRF : default                           Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
13.0.10.1        1         FULL/DR           70.2.1.2           1/1/4
14.0.10.1        1         FULL/DR           70.2.2.2           1/1/7
Site2-fabric1-BorderRR-secondary# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65002        BGP Router Identifier  : 12.0.2.1
Peers                  : 8            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor   Remote-AS   MsgRcvd MsgSent Up/Down Time      State       AdminStatus
60.2.1.1   65001       8655    8675    05h:03m:02s    Established       Up
60.2.2.1   65001       8652    8713    05h:02m:57s    Established       Up
70.2.1.2   65002       8613    9062    05d:04h:50m    Established       Up
70.2.2.2   65002       8614    9069    05d:04h:50m    Established       Up

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
Neighbor  Remote-AS   MsgRcvd MsgSent Up/Down Time       State         AdminStatus
11.0.1.1  65001       21693   21218   05h:02m:47s     Established          Up
11.0.1.2  65001       21406   21424   05h:02m:43s     Established          Up
13.0.1.1  65002       11010   20193   05d:04h:50m     Established          Up
14.0.1.1  65002       11274   19918   05d:04h:50m     Established          Up
```

Site-2-Fabric2-Access-vtep-1

```
Site2-fabric2-Access-vtep-1# show run
hostname Site2-fabric2-Access-vtep-1
power consumption-average-period 600
profile leaf
route-redistribute active-routes-only
vrf Test_1
```

```
        rd 20.1.1.1:9001
        route-target export 9001:9001 evpn
        route-target import 9001:9001 evpn
vrf Test_2
        rd 20.1.1.1:9002
        route-target export 9002:9002 evpn
        route-target import 9002:9002 evpn
vrf Test_3
        rd 20.1.1.1:9003
        route-target export 9003:9003 evpn
        route-target import 9003:9003 evpn
vrf Test_4
        rd 20.1.1.1:9004
        route-target export 9004:9004 evpn
        route-target import 9004:9004 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 601
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 602
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 603
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 604
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 701
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 702
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 703
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 704
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 1001
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 1002
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 1003
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 1004
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 1005
```

```
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 1006
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 1007
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 1008
        ip igmp snooping enable
        ipv6 mld snooping enable
virtual-mac 00:00:20:01:00:00
evpn
        arp-suppression
        redistribute local-mac
        redistribute local-svi
        vlan 601
                rd 20.1.1.1:601
                route-target export 301:601
                route-target import 301:601
                redistribute host-route
        vlan 602
                rd 20.1.1.1:602
                route-target export 302:602
                route-target import 302:602
                redistribute host-route
        vlan 603
                rd 20.1.1.1:603
                route-target export 303:603
                route-target import 303:603
                redistribute host-route
        vlan 604
                rd 20.1.1.1:604
                route-target export 304:604
                route-target import 304:604
                redistribute host-route
        vlan 701
                rd 20.1.1.1:701
                route-target export 301:701
                route-target import 301:701
                redistribute host-route
        vlan 702
                rd 20.1.1.1:702
                route-target export 302:702
                route-target import 302:702
                redistribute host-route
        vlan 703
                rd 20.1.1.1:703
                route-target export 303:703
                route-target import 303:703
                redistribute host-route
        vlan 704
                rd 20.1.1.1:704
                route-target export 304:704
                route-target import 304:704
                redistribute host-route
interface mgmt
        no shutdown
        ip dhcp
system interface-group 1 speed 10g
        !interface group 1 contains ports 1/1/1-1/1/12
system interface-group 2 speed 10g
```

```
        !interface group 2 contains ports 1/1/13-1/1/24
system interface-group 3 speed 10g
        !interface group 3 contains ports 1/1/25-1/1/36
system interface-group 4 speed 10g
        !interface group 4 contains ports 1/1/37-1/1/48
interface 1/1/3
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 601-604,701-704
interface 1/1/49
        description port_Site2-fabric2-BorderRR-SA
        no shutdown
        ip address 91.1.1.2/30
        ip ospf 1 area 0.0.0.0
interface loopback 0
        ip address 23.0.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 23.1.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 101
        vrf attach Test_1
        ip address 20.0.101.1/32
        ipv6 address 20:0:101::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 102
        vrf attach Test_2
        ip address 20.0.102.1/32
        ipv6 address 20:0:102::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 103
        vrf attach Test_3
        ip address 20.0.103.1/32
        ipv6 address 20:0:103::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 104
        vrf attach Test_4
        ip address 20.0.104.1/32
        ipv6 address 20:0:104::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 601
        vrf attach Test_1
        ip address 20.11.1.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 20.11.1.1
        ipv6 address 20:11:1::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 20:11:1::1
```

```
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vlan 602
        vrf attach Test_2
        ip address 20.11.2.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 20.11.2.1
        ipv6 address 20:11:2::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 20:11:2::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vlan 603
        vrf attach Test_3
        ip address 20.11.3.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 20.11.3.1
        ipv6 address 20:11:3::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 20:11:3::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vlan 604
        vrf attach Test_4
        ip address 20.11.4.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 20.11.4.1
        ipv6 address 20:11:4::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 20:11:4::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vlan 701
        vrf attach Test_1
        ip address 27.12.1.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 27.12.1.1
        ipv6 address 27:12:1::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 27:12:1::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
```

```
interface vlan 702
        vrf attach Test_2
        ip address 27.12.2.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 27.12.2.1
        ipv6 address 27:12:2::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 27:12:2::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vlan 703
        vrf attach Test_3
        ip address 27.12.3.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 27.12.3.1
        ipv6 address 27:12:3::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 27:12:3::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vlan 704
        vrf attach Test_4
        ip address 27.12.4.2/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 27.12.4.1
        ipv6 address 27:12:4::2/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 27:12:4::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse vsx-virtual-neighbor
        ipv6 pim6-sparse vsx-virtual-neighbor
interface vxlan 1
        source ip 23.1.1.1
        no shutdown
        vni 9001
                vrf Test_1
                routing
        vni 9002
                vrf Test_2
                routing
        vni 9003
                vrf Test_3
                routing
        vni 9004
                vrf Test_4
                routing
        vni 150101
                vlan 601
        vni 150102
                vlan 602
        vni 150103
```

```
                vlan 603
        vni 150104
                vlan 604
        vni 150701
                vlan 701
        vni 150702
                vlan 702
        vni 150703
                vlan 703
        vni 150704
                vlan 704
!
!
!
!
!
router ospf 1 vrf Test_1
        router-id 20.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_2
        router-id 20.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_3
        router-id 20.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_4
        router-id 20.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1
        router-id 20.0.10.1
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_1
        router-id 20.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_2
        router-id 20.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_3
        router-id 20.3.10.1
        distance 250
```

```
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_4
        router-id 20.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1
        router-id 20.0.10.1
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65003
        bgp router-id 23.0.1.1
        neighbor 19.0.1.1 remote-as 65003
        neighbor 19.0.1.1 update-source loopback 0
        neighbor 91.1.1.1 remote-as 65003
        address-family ipv4 unicast
                neighbor 91.1.1.1 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 19.0.1.1 send-community extended
                neighbor 19.0.1.1 activate
        exit-address-family
!
        vrf Test_1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
!
        vrf Test_2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
!
        vrf Test_3
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
!
        vrf Test_4
```

```
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
                exit-address-family
!
router pim vrf Test_1
        enable
router pim vrf Test_2
        enable
router pim vrf Test_3
        enable
router pim vrf Test_4
        enable
router pim6 vrf Test_1
        enable
router pim6 vrf Test_2
        enable
router pim6 vrf Test_3
        enable
router pim6 vrf Test_4
        enable
https-server vrf mgmt
===========
Outputs:
==========
Site2-fabric2-Access-vtep-1# show ip ospf neighbors all-vrfs
VRF : default                           Process : 1
================================================

Total Number of Neighbors : 1
Neighbor ID      Priority  State             Nbr Address       Interface
------------------------------------------------------------------------------
19.0.1.1         1         FULL/BDR          91.1.1.1           1/1/49
Site2-fabric2-Access-vtep-1#  show ip pim neighbor brief all-vrfs

--------------------------------------------------------------------------------
-
VRF : Test_1                            Total number of neighbors : 4
--------------------------------------------------------------------------------
-
Interface Neighbor    Uptime     Expires       DR     Hold Time Secondary Address
          (IPV4)     (HH:MM:SS)  (HH:MM:SS)  Priority  (HH:MM:SS)      (IPV4)
--------- ---------  ----------  ----------  --------   --------  ----------------
vni9001  11.1.1.1     03:57:29    00:03:03     1         00:03:30
vlan601  20.11.1.3    03:57:03    00:01:19    16843033   00:01:45        Nil
vni9001  25.1.1.1     03:56:59    00:03:03     1         00:03:30
vlan701  27.12.1.3    03:56:52    00:01:27    16843033   00:01:45        Nil
--------------------------------------------------------------------------------
-
VRF : Test_2                            Total number of neighbors : 4
--------------------------------------------------------------------------------
-
vni9002  11.1.1.1     03:57:22    00:03:11     1         00:03:30
vlan602  20.11.2.3    03:56:58    00:01:24    16843033   00:01:45        Nil
vni9002  25.1.1.1     03:56:52    00:03:10     1         00:03:30
vlan702  27.12.2.3    03:57:04    00:01:15    16843033   00:01:45        Nil
--------------------------------------------------------------------------------
-
```

```
VRF : Test_3                            Total number of neighbors : 4
--------------------------------------------------------------------------------
-
vni9003  11.1.1.1     03:57:23    00:03:08     1          00:03:30
vlan603  20.11.3.3    03:56:53    00:01:26    16843033   00:01:45        Nil
vni9003  25.1.1.1     03:56:50    00:03:13     1          00:03:30
vlan703  27.12.3.3    03:57:06    00:01:16    16843033   00:01:45        Nil
--------------------------------------------------------------------------------
-
VRF : Test_4                            Total number of neighbors : 4
--------------------------------------------------------------------------------
-
vni9004  11.1.1.1     03:57:18    00:03:14     1          00:03:30
vlan604  20.11.4.3    03:56:58    00:01:26    16843033   00:01:45        Nil
vni9004  25.1.1.1     03:56:51    00:03:11     1          00:03:30
vlan704  27.12.4.3    03:56:57    00:01:21    16843033   00:01:45        Nil
--------------------------------------------------------------------------------
-
Site2-fabric2-Access-vtep-1# show ip pim all-vrfs

PIM Global Parameters

VRF                               :  Test_1
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65003

VRF                               :  Test_2
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65003

VRF                               :  Test_3
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65003

VRF                               :  Test_4
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
```

```
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65003
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
Site2-fabric2-Access-vtep-1# show ipv6 pim6 all-vrfs

PIM Global Parameters

VRF                               :  Test_1
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65003
VRF                               :  Test_2
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65003

VRF                               :  Test_3
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65003

VRF                               :  Test_4
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65003
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
Site2-fabric2-Access-vtep-1#  show ipv6 pim6 neighbor brief all-vrfs
```

```
--------------------------------------------------------------------------------
-
VRF : Test_1                            Total number of neighbors : 4
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
------------------
Interface Neighbor    Uptime     Expires       DR     Hold Time Secondary Address
          (IPV4)     (HH:MM:SS)  (HH:MM:SS)  Priority  (HH:MM:SS)      (IPV4)
--------- ---------  ----------  ----------  --------   --------  ----------------
vni9001 fe80::11:1:1:1 03:58:54  00:03:02     1         00:03:30
vni9001 fe80::25:1:1:1 03:58:17  00:03:16     1         00:03:30
vlan601fe80::9020:c282:5920:e04003:58:15 00:01:33 16843033  00:01:45    20:11:1::3
vlan701 fe80::9020:c282:bd20:e04003:58:24 00:01:26 16843033 00:01:45    27:12:1::3
--------------------------------------------------------------------------------
-
VRF : Test_2                            Total number of neighbors : 4
--------------------------------------------------------------------------------
-
vni9002 fe80::11:1:1:1 03:58:52    00:03:26      1         00:03:30
vni9002 fe80::25:1:1:1 03:58:25    00:03:07      1         00:03:30
vlan602 fe80::9020:c282:5a20:e040 03:58:1700:01:35   16843033  00:01:45   20:11:2::3
vlan702 fe80::9020:c282:be20:e040 03:58:24 00:01:26  16843033  00:01:45   27:12:2::3
--------------------------------------------------------------------------------
-
VRF : Test_3                            Total number of neighbors : 4
--------------------------------------------------------------------------------
-
vni9003 fe80::11:1:1:1 03:58:54    00:03:07      1         00:03:30
vni9003 fe80::25:1:1:1 03:58:27  00:03:06       1        00:03:30
vlan603 fe80::9020:c282:5b20:e040 03:58:14 00:01:35 16843033  00:01:45   20:11:3::3
vlan703 fe80::9020:c282:bf20:e040 03:58:19 00:01:33 16843033  00:01:45   27:12:3::3
--------------------------------------------------------------------------------
-
VRF : Test_4                            Total number of neighbors : 4
--------------------------------------------------------------------------------
-
vni9004 fe80::11:1:1:1  03:58:54  00:03:20       1         00:03:30
vni9004 fe80::25:1:1:1  03:58:17   00:03:15      1         00:03:30
vlan604 fe80::9020:c282:5c20:e04003:58:20  00:01:30  16843033  00:01:45  20:11:4::3
vlan704      fe80::9020:c282:c020:e040                     03:58:15
00:01:33               16843033    00:01:45               27:12:4::3
--------------------------------------------------------------------------------
-
Site2-fabric2-Access-vtep-1#  show ip pim rp-set all-vrfs

VRF: Test_1

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.101.1       150        108          192

VRF: Test_2

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
```

```
224.0.0.0        240.0.0.0        16.0.102.1       150        134          192

VRF: Test_3

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.103.1       150        96           192

VRF: Test_4

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.104.1       150        131          192
Site2-fabric2-Access-vtep-1# show ip mroute 225.15.1.1 all-vrfs detail
show ip mroute 225.15.1.1 all-vrfs detail

IP Multicast Route Entries

VRF : Test_1
Total number of entries : 3

Group Address                 : 225.15.1.1
Source Address                : 11.11.1.100
Neighbor                      :
Incoming interface            : vlan601
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 03:45:50

Group Address                 : 225.15.1.1
Source Address                : 11.11.1.100
Neighbor                      :
Incoming interface            : vlan701
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 03:45:50

Group Address                 : 225.15.1.1
Source Address                : 11.11.1.100
Neighbor                      :
Incoming interface            : vni9001
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 00:34:50
Site2-fabric2-Access-vtep-1# show ip mroute 225.15.1.1 all-vrfs detail
IP Multicast Route Entries
VRF : Test_1
Total number of entries : 3

Group Address                 : 225.15.1.1
```

```
Source Address                : 11.11.1.100
Neighbor                      :
Incoming interface            : vlan601
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 03:45:50
Group Address                 : 225.15.1.1
Source Address                : 11.11.1.100
Neighbor                      :
Incoming interface            : vlan701
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 03:45:50

Group Address                 : 225.15.1.1
Source Address                : 11.11.1.100
Neighbor                      :
Incoming interface            : vni9001
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 00:34:50

Site2-fabric2-Access-vtep-1# show ipv6 mroute ff25:15:1::1 all-vrfs detail

IP Multicast Route Entries

VRF : Test_1
Total number of entries : 3

Group Address                 : ff25:15:1::1
Source Address                : 11:11:1::100
Neighbor                      :
Incoming interface            : vlan601
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 03:24:50

Group Address                 : ff25:15:1::1
Source Address                : 11:11:1::100
Neighbor                      :
Incoming interface            : vlan701
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 03:24:50

Group Address                 : ff25:15:1::1
Source Address                : 11:11:1::100
Neighbor                      :
Incoming interface            : vni9001
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
```

```
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 00:07:06

Site2-fabric1-Access-vtep-1# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65002        BGP Router Identifier  : 13.0.1.1
Peers                  : 4            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor  Remote-AS   MsgRcvd MsgSent   Up/Down Time     State       AdminStatus
70.1.1.1  65002       9147    8619      05d:04h:51m    Established       Up
70.2.1.1  65002       9063    8615      05d:04h:51m    Established       Up

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
Neighbor  Remote-AS   MsgRcvd MsgSent   Up/Down Time     State       AdminStatus
12.0.1.1  65002       20000   11019     05d:04h:51m    Established       Up
12.0.2.1  65002       20195   11012     05d:04h:51m    Established       Up

Codes: * Dynamic Neighbor
VRF : Test_1
BGP Summary
-----------
Local AS               : 65002        BGP Router Identifier  : 19.0.101.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------
Codes: * Dynamic Neighbor
VRF : Test_2
BGP Summary
-----------
Local AS               : 65002        BGP Router Identifier  : 19.0.102.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : Test_3
```

```
BGP Summary
-----------
Local AS               : 65002        BGP Router Identifier  : 19.0.103.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : Test_4
BGP Summary
-----------
Local AS               : 65002        BGP Router Identifier  : 19.0.104.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------
Site2-fabric1-Access-vtep-1# show interface vxlan vteps
Source   Destination      Origin      Status      VNI       Routing   VLAN   VRF
------ ---------------- ------------ ---------- --------- ---------  -----  ------
13.1.1.1  11.1.1.1         evpn     operational   9001      enabled   --    Test_1
13.1.1.1  11.1.1.1         evpn     operational   9002      enabled   --    Test_2
13.1.1.1  11.1.1.1         evpn     operational   9003      enabled   --    Test_3
13.1.1.1  11.1.1.1         evpn     operational   9004      enabled   --    Test_4
13.1.1.1  14.1.1.1         evpn     operational   9001      enabled   --    Test_1
13.1.1.1  14.1.1.1         evpn     operational   9002      enabled   --    Test_2
13.1.1.1  14.1.1.1         evpn     operational   9003      enabled   --    Test_3
13.1.1.1  14.1.1.1         evpn     operational   9004      enabled   --     Test_
4
13.1.1.1  14.1.1.1         evpn     operational   150111    disabled  401     --
13.1.1.1  14.1.1.1         evpn     operational   150112    disabled  402     --
13.1.1.1  14.1.1.1         evpn     operational   150113    disabled  403     --
13.1.1.1  14.1.1.1         evpn     operational   150114    disabled  404     --
13.1.1.1  14.1.1.1         evpn     operational   150121    disabled  301     --
13.1.1.1  14.1.1.1         evpn     operational   150122    disabled  302     --
13.1.1.1  14.1.1.1         evpn     operational   150123    disabled  303     --
13.1.1.1  14.1.1.1         evpn     operational   150124    disabled  304     --
13.1.1.1  14.1.1.1         evpn     operational   170128    disabled  1345   --
13.1.1.1 14.1.1.1         evpn      operational  170129    disabled  1346   --
```

Site-2-Fabric2-Access-vtep-2

```
Site2-fabric2-Access-vtep-2# show run
hostname Site2-fabric2-Access-vtep-2
route-redistribute active-routes-only
vrf Test_1
        rd 21.1.1.1:9001
        route-target export 9001:9001 evpn
        route-target import 9001:9001 evpn
vrf Test_2
        rd 21.1.1.1:9002
```

```
        route-target export 9002:9002 evpn
        route-target import 9002:9002 evpn
vrf Test_3
        rd 21.1.1.1:9003
        route-target export 9003:9003 evpn
        route-target import 9003:9003 evpn
vrf Test_4
        rd 21.1.1.1:9004
        route-target export 9004:9004 evpn
        route-target import 9004:9004 evpn
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vsf secondary-member 2
vsf member 1
        type jl668a
        link 1 1/1/25
        link 2 1/1/26
vsf member 2
        type jl668a
        link 1 2/1/25
        link 2 2/1/26
vlan 1
vlan 601
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 602
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 603
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 604
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 701
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 702
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 703
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 704
        ip igmp snooping enable
        ipv6 mld snooping enable
virtual-mac 00:00:20:01:56:67
evpn
        arp-suppression
        redistribute local-mac
        redistribute local-svi
        vlan 601
                rd 21.1.1.1:601
                route-target export 301:601
```

```
                route-target import 301:601
                redistribute host-route
        vlan 602
                rd 21.1.1.1:602
                route-target export 302:602
                route-target import 302:602
                redistribute host-route
        vlan 603
                rd 21.1.1.1:603
                route-target export 303:603
                route-target import 303:603
                redistribute host-route
        vlan 604
                rd 21.1.1.1:604
                route-target export 304:604
                route-target import 304:604
                redistribute host-route
        vlan 701
                rd 21.1.1.1:701
                route-target export 301:701
                route-target import 301:701
                redistribute host-route
        vlan 702
                rd 21.1.1.1:702
                route-target export 302:702
                route-target import 302:702
                redistribute host-route
        vlan 703
                rd 21.1.1.1:703
                route-target export 303:703
                route-target import 303:703
                redistribute host-route
        vlan 704
                rd 21.1.1.1:704
                route-target export 304:704
                route-target import 304:704
                redistribute host-route
no spanning-tree
interface mgmt
        no shutdown
        ip dhcp
interface 1/1/2
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 601-604,701-704
interface 2/1/10
        description port_Site2-fabric2-BorderRR-SA
        no shutdown
        routing
        ip address 91.1.2.2/30
        ip ospf 1 area 0.0.0.0
interface loopback 0
        ip address 24.0.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 25.1.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 101
        vrf attach Test_1
        ip address 25.0.101.1/32
```

```
        ipv6 address 25:0:101::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 102
        vrf attach Test_2
        ip address 25.0.102.1/32
        ipv6 address 25:0:102::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 103
        vrf attach Test_3
        ip address 25.0.103.1/32
        ipv6 address 25:0:103::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 104
        vrf attach Test_4
        ip address 25.0.104.1/32
        ipv6 address 25:0:104::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 1
        shutdown
        no ip dhcp
interface vlan 601
        vrf attach Test_1
        ip address 20.11.1.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 20.11.1.1
        ipv6 address 20:11:1::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 20:11:1::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 602
        vrf attach Test_2
        ip address 20.11.2.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 20.11.2.1
        ipv6 address 20:11:2::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 20:11:2::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 603
        vrf attach Test_3
        ip address 20.11.3.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 20.11.3.1
        ipv6 address 20:11:3::3/64
```

```
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 20:11:3::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 604
        vrf attach Test_4
        ip address 20.11.4.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 20.11.4.1
        ipv6 address 20:11:4::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 20:11:4::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 701
        vrf attach Test_1
        ip address 27.12.1.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 27.12.1.1
        ipv6 address 27:12:1::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 27:12:1::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 702
        vrf attach Test_2
        ip address 27.12.2.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 27.12.2.1
        ipv6 address 27:12:2::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 27:12:2::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 703
        vrf attach Test_3
        ip address 27.12.3.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 27.12.3.1
        ipv6 address 27:12:3::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 27:12:3::1
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 704
        vrf attach Test_4
        ip address 27.12.4.3/24
        active-gateway ip mac 00:00:10:00:10:01
        active-gateway ip 27.12.4.1
        ipv6 address 27:12:4::3/64
        active-gateway ipv6 mac 00:00:14:14:15:00
        active-gateway ipv6 27:12:4::1
```

```
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vxlan 1
        source ip 25.1.1.1
        no shutdown
        vni 9001
                vrf Test_1
                routing
        vni 9002
                vrf Test_2
                routing
        vni 9003
                vrf Test_3
                routing
        vni 9004
                vrf Test_4
                routing
        vni 150101
                vlan 601
        vni 150102
                vlan 602
        vni 150103
                vlan 603
        vni 150104
                vlan 604
        vni 150701
                vlan 701
        vni 150702
                vlan 702
        vni 150703
                vlan 703
        vni 150704
                vlan 704
!
!
!
!
!
router ospf 1 vrf Test_1
        router-id 21.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_2
        router-id 21.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_3
        router-id 21.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospf 1 vrf Test_4
        router-id 21.4.10.1
        distance 250
        redistribute connected
```

```
        redistribute local loopback
        area 0.0.0.0
router ospf 1
        router-id 21.0.10.1
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_1
        router-id 21.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_2
        router-id 21.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_3
        router-id 21.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1 vrf Test_4
        router-id 21.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router ospfv3 1
        router-id 21.0.10.1
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65003
        bgp router-id 25.0.1.1
        neighbor 19.0.1.1 remote-as 65003
        neighbor 19.0.1.1 update-source loopback 0
        neighbor 91.1.1.1 remote-as 65003
        address-family ipv4 unicast
                neighbor 91.1.1.1 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 19.0.1.1 send-community extended
                neighbor 19.0.1.1 activate
        exit-address-family
!
vrf Test_1
        address-family ipv4 unicast
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family ipv6 unicast
                redistribute connected
```

```
                redistribute local loopback
        exit-address-family
!
vrf Test_2
        address-family ipv4 unicast
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family ipv6 unicast
                redistribute connected
                redistribute local loopback
        exit-address-family
!
vrf Test_3
        address-family ipv4 unicast
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family ipv6 unicast
                redistribute connected
                redistribute local loopback
        exit-address-family
!
vrf Test_4
        address-family ipv4 unicast
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family ipv6 unicast
                redistribute connected
                redistribute local loopback
        exit-address-family
!
router pim vrf Test_1
        enable
router pim vrf Test_2
        enable
router pim vrf Test_3
        enable
router pim vrf Test_4
        enable
router pim6 vrf Test_1
        enable
router pim6 vrf Test_2
        enable
router pim6 vrf Test_3
        enable
router pim6 vrf Test_4
        enable
https-server vrf default
https-server vrf mgmt
===========
Outputs:
==========
Site2-fabric2-Access-vtep-2#  show ip ospf neighbors all-vrfs
VRF : default                           Process : 1
================================================

Total Number of Neighbors : 1
Neighbor ID      Priority  State             Nbr Address       Interface
------------------------------------------------------------------------------
19.0.1.1         1         FULL/BDR          91.1.2.1           2/1/10
```

```
Site2-fabric2-Access-vtep-2# show ipv6 ospfv3 neighbors all-vrfs
No OSPFv3 neighbor found on any vrf.

Site2-fabric2-Access-vtep-2#  show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : Test_1                            Total number of neighbors : 4
-------------------------------------------------------------------------------
-
Interface Neighbor Uptime    Expires      DR       Hold Time     Secondary Address
          (IPV4)   (HH:MM:SS)(HH:MM:SS)  Priority  (HH:MM:SS)          (IPV4)
--------  -------- ------  ----------  ----------  ---------  --------------------
-
vni9001  11.1.1.1  04:02:05  00:03:29    1          00:03:30
vlan601  20.11.1.2 03:57:03  00:01:42    16843031   00:01:45            Nil
vni9001  23.1.1.1  04:02:05  00:03:29    1          00:03:30
vlan701  27.12.1.2 03:56:56  00:01:21    16843031   00:01:45            Nil
-------------------------------------------------------------------------------
-
VRF : Test_2                            Total number of neighbors : 4
-------------------------------------------------------------------------------
-
vni9002  11.1.1.1  04:01:58  00:03:07    1          00:03:30
vlan602  20.11.2.2 03:57:02  00:01:45    16843031   00:01:45            Nil
vni9002  23.1.1.1  04:01:58  00:03:06    1          00:03:30
vlan702  27.12.2.2 03:57:08  00:01:42    16843031   00:01:45            Nil
-------------------------------------------------------------------------------
-
VRF : Test_3                            Total number of neighbors : 4
-------------------------------------------------------------------------------
-
vni9003  11.1.1.1  04:01:58  00:03:04    1           00:03:30
vlan603  20.11.3.2 03:56:57  00:01:22    16843031    00:01:45           Nil
vni9003  23.1.1.1  04:01:58  00:03:08    1           00:03:30
vlan703  27.12.3.2 03:57:09  00:01:42    16843031    00:01:45           Nil
-------------------------------------------------------------------------------
-
VRF : Test_4                            Total number of neighbors : 4
-------------------------------------------------------------------------------
-
vni9004  11.1.1.1  04:01:54  00:03:10    1           00:03:30
vlan604  20.11.4.2 03:57:00  00:01:16    16843031    00:01:45            Nil
vni9004  23.1.1.1  04:01:49  00:03:09    1           00:03:30
vlan704  27.12.4.2 03:57:01  00:01:44    16843031    00:01:45            Nil
-------------------------------------------------------------------------------
-
Site2-fabric2-Access-vtep-2# show ip pim all-vrfs

PIM Global Parameters

VRF                              :  Test_1
PIM Status                       :  Enabled
PIM SSM Status                   :  Disabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
PIM BIDI NSF Status              :  Inactive
Shared Border Status             :  Disabled
Multicast Fabric Identifier      :  65003
```

```
VRF                                 :  Test_2
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Disabled
Multicast Fabric Identifier         :  65003
VRF                                 :  Test_3
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Disabled
Multicast Fabric Identifier         :  65003

VRF                                 :  Test_4
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Disabled
Multicast Fabric Identifier         :  65003
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
Site2-fabric2-Access-vtep-2# show ipv6 pim6 all-vrfs

PIM Global Parameters

VRF                                 :  Test_1
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Disabled
Multicast Fabric Identifier         :  65003

VRF                                 :  Test_2
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Disabled
```

```
Multicast Fabric Identifier       :  65003

VRF                               :  Test_3
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65003

VRF                               :  Test_4
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Disabled
Multicast Fabric Identifier       :  65003
PIM is not enabled for VRF default
PIM is not enabled for VRF mgmt
Site2-fabric2-Access-vtep-2# show ipv6 pim6 neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : Test_1                           Total number of neighbors : 4
--------------------------------------------------------------------------------
Interface Neighbor  Uptime     Expires     DR        Hold Time    Secondary
Address
          (IPV6)     (HH:MM:SS) (HH:MM:SS)  Priority  (HH:MM:SS)        (IPV6)
--------- ---------- -------  ---------  ----------  ----------  -----------------
-
vni9001 fe80::11:1:1:1 04:03:18  00:03:01      1          00:03:30
vni9001 fe80::23:1:1:1 04:03:22  00:03:15      1          00:03:30
vlan601fe80::5480:2882:59fc:950003:58:16 00:01:35 16843031  00:01:45     20:11:1::2
vlan701fe80::5480:2882:bdfc:950003:58:25 00:01:23 16843031  00:01:45     27:12:1::2
--------------------------------------------------------------------------------
-
VRF : Test_2                           Total number of neighbors : 4
--------------------------------------------------------------------------------
-
vni9002 fe80::11:1:1:1  04:03:23 00:03:25     1         00:03:30
vni9002 fe80::23:1:1:1  04:03:23 00:03:09     1         00:03:30
vlan602 fe80::5480:2882:5afc:950003:58:18 00:01:31 16843031 00:01:45     20:11:2::2
vlan702 fe80::5480:2882:befc:950003:58:25 00:01:21 16843031 00:01:45     27:12:2::2
--------------------------------------------------------------------------------
-
VRF : Test_3                           Total number of neighbors : 4
--------------------------------------------------------------------------------
-
vni9003 fe80::11:1:1:1  04:03:25 00:03:06    1          00:03:30
vni9003 fe80::23:1:1:1  04:03:23 00:03:07    1          00:03:30
vlan603 fe80::5480:2882:5bfc:950003:58:15 00:01:35 16843031 00:01:45    20:11:3::2
vlan703 fe80::5480:2882:bffc:950003:58:20 00:01:28  16843031 00:01:45    27:12:3::2
--------------------------------------------------------------------------------
-
VRF : Test_4                           Total number of neighbors : 4
```

```
--------------------------------------------------------------------------------
-
vni9004 fe80::11:1:1:1 04:03:21  00:03:19    1          00:03:30
vni9004 fe80::23:1:1:1 04:03:22  00:03:14    1          00:03:30
vlan604 fe80::5480:2882:5cfc:950003:58:21 00:01:26  16843031 00:01:45   20:11:4::2
vlan704 fe80::5480:2882:c0fc:950003:58:16 00:01:32  16843031 00:01:45   27:12:4::2
--------------------------------------------------------------------------------
-
Site2-fabric2-Access-vtep-2#  show ip pim rp-set all-vrfs

VRF: Test_1

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.101.1       150        106          192

VRF: Test_2

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.102.1       150        132          192
VRF: Test_3
Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.103.1       150        94           192

VRF: Test_4

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.104.1       150        129          192
Site2-fabric2-Access-vtep-2# show ip mroute 225.15.1.1 all-vrfs detail

IP Multicast Route Entries


VRF : Test_1

Group Address                 : 225.15.1.1
Source Address                : 11.11.1.100
Neighbor                      : 11.1.1.1
Incoming interface            : vni9001
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 02:46:40
Downstream Interface
Interface       State
-----------     ----------
```

```
vlan701         forwarding
vlan601         forwarding

Site2-fabric2-Access-vtep-2# show ipv6 mroute ff25:15:1::1 all-vrfs detail

IP Multicast Route Entries

VRF : Test_1

Group Address                 : ff25:15:1::1
Source Address                : 11:11:1::100
Neighbor                      : fe80::11:1:1:1
Incoming interface            : vni9001
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 02:53:12
Downstream Interface
Interface       State
-----------     ----------
vlan701         forwarding
vlan601         forwarding

Site2-fabric2-Access-vtep-2#

Site2-fabric2-Access-vtep-2#  show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65003        BGP Router Identifier  : 25.0.1.1
Peers                  : 2            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------
Neighbor                                 Remote-AS   MsgRcvd MsgSent Up/Down Time
State         AdminStatus
91.1.1.1                                 65003       1116    1062    15h:19m:59s
Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
Neighbor                                 Remote-AS   MsgRcvd MsgSent Up/Down Time
State         AdminStatus
19.0.1.1                                 65003       3819    2378    15h:19m:56s
Established   Up
Codes: * Dynamic Neighbor
VRF : Test_1
BGP Summary
-----------
Local AS               : 65003        BGP Router Identifier  : 25.0.101.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
```

```
Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : Test_2
BGP Summary
-----------
Local AS               : 65003        BGP Router Identifier  : 25.0.102.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------
Codes: * Dynamic Neighbor

VRF : Test_3
BGP Summary
-----------
Local AS               : 65003        BGP Router Identifier  : 25.0.103.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : Test_4
BGP Summary
-----------
Local AS               : 65003        BGP Router Identifier  : 25.0.104.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------
Site2-fabric2-Access-vtep-2# show interface vxlan vteps
Source    Destination   Origin     Status       VNI       Routing   VLAN    VRF
--------- ------------  --------  ---------   --------    --------  ------ -----
25.1.1.1  11.1.1.1      evpn      operational   9001      enabled   --    Test_1
25.1.1.1  11.1.1.1      evpn      operational   9002      enabled   --    Test_2
25.1.1.1  11.1.1.1      evpn      operational   9003      enabled   --    Test_3
25.1.1.1  11.1.1.1      evpn      operational   9004      enabled   --    Test_4
25.1.1.1  23.1.1.1      evpn      operational   9001      enabled   --    Test_1
25.1.1.1  23.1.1.1      evpn      operational   9002      enabled   --    Test_2
25.1.1.1  23.1.1.1      evpn      operational   9003      enabled   --    Test_3
25.1.1.1  23.1.1.1      evpn      operational   9004      enabled   --    Test_4
```

```
25.1.1.1  23.1.1.1      evpn      operational   150101    disabled  601    --
25.1.1.1  23.1.1.1      evpn      operational   150102    disabled  602    --
25.1.1.1  23.1.1.1      evpn      operational   150103    disabled  603    --
25.1.1.1  23.1.1.1      evpn      operational   150104    disabled  604    --
25.1.1.1  23.1.1.1      evpn      operational   150701    disabled  701    --
25.1.1.1  23.1.1.1      evpn      operational   150702    disabled  702    --
25.1.1.1  23.1.1.1      evpn      operational   150703    disabled  703    --
25.1.1.1  23.1.1.1      evpn      operational   150704    disabled  704    --
```

Site-2-Fabric2-BorderRR-SA

```
Site2-fabric2-BorderRR-SA# show run
hostname Site2-fabric2-BorderRR-SA
user admin group administrators password ciphertext
AQBapWow9UMjYHKqXqB7XmVw+VamJZGduGA28fKdlKc6qyH9YgAAAN3tP6I96vONgPLoNC42pbNHmvivtH
bPzx0I/kITPiEGwx1SoqhH9Wzeahlv5wHadHbmQo7toT3G1acLKc7D94cmugoNqupxyeIxHso1c14joRyR
zCleju3MmwyNJ1lz4FSj
module 1/3 product-number r0x45a
module 1/4 product-number r0x40b
module 1/5 product-number r0x40b
module 1/6 product-number r0x41a
module 1/7 product-number r0x45a
module 1/8 product-number r0x43a
module 1/9 product-number r0x39b
module 1/10 product-number r0x41a
module 1/11 product-number r0x41a
module 1/12 product-number r0x41a
profile default
ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst
ntp enable
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf default
ssh server vrf mgmt
vlan 1
virtual-mac 00:00:10:25:00:03
spanning-tree
interface mgmt
        no shutdown
        ip dhcp
interface lag 100
        no shutdown
        no routing
        vlan trunk native 1 tag
        vlan trunk allowed all
        lacp mode active
interface 1/3/12
        description port_Site2-fabric2-Access-vtep-1
        no shutdown
        routing
        ip address 91.1.1.1/30
        ip ospf 1 area 0.0.0.0
interface 1/8/3
        description port_Site2-Shared-border-vsxsec
        no shutdown
```

```
        routing
        ip address 90.1.2.2/30
interface 1/8/8
        description port_Site2-Shared-border-vsxpri
        no shutdown
        routing
        ip address 90.1.1.2/30
interface 1/11/19
        description port_Site2-fabric2-Access-vtep-2
        no shutdown
        routing
        ip address 91.1.2.1/30
        ip ospf 1 area 0.0.0.0
interface loopback 0
        ip address 19.0.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 19.1.1.1/32
        ip ospf 1 area 0.0.0.0
interface vlan 1
        ip dhcp
interface vxlan 1
!
!
!
!
!
router ospf 1
        router-id 19.0.1.1
        distance 250
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65003
        bgp router-id 19.0.1.1
        neighbor 11.0.1.1 remote-as 65001
        neighbor 11.0.1.1 ebgp-multihop 5
        neighbor 11.0.1.1 update-source loopback 0
        neighbor 11.0.1.2 remote-as 65001
        neighbor 11.0.1.2 ebgp-multihop 5
        neighbor 11.0.1.2 update-source loopback 0
        neighbor 23.0.1.1 remote-as 65003
        neighbor 23.0.1.1 update-source loopback 0
        neighbor 24.0.1.1 remote-as 65003
        neighbor 24.0.1.1 update-source loopback 0
        neighbor 90.1.1.1 remote-as 65001
        neighbor 90.1.1.1 ebgp-multihop 5
        neighbor 90.1.2.1 remote-as 65001
        neighbor 90.1.2.1 ebgp-multihop 5
        neighbor 91.1.1.2 remote-as 65003
        neighbor 91.1.2.2 remote-as 65003
        address-family ipv4 unicast
                neighbor 90.1.1.1 activate
                neighbor 90.1.2.1 activate
                neighbor 91.1.1.2 activate
                neighbor 91.1.2.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 11.0.1.1 next-hop-unchanged
                neighbor 11.0.1.1 send-community extended
```

```
                neighbor 11.0.1.1 activate
                neighbor 11.0.1.2 next-hop-unchanged
                neighbor 11.0.1.2 send-community extended
                neighbor 11.0.1.2 activate
                neighbor 23.0.1.1 route-reflector-client
                neighbor 23.0.1.1 send-community extended
                neighbor 23.0.1.1 activate
                neighbor 24.0.1.1 route-reflector-client
                neighbor 24.0.1.1 send-community extended
                neighbor 24.0.1.1 activate
        exit-address-family
!
https-server vrf default
https-server vrf mgmt
===========
Outputs:
==========
Site2-fabric2-BorderRR-SA# show ip ospf neighbors all-vrfs
VRF : default                           Process : 1
================================================

Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
21.0.10.1        1         FULL/DR           91.1.2.2           1/11/19
20.0.10.1        1         FULL/DR           91.1.1.2           1/3/12


Site2-fabric2-BorderRR-SA# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65003        BGP Router Identifier  : 19.0.1.1
Peers                  : 8            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor                                 Remote-AS   MsgRcvd MsgSent Up/Down Time
State         AdminStatus
90.1.1.1                                 65001       8598    8621    05h:03m:38s
Established   Up
90.1.2.1                                 65001       8582    8635    05h:03m:33s
Established   Up
91.1.1.2                                 65003       8590    9038    06h:18m:32s
Established   Up
91.1.2.2                                 65003       8580    9056    15h:18m:57s
Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
Neighbor  Remote-AS   MsgRcvd MsgSent Up/Down Time State         AdminStatus
11.0.1.1  65001       15109   21850   05h:03m:23s  Established   Up
11.0.1.2  65001       14775   21636   05h:03m:19s  Established   Up
```

```
23.0.1.1  65003       11467   18980   06h:18m:17s  Established   Up
24.0.1.1  65003       12296   19091   15h:18m:54s  Established   Up
```

Site-2-Shared-Border-vsx-primary

```
Site2-Shared-border-vsxpri# show run
hostname Site2-Shared-border-vsxpri
power consumption-average-period 600
no ip icmp redirect
profile leaf
route-redistribute active-routes-only
vrf Test_1
        rd 11.1.1.1:9001
        route-target export 9001:9001 evpn
        route-target import 9001:9001 evpn
vrf Test_2
rd 11.1.1.1:9002
        route-target export 9002:9002 evpn
        route-target import 9002:9002 evpn
vrf Test_3
        rd 11.1.1.1:9003
        route-target export 9003:9003 evpn
        route-target import 9003:9003 evpn
vrf Test_4
        rd 11.1.1.1:9004
        route-target export 9004:9004 evpn
        route-target import 9004:9004 evpn
vrf ka
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
system internal-vlan-range 3000-3999
vlan 1,5,1001-1008,1101-1108,2001
virtual-mac 00:00:02:00:00:00
evpn
        arp-suppression
        redistribute local-mac
        redistribute local-svi
interface mgmt
        no shutdown
        ip dhcp
system interface-group 1 speed 10g
        !interface group 1 contains ports 1/1/1-1/1/12
system interface-group 2 speed 10g
        !interface group 2 contains ports 1/1/13-1/1/24
system interface-group 3 speed 10g
        !interface group 3 contains ports 1/1/25-1/1/36
system interface-group 4 speed 10g
        !interface group 4 contains ports 1/1/37-1/1/48
interface lag 100
        no shutdown
        no routing
        vlan trunk native 1 tag
```

```
        vlan trunk allowed 5,1001-1008,2001
        lacp mode active
interface 1/1/5
        description port_Site2-Shared-border-vsxsec
        no shutdown
        lag 100
interface 1/1/7
        description port_Site2-fabric1-BorderRR-primary
        no shutdown
        ip address 60.1.1.1/30
interface 1/1/37
        description port_R15-Site5-BorderVtep2
        no shutdown
        ip address 50.10.1.2/30
interface 1/1/41
        description port_Site2-fabric1-BorderRR-secondary
        no shutdown
        ip address 60.2.1.1/30
interface 1/1/43
        description port_External-DUT
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1101-1108
interface 1/1/44
        description port_Site1-BorderVtep-SA
        no shutdown
        ip address 50.1.1.2/30
interface 1/1/47
        description port_Site2-fabric2-BorderRR-SA
        no shutdown
        ip address 90.1.1.1/30
interface loopback 0
        ip address 11.0.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 11.1.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 2
        ip address 11.1.1.10/32
        ip ospf 1 area 0.0.0.0
interface loopback 5
        ip address 15.1.17.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 67
        ip address 191.12.14.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 101
        vrf attach Test_1
        ip address 16.0.101.1/32
        ipv6 address 16:0:101::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 102
        vrf attach Test_2
        ip address 16.0.102.1/32
        ipv6 address 16:0:102::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
```

```
        ipv6 pim6-sparse enable
interface loopback 103
        vrf attach Test_3
        ip address 16.0.103.1/32
        ipv6 address 16:0:103::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 104
        vrf attach Test_4
        ip address 16.0.104.1/32
        ipv6 address 16:0:104::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 5
        ip address 25.1.91.1/30
        ipv6 address 50:19:4::1/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
interface vlan 1001
        vrf attach Test_1
        ip address 60.19.1.1/30
        ipv6 address 60:19:1::1/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse datapath-auto-include
        ipv6 pim6-sparse datapath-auto-include
interface vlan 1002
        vrf attach Test_2
        ip address 60.19.2.1/30
        ipv6 address 60:19:2::1/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse datapath-auto-include
        ipv6 pim6-sparse datapath-auto-include
interface vlan 1003
        vrf attach Test_3
        ip address 60.19.3.1/30
        ipv6 address 60:19:3::1/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse datapath-auto-include
        ipv6 pim6-sparse datapath-auto-include
interface vlan 1004
        vrf attach Test_4
        ip address 60.19.4.1/30
        ipv6 address 60:19:4::1/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse datapath-auto-include
        ipv6 pim6-sparse datapath-auto-include
```

```
interface vlan 1101
        vrf attach Test_1
        ip address 60.1.1.2/30
        ipv6 address 60:1:1::2/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 1102
        vrf attach Test_2
        ip address 60.1.2.2/30
        ipv6 address 60:1:2::2/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 1103
        vrf attach Test_3
        ip address 60.1.3.2/30
        ipv6 address 60:1:3::2/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 1104
        vrf attach Test_4
        ip address 60.1.4.2/30
        ipv6 address 60:1:4::2/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 2001
        vrf attach ka
        ip address 192.168.100.1/30
interface vxlan 1
        source ip 11.1.1.1
        no shutdown
        vni 9001
                vrf Test_1
                routing
        vni 9002
                vrf Test_2
                routing
        vni 9003
                vrf Test_3
                routing
        vni 9004
                vrf Test_4
                routing
vsx
        system-mac 00:00:01:00:00:00
        inter-switch-link lag 100
        role primary
        keepalive peer 192.168.100.2 source 192.168.100.1 vrf ka
        vsx-sync evpn mgmd-global vsx-global
mirror session 1
        destination cpu
        source interface 1/1/7 tx
        enable
!
!
```

```
!
!
route-map rmap1 permit seq 10
        set local-broadcast-group 1
route-map rmap2 permit seq 10
        set local-broadcast-group 2
route-map rmap3 permit seq 10
        set local-broadcast-group 4
route-map rmap4 permit seq 10
        set local-broadcast-group 3
route-map tag_bgp_ospf permit seq 10
        set tag 110
route-map tag_ospf_bgp deny seq 10
        match tag 110
route-map tag_ospf_bgp deny seq 20
        match tag 120
route-map tag_ospf_bgp permit seq 30
!
router ospf 1 vrf Test_1
        router-id 11.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1 vrf Test_2
        router-id 11.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1 vrf Test_3
        router-id 11.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1 vrf Test_4
        router-id 11.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1
        router-id 11.0.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospfv3 1 vrf Test_1
        router-id 11.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospfv3 1 vrf Test_2
        router-id 11.2.10.1
```

```
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospfv3 1 vrf Test_3
        router-id 11.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospfv3 1 vrf Test_4
        router-id 11.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospfv3 1
        router-id 11.0.10.1
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65001
        bgp router-id 11.0.1.1
        neighbor 10.0.1.1 remote-as 65000
        neighbor 10.0.1.1 ebgp-multihop 5
        neighbor 10.0.1.1 update-source loopback 0
        neighbor 10.10.1.1 remote-as 65010
        neighbor 10.10.1.1 ebgp-multihop 5
        neighbor 10.10.1.1 update-source loopback 0
        neighbor 12.0.1.1 remote-as 65002
        neighbor 12.0.1.1 ebgp-multihop 5
        neighbor 12.0.1.1 update-source loopback 0
        neighbor 12.0.2.1 remote-as 65002
        neighbor 12.0.2.1 ebgp-multihop 5
        neighbor 12.0.2.1 update-source loopback 0
        neighbor 19.0.1.1 remote-as 65003
        neighbor 19.0.1.1 ebgp-multihop 5
        neighbor 19.0.1.1 update-source loopback 0
        neighbor 50.1.1.1 remote-as 65000
        neighbor 50.1.1.1 ebgp-multihop 5
        neighbor 50.10.1.1 remote-as 65010
        neighbor 50.10.1.1 ebgp-multihop 5
        neighbor 60.1.1.2 remote-as 65002
        neighbor 60.1.1.2 ebgp-multihop 5
        neighbor 60.2.1.2 remote-as 65002
        neighbor 60.2.1.2 ebgp-multihop 5
        neighbor 90.1.1.2 remote-as 65003
        neighbor 90.1.1.2 ebgp-multihop 5
        address-family ipv4 unicast
                neighbor 50.1.1.1 activate
                neighbor 50.10.1.1 activate
                neighbor 60.1.1.2 activate
                neighbor 60.2.1.2 activate
                neighbor 90.1.1.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
```

```
        address-family l2vpn evpn
                neighbor 10.0.1.1 route-map rmap1 in
                neighbor 10.0.1.1 send-community extended
                neighbor 10.0.1.1 activate
                neighbor 10.10.1.1 route-map rmap1 in
                neighbor 10.10.1.1 send-community extended
                neighbor 10.10.1.1 activate
                neighbor 12.0.1.1 route-map rmap2 in
                neighbor 12.0.1.1 send-community extended
                neighbor 12.0.1.1 activate
                neighbor 12.0.2.1 route-map rmap2 in
                neighbor 12.0.2.1 send-community extended
                neighbor 12.0.2.1 activate
                neighbor 19.0.1.1 route-map rmap4 in
                neighbor 19.0.1.1 send-community extended
                neighbor 19.0.1.1 activate
        exit-address-family
!
        vrf Test_1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospfv3 route-map tag_ospf_bgp
                exit-address-family
!
        vrf Test_2
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospfv3 route-map tag_ospf_bgp
                exit-address-family
!
        vrf Test_3
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospfv3 route-map tag_ospf_bgp
                exit-address-family
!
        vrf Test_4
                address-family ipv4 unicast
                        redistribute connected
                redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
```

```
                        redistribute local loopback
                        redistribute ospfv3 route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf Test_1
        enable
        rp-candidate source-ip-interface loopback101 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface loopback101
router pim vrf Test_2
        enable
        rp-candidate source-ip-interface loopback102 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface loopback102
router pim vrf Test_3
        enable
        rp-candidate source-ip-interface loopback103 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface loopback103
router pim vrf Test_4
        enable
        rp-candidate source-ip-interface loopback104 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface loopback104
router pim6 vrf Test_1
        enable
router pim6 vrf Test_2
        enable
router pim6 vrf Test_3
        enable
router pim6 vrf Test_4
        enable
https-server vrf mgmt
ip multicast multi-fabric border
ipv6 multicast multi-fabric border
===========
Outputs:
==========
Site2-Shared-border-vsxpri#  show ip ospf neighbors all-vrfs
VRF : Test_1                            Process : 1
=================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
12.1.10.1        1         FULL/DR           60.19.1.2          vlan1001
20.1.10.1        1         FULL/DR           60.1.1.1           vlan1101
VRF : Test_2                            Process : 1
=================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
12.2.10.1        1         FULL/DR           60.19.2.2          vlan1002
20.2.10.1        1         FULL/DR           60.1.2.1           vlan1102
VRF : Test_3                            Process : 1
=================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
12.3.10.1        1         FULL/DR           60.19.3.2          vlan1003
20.3.10.1        1         FULL/DR           60.1.3.1           vlan1103
```

```
VRF : Test_4                            Process : 1
================================================

Total Number of Neighbors : 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
12.4.10.1        1         FULL/DR           60.19.4.2          vlan1004
20.4.10.1        1         FULL/DR           60.1.4.1           vlan1104
VRF : default                           Process : 1
================================================

Total Number of Neighbors : 1

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
12.0.10.1        1         FULL/DR           25.1.91.2          vlan5
Site2-Shared-border-vsxpri# show ipv6 ospfv3 neighbors all-vrfs
VRF : Test_1                            Process : 1
================================================

Total Number of Neighbors: 2

Neighbor ID      Priority  State             Interface
-------------------------------------------------------
12.1.10.1        1         FULL/DR           vlan1001
Neighbor address fe80::9020:c283:e9be:3700
20.1.10.1        1         FULL/DR           vlan1101
Neighbor address fe80::ec50:aa84:4da4:3060
VRF : Test_2                            Process : 1

================================================
Total Number of Neighbors: 2

Neighbor ID      Priority  State             Interface
-------------------------------------------------------
12.2.10.1        1         FULL/DR           vlan1002
Neighbor address fe80::9020:c283:eabe:3700
20.2.10.1        1         FULL/DR           vlan1102
Neighbor address fe80::ec50:aa84:4ea4:3060
VRF : Test_3                            Process : 1
================================================

Total Number of Neighbors: 2

Neighbor ID      Priority  State             Interface
-------------------------------------------------------
12.3.10.1        1         FULL/DR           vlan1003
Neighbor address fe80::9020:c283:ebbe:3700
20.3.10.1        1         FULL/DR           vlan1103
Neighbor address fe80::ec50:aa84:4fa4:3060
VRF : Test_4                            Process : 1
================================================

Total Number of Neighbors: 2

Neighbor ID      Priority  State             Interface
-------------------------------------------------------
12.4.10.1        1         FULL/DR           vlan1004
Neighbor address fe80::9020:c283:ecbe:3700
20.4.10.1        1         FULL/DR           vlan1104
Neighbor address fe80::ec50:aa84:50a4:3060
```

```
VRF : default                           Process : 1
=================================================

Total Number of Neighbors: 1

Neighbor ID      Priority  State             Interface
-------------------------------------------------------
12.0.10.1        1         FULL/DR           vlan5
Neighbor address fe80::9020:c280:5be:3700
Site2-Shared-border-vsxpri#  show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : Test_1                            Total number of neighbors : 8
-------------------------------------------------------------------------------
-
Interface Neighbor    Uptime        Expires    DR      Hold Time  Secondary
Address
          (IPV4)      (HH:MM:SS)    (HH:MM:SS) Priority (HH:MM:SS)       (IPV4)
--------- ----------  ---------  ------------ ------  ----------  ----------------
-
vni9001  10.1.1.1    15:12:58      00:03:22    1        00:03:30
vni9001  10.10.10.1  15:12:58      00:03:19    1        00:03:30
vni9001  13.1.1.1    15:12:58      00:03:19    1        00:03:30
vni9001  14.1.1.1    15:12:58      00:03:19    1        00:03:30
vni9001  23.1.1.1    04:10:52      00:03:10    1        00:03:30
vni9001  25.1.1.1    04:01:54      00:03:10    1        00:03:30
vlan1101 60.1.1.1    15:12:38      00:01:16    1        00:01:45         Nil
vlan1001 60.19.1.2   15:12:38      00:01:40    16843019 00:01:45         Nil
-------------------------------------------------------------------------------
-
VRF : Test_2                            Total number of neighbors : 8
-------------------------------------------------------------------------------
-
vni9002  10.1.1.1    17:58:30      00:03:04    1        00:03:30
vni9002  10.10.10.1  17:58:30      00:03:05    1        00:03:30
vni9002  13.1.1.1    17:58:30      00:03:03    1        00:03:30
vni9002  14.1.1.1    17:58:30      00:03:07    1        00:03:30
vni9002  23.1.1.1    17:58:30      00:03:17    1        00:03:30
vni9002  25.1.1.1    04:01:46      00:03:17    1        00:03:30
vlan1102 60.1.2.1    17:58:37      00:01:19    1        00:01:45         Nil
vlan1002 60.19.2.2   17:58:37      00:01:17    16843019 00:01:45         Nil
-------------------------------------------------------------------------------
VRF : Test_3                            Total number of neighbors : 8
-------------------------------------------------------------------------------
-
vni9003  10.1.1.1    13:15:16      00:03:20     1       00:03:30
vni9003  10.10.10.1  13:15:16      00:03:23     1       00:03:30
vni9003  13.1.1.1    13:15:16      00:03:21     1       00:03:30
vni9003  14.1.1.1    13:15:16      00:03:23     1       00:03:30
vni9003  23.1.1.1    13:14:17      00:03:19     1       00:03:30
vni9003  25.1.1.1    04:01:45      00:03:20     1       00:03:30
vlan1103 60.1.3.1    13:15:07      00:01:44     1       00:01:45         Nil
vlan1003 60.19.3.2   13:15:01      00:01:38     16843019 00:01:45        Nil
-------------------------------------------------------------------------------
-
VRF : Test_4                            Total number of neighbors : 8
-------------------------------------------------------------------------------
-
vni9004 10.1.1.1     17:58:30     00:03:05      1        00:03:30
vni9004 10.10.10.1   17:58:32     00:03:04      1        00:03:30
vni9004 13.1.1.1     17:58:32     00:03:00      1        00:03:30
vni9004 14.1.1.1     17:58:30     00:03:07      1        00:03:30
```

```
vni9004 23.1.1.1     17:58:32     00:03:20      1        00:03:30
vni9004 25.1.1.1     04:01:42     00:03:18      1        00:03:30
vlan1104 60.1.4.1    17:58:37     00:01:15      1        00:01:45        Nil
vlan1004 60.19.4.2   17:58:37     00:01:44      16843019 00:01:45        Nil
--------------------------------------------------------------------------------
-
Site2-Shared-border-vsxpri#  show ip pim all-vrfs
PIM Global Parameters
VRF                              :  Test_1
PIM Status                       :  Enabled
PIM SSM Status                   :  Disabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
PIM BIDI NSF Status              :  Inactive
Shared Border Status             :  Enabled
Multicast Fabric Identifier      :  65001

VRF                              :  Test_2
PIM Status                       :  Enabled
PIM SSM Status                   :  Disabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
PIM BIDI NSF Status              :  Inactive
Shared Border Status             :  Enabled
Multicast Fabric Identifier      :  65001

VRF                              :  Test_3
PIM Status                       :  Enabled
PIM SSM Status                   :  Disabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
PIM BIDI NSF Status              :  Inactive
Shared Border Status             :  Enabled
Multicast Fabric Identifier      :  65001

VRF                              :  Test_4
PIM Status                       :  Enabled
PIM SSM Status                   :  Disabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
PIM BIDI NSF Status              :  Inactive
Shared Border Status             :  Enabled
Multicast Fabric Identifier      :  65001
PIM is not enabled for VRF default
PIM is not enabled for VRF ka
PIM is not enabled for VRF mgmt
Site2-Shared-border-vsxpri# show ipv6 pim6 all-vrfs

PIM Global Parameters
```

```
VRF                                 :  Test_1
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Enabled
Multicast Fabric Identifier         :  65001

VRF                                 :  Test_2
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Enabled
Multicast Fabric Identifier         :  65001

VRF                                 :  Test_3
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Enabled
Multicast Fabric Identifier         :  65001

VRF                                 :  Test_4
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Enabled
Multicast Fabric Identifier         :  65001
PIM is not enabled for VRF default
PIM is not enabled for VRF ka
PIM is not enabled for VRF mgmt
Site2-Shared-border-vsxpri# show ipv6 pim6 neighbor brief all-vrfs
--------------------------------------------------------------------------------
-
VRF : Test_1                            Total number of neighbors : 7
--------------------------------------------------------------------------------
-
Interface Neighbor    Uptime        Expires    DR      Hold Time  Secondary
Address
          (IPV4)      (HH:MM:SS)    (HH:MM:SS) Priority (HH:MM:SS)       (IPV4)
--------- ----------  ---------  ------------- ------  ----------  ----------------
-
vni9001 fe80::10:10:10:103:03:55     00:03:05    1       00:03:30
```

```
vni9001 fe80::13:1:1:1  00:10:52     00:08:10    1       00:08:32
vni9001 fe80::14:1:1:1  00:41:50     00:03:10    1       00:03:30
vni9001 fe80::23:1:1:1 00:05:06   00:03:24     1         00:03:30
vni9001 fe80::25:1:1:1 00:20:03   00:03:24     1         00:03:30
vlan1001fe80::9020:c283:e9be:370017:59:57 00:01:41 16843019  00:01:45   60:19:1::2
vlan1101fe80::ec50:aa84:4da4:306017:59:57 00:01:27 1         00:01:45   60:1:1::1
--------------------------------------------------------------------------------
-
VRF : Test_2                            Total number of neighbors : 8
--------------------------------------------------------------------------------
-
vni9002 fe80::10:1:1:1 00:01:11  00:03:17      1         00:03:30
vni9002 fe80::10:10:10:1 03:17:45  00:03:16      1         00:03:30
vni9002 fe80::13:1:1:1 00:37:47  00:03:13      1         00:03:30
vni9002 fe80::14:1:1:1 00:40:39  00:03:19      1         00:03:30
vni9002 fe80::23:1:1:1 00:03:11  00:08:20      1         00:08:32
vni9002 fe80::25:1:1:1 00:32:11  00:08:17      1         00:08:32
vlan1002 fe80::9020:c283:eabe:3700 17:59:57 00:01:24  16843019  00:01:45   60:19:2::2
vlan1102 fe80::ec50:aa84:4ea4:3060 17:59:57 00:01:25 1       00:01:45   60:1:2::1
--------------------------------------------------------------------------------
-
VRF : Test_3                            Total number of neighbors : 7
--------------------------------------------------------------------------------
-
vni9003 fe80::10:1:1:1 00:03:19  00:03:11      1          00:03:30
vni9003 fe80::10:10:10:1 02:46:16  00:03:15      1          00:03:30
vni9003 fe80::13:1:1:1 01:23:49  00:03:12      1          00:03:30
vni9003 fe80::14:1:1:1 01:26:10  00:03:15      1          00:03:30
vni9003 fe80::25:1:1:1 04:03:16  00:03:14      1          00:03:30
vlan1003fe80::9020:c283:ebbe:370017:59:57 00:01:19  16843019  00:01:45  60:19:3::2
vlan1103fe80::ec50:aa84:4fa4:3060 17:59:57 00:01:29   1       00:01:45    60:1:3::1
--------------------------------------------------------------------------------
-
VRF : Test_4                            Total number of neighbors : 8
--------------------------------------------------------------------------------
-
vni9004 fe80::10:1:1:1 00:03:11  00:03:13       1         00:03:30
vni9004 fe80::10:10:10:1 03:00:49  00:03:12       1         00:03:30
vni9004 fe80::13:1:1:1 00:26:42  00:03:16       1         00:03:30
vni9004 fe80::14:1:1:1 04:18:48  00:03:14       1         00:03:30
vni9004 fe80::23:1:1:1 00:03:07  00:03:23       1         00:03:30
vni9004 fe80::25:1:1:1 00:16:37  00:03:23       1         00:03:30
vlan1004fe80::9020:c283:ecbe:3700 17:59:57 00:01:24 16843019     00:01:45
60:19:4::2
vlan1104fe80::ec50:aa84:50a4:3060 17:59:57 00:01:25    1         00:01:45    60:1:4::1
--------------------------------------------------------------------------------
-
Site2-Shared-border-vsxpri#  show ip pim rp-set all-vrfs

VRF: Test_1

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.101.1       150        121          192
VRF: Test_2
Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
```

```
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.102.1       150        147          192

VRF: Test_3

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.103.1       150        109          192

VRF: Test_4

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.104.1       150        144          192
Site2-Shared-border-vsxpri# show ip mroute 225.15.1.1 all-vrfs detail

IP Multicast Route Entries

VRF : Test_1
Group Address                 : 225.15.1.1
Source Address                : 11.11.1.100
Neighbor                      : 10.1.1.1
Incoming interface            : vni9001
Intra-Inter Forwarded VTEP(s) : 14.1.1.1, 25.1.1.1
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:00:15
Downstream Interface
Interface       State
-----------     ----------
vlan1001        forwarding
Site2-Shared-border-vsxpri# show ipv6 mroute ff25:15:1::1 all-vrfs detail
IP Multicast Route Entries
VRF : Test_1
Group Address                 : ff25:15:1::1
Source Address                : 11:11:1::100
Neighbor                      : fe80::10:1:1:1
Incoming interface            : vni9001
Intra-Inter Forwarded VTEP(s) : 14.1.1.1, 25.1.1.1
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 00:00:27
Downstream Interface
Interface       State
-----------     ----------
vlan1001        forwarding
Site2-Shared-border-vsxpri# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
```

```
Local AS               : 65001        BGP Router Identifier  : 11.0.1.1
Peers                  : 10           Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------
Neighbor                                 Remote-AS   MsgRcvd MsgSent Up/Down Time
State         AdminStatus
50.1.1.1                                 65000       358     362     05h:04m:15s
Established   Up
50.10.1.1                                65010       364     356     05h:04m:30s
Established   Up
60.1.1.2                                 65002       363     356     05h:04m:30s
Established   Up
60.2.1.2                                 65002       364     360     05h:04m:30s
Established   Up
90.1.1.2                                 65003       363     356     05h:04m:30s
Established   Up

Address-family : IPv6 Unicast
------------------------------

Address-family : VPNv4 Unicast
------------------------------

Address-family : L2VPN EVPN
------------------------------
Neighbor                                 Remote-AS   MsgRcvd MsgSent Up/Down Time
State         AdminStatus
10.0.1.1                                 65000       892     883     05h:04m:30s
Established   Up
10.10.1.1                                65010       976     932     05h:04m:30s
Established   Up
12.0.1.1                                 65002       757     919     05h:04m:15s
Established   Up
12.0.2.1                                 65002       719     935     05h:04m:15s
Established   Up
19.0.1.1                                 65003       1223    424     05h:04m:15s
Established   Up
Codes: * Dynamic Neighbor
VRF : Test_1
BGP Summary
-----------
Local AS               : 65001        BGP Router Identifier  : 16.0.101.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : Test_2
BGP Summary
-----------
Local AS               : 65001        BGP Router Identifier  : 16.0.102.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0
```

```
Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : Test_3
BGP Summary
-----------
Local AS               : 65001        BGP Router Identifier  : 16.0.103.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : Test_4
BGP Summary
-----------
Local AS               : 65001        BGP Router Identifier  : 16.0.104.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------
Site2-Shared-border-vsxpri# show interface vxlan vteps
Source   Destination      Origin    Status       VNI       Routing   VLAN  VRF
------ ---------------- ----------- -------   --------- --------- ----- ---------
-
11.1.1.1  10.1.1.1        evpn    operational    9001      enabled   --     Test_1
11.1.1.1  10.1.1.1        evpn    operational    9002      enabled   --     Test_2
11.1.1.1  10.1.1.1        evpn    operational    9003      enabled   --     Test_3
11.1.1.1  10.1.1.1        evpn    operational    9004      enabled   --     Test_4
11.1.1.1  10.10.10.1      evpn    operational    9001      enabled   --     Test_1
11.1.1.1  10.10.10.1      evpn    operational    9002      enabled   --     Test_2
11.1.1.1  10.10.10.1      evpn    operational    9003      enabled   --     Test_3
11.1.1.1  10.10.10.1      evpn    operational    9004      enabled   --     Test_4
11.1.1.1  13.1.1.1        evpn    operational    9001      enabled   --     Test_1
11.1.1.1  13.1.1.1        evpn    operational    9002      enabled   --     Test_2
11.1.1.1  13.1.1.1        evpn    operational    9003      enabled   --     Test_3
11.1.1.1  13.1.1.1        evpn    operational    9004      enabled   --     Test_4
11.1.1.1  14.1.1.1        evpn    operational    9001      enabled   --     Test_1
11.1.1.1  14.1.1.1        evpn    operational    9002      enabled   --     Test_2
11.1.1.1  14.1.1.1        evpn    operational    9003      enabled   --     Test_3
11.1.1.1  14.1.1.1        evpn    operational    9004      enabled   --     Test_4
11.1.1.1  23.1.1.1        evpn    operational    9001      enabled   --     Test_1
11.1.1.1  23.1.1.1        evpn    operational    9002      enabled   --     Test_2
11.1.1.1  23.1.1.1        evpn    operational    9003      enabled   --     Test_3
11.1.1.1  23.1.1.1        evpn    operational    9004      enabled   --     Test_4
11.1.1.1  25.1.1.1        evpn    operational    9001      enabled   --     Test_1
11.1.1.1  25.1.1.1        evpn    operational    9002      enabled   --     Test_2
```

```
11.1.1.1  25.1.1.1        evpn    operational    9003      enabled   --     Test_3
11.1.1.1  25.1.1.1        evpn    operational    9004      enabled   --     Test_4
Site2-Shared-border-vsxpri#
```

Site-2-Shared-Border-vsx-secondary

```
Site2-Shared-border-vsxsec# show ru
hostname Site2-Shared-border-vsxsec
power consumption-average-period 600
no ip icmp redirect
profile leaf
route-redistribute active-routes-only
vrf Test_1
        rd 11.1.1.1:9001
        route-target export 9001:9001 evpn
        route-target import 9001:9001 evpn
vrf Test_2
        rd 11.1.1.1:9002
        route-target export 9002:9002 evpn
        route-target import 9002:9002 evpn
vrf Test_3
        rd 11.1.1.1:9003
        route-target export 9003:9003 evpn
        route-target import 9003:9003 evpn
vrf Test_4
        rd 11.1.1.1:9004
        route-target export 9004:9004 evpn
        route-target import 9004:9004 evpn
vrf ka
cli-session
        timeout 0
!
!
!
!
!
!
ssh server vrf mgmt
system internal-vlan-range 3000-3999
vlan 1,5
vlan 501
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 502
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 503
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 504
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 601
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 602
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 603
        ip igmp snooping enable
        ipv6 mld snooping enable
```

```
vlan 604
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 1001-1004,2001,2101-2104
virtual-mac 00:00:02:00:00:00
evpn
        arp-suppression
        redistribute local-mac
        redistribute local-svi
interface mgmt
        no shutdown
        ip dhcp
system interface-group 1 speed 10g
        !interface group 1 contains ports 1/1/1-1/1/12
system interface-group 2 speed 10g
        !interface group 2 contains ports 1/1/13-1/1/24
system interface-group 3 speed 10g
        !interface group 3 contains ports 1/1/25-1/1/36
system interface-group 4 speed 10g
        !interface group 4 contains ports 1/1/37-1/1/48
interface lag 100
        no shutdown
        no routing
        vlan trunk native 1 tag
        vlan trunk allowed 5,1001-1004,2001
        lacp mode active
interface 1/1/5
        description port_Site2-Shared-border-vsxpri
        no shutdown
        lag 100
interface 1/1/7
        description port_Site2-fabric1-BorderRR-primary
        no shutdown
        ip address 60.1.2.1/30
interface 1/1/8
        description port_Site2-fabric1-BorderRR-secondary
        no shutdown
        ip address 60.2.2.1/30
interface 1/1/25
        no shutdown
        description port_External-DUT
        no routing
        vlan trunk native 1
        vlan trunk allowed 2101-2104
interface 1/1/26
        no shutdown
        description port_Site1-BorderVtep-SA
        vsx shutdown-on-split
        ip address 50.1.2.2/30
interface 1/1/35
        description port_ixia
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 501-504,601-604
interface 1/1/43
        description port_R15-Site5-BorderVtep2
        no shutdown
        ip address 50.10.2.2/30
interface 1/1/46
        description port_Site2-fabric2-BorderRR-SA
        no shutdown
```

```
        ip address 90.1.2.1/30
interface loopback 0
        ip address 11.0.1.2/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 11.1.1.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 2
        ip address 11.1.1.10/32
        ip ospf 1 area 0.0.0.0
interface loopback 5
        ip address 15.1.17.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 67
        ip address 191.12.14.1/32
        ip ospf 1 area 0.0.0.0
interface loopback 101
        vrf attach Test_1
        ip address 17.0.101.1/32
        ipv6 address 17:0:101::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 102
        vrf attach Test_2
        ip address 17.0.102.1/32
        ipv6 address 17:0:102::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 103
        vrf attach Test_3
        ip address 17.0.103.1/32
        ipv6 address 17:0:103::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface loopback 104
        vrf attach Test_4
        ip address 17.0.104.1/32
        ipv6 address 17:0:104::1/128
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 5
        ip address 25.1.91.2/30
        ipv6 address 50:19:4::2/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
interface vlan 501
        vrf attach Test_1
        ip address 11.19.1.1/24
        ipv6 address 11:19:1::1/64
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 502
```

```
        vrf attach Test_2
        ip address 11.19.2.1/24
        ipv6 address 11:19:2::1/64
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 503
        vrf attach Test_3
        ip address 11.19.3.1/24
        ipv6 address 11:19:3::1/64
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 504
        vrf attach Test_4
        ip address 11.19.4.1/24
        ipv6 address 11:19:4::1/64
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 601
        vrf attach Test_1
        ip address 11.21.1.1/24
        ipv6 address 11:21:1::1/64
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 602
        vrf attach Test_2
        ip address 11.21.2.1/24
        ipv6 address 11:21:2::1/64
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 603
        vrf attach Test_3
        ip address 11.21.3.1/24
        ipv6 address 11:21:3::1/64
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 604
        vrf attach Test_4
        ip address 11.21.4.1/24
        ipv6 address 11:21:4::1/64
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 1001
        vrf attach Test_1
        ip address 60.19.1.2/30
        ipv6 address 60:19:1::2/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
```

```
        ipv6 pim6-sparse enable
        ip pim-sparse datapath-auto-include
        ipv6 pim6-sparse datapath-auto-include
interface vlan 1002
        vrf attach Test_2
        ip address 60.19.2.2/30
        ipv6 address 60:19:2::2/124
ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse datapath-auto-include
        ipv6 pim6-sparse datapath-auto-include
interface vlan 1003
        vrf attach Test_3
        ip address 60.19.3.2/30
        ipv6 address 60:19:3::2/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse datapath-auto-include
        ipv6 pim6-sparse datapath-auto-include
interface vlan 1004
        vrf attach Test_4
        ip address 60.19.4.2/30
        ipv6 address 60:19:4::2/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
        ip pim-sparse datapath-auto-include
        ipv6 pim6-sparse datapath-auto-include
interface vlan 2001
        vrf attach ka
        ip address 192.168.100.2/30
interface vlan 2101
        vrf attach Test_1
        ip address 61.1.1.2/30
        ipv6 address 61:1:1::2/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 2102
        vrf attach Test_2
        ip address 61.1.2.2/30
        ipv6 address 61:1:2::2/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 2103
        vrf attach Test_3
        ip address 61.1.3.2/30
        ipv6 address 61:1:3::2/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 2104
        vrf attach Test_4
```

```
        ip address 61.1.4.2/30
        ipv6 address 61:1:4::2/124
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vxlan 1
        source ip 11.1.1.1
        no shutdown
        vni 9001
                vrf Test_1
                routing
        vni 9002
                vrf Test_2
                routing
        vni 9003
                vrf Test_3
                routing
        vni 9004
                vrf Test_4
                routing
vsx
        system-mac 00:00:01:00:00:00
        inter-switch-link lag 100
        role secondary
        keepalive peer 192.168.100.1 source 192.168.100.2 vrf ka
        vsx-sync evpn mgmd-global vsx-global
!
!
!
!
route-map rmap1 permit seq 10
        set local-broadcast-group 1
route-map rmap1 permit seq 70
route-map rmap2 permit seq 10
        set local-broadcast-group 2
route-map rmap3 permit seq 10
        set local-broadcast-group 4
route-map rmap4 permit seq 10
        set local-broadcast-group 3
route-map tag_bgp_ospf permit seq 10
        set tag 110
route-map tag_ospf_bgp deny seq 10
        match tag 110
route-map tag_ospf_bgp deny seq 20
        match tag 120
route-map tag_ospf_bgp permit seq 30
!
router ospf 1 vrf Test_1
        router-id 12.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1 vrf Test_2
        router-id 12.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
```

```
router ospf 1 vrf Test_3
        router-id 12.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1 vrf Test_4
        router-id 12.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospf 1
        router-id 12.0.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospfv3 1 vrf Test_1
        router-id 12.1.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospfv3 1 vrf Test_2
        router-id 12.2.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospfv3 1 vrf Test_3
        router-id 12.3.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospfv3 1 vrf Test_4
        router-id 12.4.10.1
        distance 250
        redistribute connected
        redistribute local loopback
        redistribute bgp route-map tag_bgp_ospf
        area 0.0.0.0
router ospfv3 1
        router-id 12.0.10.1
        distance 250
        redistribute bgp
        redistribute connected
        redistribute local loopback
        area 0.0.0.0
router bgp 65001
        bgp router-id 11.0.10.1
        neighbor 10.0.1.1 remote-as 65000
        neighbor 10.0.1.1 ebgp-multihop 5
        neighbor 10.0.1.1 update-source loopback 0
        neighbor 10.10.1.1 remote-as 65010
```

```
        neighbor 10.10.1.1 ebgp-multihop 5
        neighbor 10.10.1.1 update-source loopback 0
        neighbor 12.0.1.1 remote-as 65002
        neighbor 12.0.1.1 ebgp-multihop 5
        neighbor 12.0.1.1 update-source loopback 0
        neighbor 12.0.2.1 remote-as 65002
        neighbor 12.0.2.1 ebgp-multihop 5
        neighbor 12.0.2.1 update-source loopback 0
        neighbor 19.0.1.1 remote-as 65003
        neighbor 19.0.1.1 ebgp-multihop 5
        neighbor 19.0.1.1 update-source loopback 0
        neighbor 50.1.2.1 remote-as 65000
        neighbor 50.1.2.1 ebgp-multihop 5
        neighbor 50.10.2.1 remote-as 65010
        neighbor 50.10.2.1 ebgp-multihop 5
        neighbor 60.1.2.2 remote-as 65002
        neighbor 60.1.2.2 ebgp-multihop 5
        neighbor 60.2.2.2 remote-as 65002
        neighbor 60.2.2.2 ebgp-multihop 5
        neighbor 90.1.2.2 remote-as 65003
        neighbor 90.1.2.2 ebgp-multihop 5
        address-family ipv4 unicast
                neighbor 50.1.2.1 activate
                neighbor 50.10.2.1 activate
                neighbor 60.1.2.2 activate
                neighbor 60.2.2.2 activate
                neighbor 90.1.2.2 activate
                redistribute connected
                redistribute local loopback
        exit-address-family
        address-family l2vpn evpn
                neighbor 10.0.1.1 route-map rmap1 in
                neighbor 10.0.1.1 send-community extended
                neighbor 10.0.1.1 activate
                neighbor 10.10.1.1 route-map rmap1 in
                neighbor 10.10.1.1 send-community extended
                neighbor 10.10.1.1 activate
                neighbor 12.0.1.1 route-map rmap2 in
                neighbor 12.0.1.1 send-community extended
                neighbor 12.0.1.1 activate
                neighbor 12.0.2.1 route-map rmap2 in
                neighbor 12.0.2.1 send-community extended
                neighbor 12.0.2.1 activate
                neighbor 19.0.1.1 route-map rmap4 in
                neighbor 19.0.1.1 send-community extended
                neighbor 19.0.1.1 activate
        exit-address-family
!
        vrf Test_1
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospfv3 route-map tag_ospf_bgp
                exit-address-family
!
        vrf Test_2
                address-family ipv4 unicast
```

```
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospfv3 route-map tag_ospf_bgp
                exit-address-family
!
        vrf Test_3
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospfv3 route-map tag_ospf_bgp
                exit-address-family
!
        vrf Test_4
                address-family ipv4 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospf route-map tag_ospf_bgp
                exit-address-family
                address-family ipv6 unicast
                        redistribute connected
                        redistribute local loopback
                        redistribute ospfv3 route-map tag_ospf_bgp
                exit-address-family
!
router pim vrf Test_1
        enable
router pim vrf Test_2
        enable
router pim vrf Test_3
        enable
router pim vrf Test_4
        enable
router pim6 vrf Test_1
        enable
        rp-candidate source-ip-interface loopback101 group-prefix ff00::/8
        bsr-candidate source-ip-interface loopback101
router pim6 vrf Test_2
        enable
        rp-candidate source-ip-interface loopback102 group-prefix ff00::/8
        bsr-candidate source-ip-interface loopback102
router pim6 vrf Test_3
        enable
        rp-candidate source-ip-interface loopback103 group-prefix ff00::/8
        bsr-candidate source-ip-interface loopback103
router pim6 vrf Test_4
        enable
        rp-candidate source-ip-interface loopback104 group-prefix ff00::/8
        bsr-candidate source-ip-interface loopback104
https-server vrf mgmt
ip multicast multi-fabric border
ipv6 multicast multi-fabric border
===========
```

```
Outputs:
==========
Site2-Shared-border-vsxsec# show ip ospf neighbors all-vrfs
VRF : Test_1                              Process : 1
================================================

Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
11.1.10.1        1         FULL/BDR          60.19.1.1          vlan1001
20.1.10.1        1         FULL/DR           61.1.1.1           vlan2101
VRF : Test_2                              Process : 1
================================================
Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
11.2.10.1        1         FULL/BDR          60.19.2.1          vlan1002
20.2.10.1        1         FULL/DR           61.1.2.1           vlan2102
VRF : Test_3                              Process : 1
================================================

Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
11.3.10.1        1         FULL/BDR          60.19.3.1          vlan1003
20.3.10.1        1         FULL/DR           61.1.3.1           vlan2103
VRF : Test_4                              Process : 1
================================================

Total Number of Neighbors : 2
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
11.4.10.1        1         FULL/BDR          60.19.4.1          vlan1004
20.4.10.1        1         FULL/DR           61.1.4.1           vlan2104
VRF : default                             Process : 1
================================================

Total Number of Neighbors : 1
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
11.0.10.1        1         FULL/BDR          25.1.91.1          vlan5
Site2-Shared-border-vsxsec# show ipv6 ospfv3 neighbors all-vrfs
VRF : Test_1                              Process : 1

================================================

Total Number of Neighbors: 2
Neighbor ID      Priority  State             Interface
---------------------------------------------------------
11.1.10.1        1         FULL/BDR          vlan1001
Neighbor address fe80::b8d4:e783:e940:8700
20.1.10.1        1         FULL/DR           vlan2101
Neighbor address fe80::ec50:aa88:35a4:3060
VRF : Test_2                              Process : 1
================================================

Total Number of Neighbors: 2
Neighbor ID      Priority  State             Interface
---------------------------------------------------------
11.2.10.1        1         FULL/BDR          vlan1002
Neighbor address fe80::b8d4:e783:ea40:8700
20.2.10.1        1         FULL/DR           vlan2102
```

```
Neighbor address fe80::ec50:aa88:36a4:3060
VRF : Test_3                              Process : 1
=====================================================

Total Number of Neighbors: 2
Neighbor ID      Priority  State              Interface
-----------------------------------------------------------
11.3.10.1        1         FULL/BDR           vlan1003
Neighbor address fe80::b8d4:e783:eb40:8700
20.3.10.1        1         FULL/DR            vlan2103
Neighbor address fe80::ec50:aa88:37a4:3060
VRF : Test_4                              Process : 1
=====================================================

Total Number of Neighbors: 2
Neighbor ID      Priority  State              Interface
-----------------------------------------------------------
11.4.10.1        1         FULL/BDR           vlan1004
Neighbor address fe80::b8d4:e783:ec40:8700
20.4.10.1        1         FULL/DR            vlan2104
Neighbor address fe80::ec50:aa88:38a4:3060
VRF : default                             Process : 1
=====================================================

Total Number of Neighbors: 1
Neighbor ID      Priority  State              Interface
-----------------------------------------------------------
11.0.10.1        1         FULL/BDR           vlan5
Neighbor address fe80::b8d4:e780:540:8700
Site2-Shared-border-vsxsec#  show ip pim neighbor brief all-vrfs
-------------------------------------------------------------------------------
-
VRF : Test_1                              Total number of neighbors : 8
-------------------------------------------------------------------------------
-
Interface Neighbor      Uptime     Expires    DR     Hold Time   Secondary Address
          (IPV4)        (HH:MM:SS) (HH:MM:SS) Priority (HH:MM:SS)       (IPV4)
---------  ----------  ----------  --------  ----------  -------  ----------------
-
vni9001    10.1.1.1    15:12:34     00:03:20    1         00:03:30
vni9001   10.10.10.1   15:12:35    00:03:17     1        00:03:30
vni9001   13.1.1.1     15:12:41    00:03:17     1        00:03:30
vni9001   14.1.1.1     15:12:41    00:03:17     1        00:03:30
vni9001   23.1.1.1     04:10:54    00:03:08     1        00:03:30
vni9001   25.1.1.1     04:01:56    00:03:08     1        00:03:30
vlan1001 60.19.1.1     15:12:26    00:01:41    16843019  00:01:45          Nil
vlan2101 61.1.1.1      15:12:27    00:01:40     1        00:01:45          Nil
-------------------------------------------------------------------------------
-
VRF : Test_2                              Total number of neighbors : 8
-------------------------------------------------------------------------------
-
vni9002   10.1.1.1     18:06:28    00:03:02     1        00:03:30
vni9002   10.10.10.1   18:06:06    00:03:03     1        00:03:30
vni9002   13.1.1.1     18:06:28    00:03:01     1        00:03:30
vni9002   14.1.1.1     18:06:28    00:03:05     1        00:03:30
vni9002   23.1.1.1     18:06:28    00:03:15     1        00:03:30
vni9002   25.1.1.1     04:01:48    00:03:15     1        00:03:30
vlan1002 60.19.2.1     17:58:39    00:01:43   16843019   00:01:45          Nil
vlan2102 61.1.2.1      18:06:36    00:01:16     1        00:01:45          Nil
-------------------------------------------------------------------------------
-
```

```
VRF : Test_3                            Total number of neighbors : 8
--------------------------------------------------------------------------------
-
vni9003  10.1.1.1     13:15:15    00:03:18    1         00:03:30
vni9003  10.10.10.1   13:15:15    00:03:21    1         00:03:30
vni9003  13.1.1.1     13:15:12    00:03:19    1         00:03:30
vni9003  14.1.1.1     13:15:08    00:03:21    1         00:03:30
vni9003  23.1.1.1     13:14:19    00:03:17    1         00:03:30
vni9003  25.1.1.1     04:01:48    00:03:18    1         00:03:30
vlan1003 60.19.3.1    13:15:03    00:01:20   16843019   00:01:45          Nil
vlan2103 61.1.3.1     13:14:55    00:01:25     1        00:01:45          Nil
--------------------------------------------------------------------------------
-
VRF : Test_4                            Total number of neighbors : 8
--------------------------------------------------------------------------------
-
vni9004  10.1.1.1     18:06:28    00:03:03    1         00:03:30
vni9004  10.10.10.1   18:06:28    00:03:02    1         00:03:30
vni9004  13.1.1.1     18:06:28    00:03:28    1         00:03:30
vni9004  14.1.1.1     18:06:28    00:03:05    1         00:03:30
vni9004  23.1.1.1     18:06:08    00:03:18    1         00:03:30
vni9004  25.1.1.1     04:01:45    00:03:16    1         00:03:30
vlan1004 60.19.4.1    17:58:39    00:01:43   16843019   00:01:45          Nil
vlan2104 61.1.4.1     18:06:37    00:01:16    1         00:01:45          Nil
--------------------------------------------------------------------------------
-
Site2-Shared-border-vsxsec# show ip pim all-vrfs

PIM Global Parameters

VRF                                 :  Test_1
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Enabled
Multicast Fabric Identifier         :  65001

VRF                                 :  Test_2
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
PIM BIDI NSF Status                 :  Inactive
Shared Border Status                :  Enabled
Multicast Fabric Identifier         :  65001

VRF                                 :  Test_3
PIM Status                          :  Enabled
PIM SSM Status                      :  Disabled
PIM SSM Range ACL                   :  Not Configured
Join/Prune Interval (sec)           :  60
SPT Threshold                       :  Enabled
State Refresh Interval (sec)        :  60
PIM NSF Status                      :  Inactive
```

```
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Enabled
Multicast Fabric Identifier       :  65001

VRF                               :  Test_4
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Enabled
Multicast Fabric Identifier       :  65001
PIM is not enabled for VRF default
PIM is not enabled for VRF ka
PIM is not enabled for VRF mgmt
Site2-Shared-border-vsxsec# show ipv6 pim6 all-vrfs

PIM Global Parameters

VRF                               :  Test_1
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Enabled
Multicast Fabric Identifier       :  65001

VRF                               :  Test_2
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Enabled
Multicast Fabric Identifier       :  65001

VRF                               :  Test_3
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Enabled
Multicast Fabric Identifier       :  65001

VRF                               :  Test_4
PIM Status                        :  Enabled
PIM SSM Status                    :  Disabled
PIM SSM Range ACL                 :  Not Configured
```

```
Join/Prune Interval (sec)         :  60
SPT Threshold                     :  Enabled
State Refresh Interval (sec)      :  60
PIM NSF Status                    :  Inactive
PIM BIDI NSF Status               :  Inactive
Shared Border Status              :  Enabled
Multicast Fabric Identifier       :  65001
PIM is not enabled for VRF default
PIM is not enabled for VRF ka
PIM is not enabled for VRF mgmt
Site2-Shared-border-vsxsec# show ipv6 pim6 neighbor brief all-vrfs
------------------------------------------------------------------------------
-
VRF : Test_1                            Total number of neighbors : 8
------------------------------------------------------------------------------
-
Interface Neighbor      Uptime     Expires    DR     Hold Time   Secondary Address
          (IPV6)        (HH:MM:SS) (HH:MM:SS) Priority (HH:MM:SS)       (IPV6)
---------  ----------  ----------  --------  ----------  -------  -----------------
-
vni9001  fe80::10:1:1:1  18:07:48   00:03:09   1        00:03:30
vni9001  fe80::10:10:10:1 18:07:35  00:03:03   1        00:03:30
vni9001  fe80::13:1:1:1  18:07:35   00:03:06   1        00:03:30
vni9001  fe80::14:1:1:1  02:52:23   00:03:08   1        00:03:30
vni9001  fe80::23:1:1:1  05:20:07   00:03:22   1        00:03:30
vni9001  fe80::25:1:1:1  04:03:16   00:03:22   1        00:03:30
vlan1001 fe80::b8d4:e783:e940:8700 17:59:5900:01:32  16843019  00:01:45   60:19:1::1
vlan2101 fe80::ec50:aa88:35a4:306018:07:55 00:01:30  1      00:01:45    61:1:1::1
------------------------------------------------------------------------------
-
VRF : Test_2                            Total number of neighbors : 8
------------------------------------------------------------------------------
-
vni9002 fe80::10:1:1:1   18:07:48    00:03:15    1         00:03:30
vni9002 fe80::10:10:10:1 18:07:48    00:03:14    1         00:03:30
vni9002 fe80::13:1:1:1   02:56:20    00:03:11    1         00:03:30
vni9002 fe80::14:1:1:1   02:55:44    00:03:17    1         00:03:30
vni9002 fe80::23:1:1:1   05:11:09    00:03:16    1         00:03:30
vni9002 fe80::25:1:1:1   04:03:17    00:03:13    1         00:03:30
vlan1002 fe80::b8d4:e783:ea40:8700  17:59:59 00:01:22  16843019   00:01:45
60:19:2::1
vlan2102 fe80::ec50:aa88:36a4:306018:07:53 00:01:33  1         00:01:45   61:1:2::1
------------------------------------------------------------------------------
-
VRF : Test_3                            Total number of neighbors : 8
------------------------------------------------------------------------------
-
vni9003 fe80::10:1:1:1   18:07:48     00:03:09    1         00:03:30
vni9003 fe80::10:10:10:1 02:46:18     00:03:13    1         00:03:30
vni9003 fe80::13:1:1:1   18:07:48     00:03:10    1         00:03:30
vni9003 fe80::14:1:1:1   02:53:18     00:03:13    1         00:03:30
vni9003 fe80::23:1:1:1   06:32:09     00:03:14    1         00:03:30
vni9003 fe80::25:1:1:1   04:03:18     00:03:12    1         00:03:30
vlan1003 fe80::b8d4:e783:eb40:870017:59:59 00:01:38  16843019   00:01:45  60:19:3::1
vlan2103 fe80::ec50:aa88:37a4:306018:07:54 00:01:28   1         00:01:45   61:1:3::1
------------------------------------------------------------------------------
-
VRF : Test_4                            Total number of neighbors : 8
------------------------------------------------------------------------------
-
vni9004 fe80::10:1:1:1  02:55:18    00:03:11       1       00:03:30
vni9004 fe80::10:10:10:1 18:07:48   00:03:10       1       00:03:30
```

```
vni9004 fe80::13:1:1:1  02:52:11    00:03:14       1       00:03:30
vni9004 fe80::14:1:1:1  02:54:19    00:03:12       1       00:03:30
vni9004 fe80::23:1:1:1  05:11:10    00:03:21       1       00:03:30
vni9004 fe80::25:1:1:1  04:03:16    00:03:21       1       00:03:30
vlan1004 fe80::b8d4:e783:ec40:870017:59:5900:01:22   16843019 00:01:45   60:19:4::1
vlan2104 fe80::ec50:aa88:38a4:3060 18:07:5600:01:31   1       00:01:45   61:1:4::1
--------------------------------------------------------------------------------
-
Site2-Shared-border-vsxsec#  show ip pim rp-set all-vrfs

VRF: Test_1

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.101.1       150        119          192

VRF: Test_2

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.102.1       150        145          192
VRF: Test_3
Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.103.1       150        107          192

VRF: Test_4

Status and Counters - PIM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        16.0.104.1       150        142          192
Site2-Shared-border-vsxsec# show ip mroute 225.15.1.1 all-vrfs detail

IP Multicast Route Entries

VRF : Test_1
Total number of entries : 2

Group Address                 : 225.15.1.1
Source Address                : 11.11.1.100
Neighbor                      : 60.19.1.1
Incoming interface            : vlan1001
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 02:44:28
Downstream Interface
Interface       State          Vteps
```

```
-----------     ----------     -----
vni9001         forwarding     14.1.1.1, 25.1.1.1

Group Address                 : 225.15.1.1
Source Address                : 11.11.1.100
Neighbor                      : 10.1.1.1
Incoming interface            : vni9001
Intra-Inter Forwarded VTEP(s) : 25.1.1.1, 14.1.1.1
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 02:45:04
Downstream Interface
Interface       State
-----------     ----------
vlan1001        forwarding

Site2-Shared-border-vsxsec# show ipv6 mroute ff25:15:1::1 all-vrfs detail

IP Multicast Route Entries

VRF : Test_1
Total number of entries : 1

Group Address                 : ff25:15:1::1
Source Address                : 11:11:1::100
Neighbor                      : fe80::b8d4:e783:e940:8700
Incoming interface            : vlan1001
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 20
Uptime (HH:MM:SS)             : 02:45:55
Downstream Interface
Interface       State          Vteps
-----------     ----------     -----
vni9001         forwarding     14.1.1.1, 25.1.1.1

Site2-Shared-border-vsxsec# show bgp all-vrf all summary
Codes: * Dynamic Neighbor
VRF : default
BGP Summary
-----------
Local AS               : 65001        BGP Router Identifier  : 11.0.10.1
Peers                  : 10           Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------
Neighbor   Remote-AS   MsgRcvd MsgSent Up/Down Time   State     AdminStatus
50.1.2.1    65000       364     359     05h:04m:14s  Established   Up
50.10.2.1   65010       359     356     05h:04m:29s  Established   Up
60.1.2.2    65002       360     360     05h:04m:14s  Established   Up
60.2.2.2    65002       354     358     05h:04m:29s  Established   Up
90.1.2.2    65003       354     358     05h:04m:29s  Established   Up

Address-family : IPv6 Unicast
------------------------------
```

```
Address-family : VPNv4 Unicast

------------------------------
Address-family : L2VPN EVPN
------------------------------
Neighbor   Remote-AS   MsgRcvd MsgSent Up/Down Time   State      AdminStatus
10.0.1.1   65000       1032    949     05h:04m:29s  Established   Up
10.10.1.1  65010       1064    959     05h:04m:29s  Established   Up
12.0.1.1   65002       843     864     05h:04m:29s  Established   Up
12.0.2.1   65002       817     915     05h:04m:14s  Established   Up
19.0.1.1   65003       1270    414     05h:04m:14s  Established   Up

Codes: * Dynamic Neighbor
VRF : Test_1
BGP Summary
-----------
Local AS               : 65001        BGP Router Identifier  : 17.0.101.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------
Codes: * Dynamic Neighbor
VRF : Test_2
BGP Summary
-----------
Local AS               : 65001        BGP Router Identifier  : 17.0.102.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
Confederation Id       : 0

Address-family : IPv4 Unicast

------------------------------
Address-family : IPv6 Unicast
------------------------------

Codes: * Dynamic Neighbor
VRF : Test_3
BGP Summary
-----------
Local AS               : 65001        BGP Router Identifier  : 17.0.103.1
Peers                  : 0            Log Neighbor Changes   : No
Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60

Confederation Id       : 0
Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast

------------------------------
Codes: * Dynamic Neighbor
VRF : Test_4
BGP Summary
-----------
Local AS               : 65001        BGP Router Identifier  : 17.0.104.1
Peers                  : 0            Log Neighbor Changes   : No
```

```
Cfg. Hold Time          : 180          Cfg. Keep Alive        : 60
Confederation Id        : 0

Address-family : IPv4 Unicast
------------------------------

Address-family : IPv6 Unicast
------------------------------
Site2-Shared-border-vsxsec# show interface vxlan vteps
Source   Destination      Origin       Status      VNI     Routing   VLAN     VRF
-------  ------------    ---------    ---------   ------   --------  -----    ---
11.1.1.1  10.1.1.1         evpn      operational  9001      enabled   --     Test_
1
11.1.1.1  10.1.1.1         evpn      operational  9002      enabled   --     Test_
2
11.1.1.1  10.1.1.1         evpn      operational  9003      enabled   --     Test_
3
11.1.1.1  10.1.1.1         evpn      operational  9004      enabled   --     Test_
4
11.1.1.1  10.10.10.1       evpn      operational  9001      enabled   --     Test_
1
11.1.1.1  10.10.10.1       evpn      operational  9002      enabled   --     Test_
2
11.1.1.1  10.10.10.1       evpn      operational  9003      enabled   --     Test_
3
11.1.1.1  10.10.10.1       evpn      operational  9004      enabled   --     Test_
4
11.1.1.1  13.1.1.1         evpn      operational  9001      enabled   --     Test_
1
11.1.1.1  13.1.1.1         evpn      operational  9002      enabled   --     Test_
2
11.1.1.1  13.1.1.1         evpn      operational  9003      enabled   --     Test_
3
11.1.1.1  13.1.1.1         evpn      operational  9004      enabled   --     Test_
4
11.1.1.1  14.1.1.1         evpn      operational  9001      enabled   --     Test_
1
11.1.1.1  14.1.1.1         evpn      operational  9002      enabled   --     Test_
2
11.1.1.1  14.1.1.1         evpn      operational  9003      enabled   --     Test_
3
11.1.1.1  14.1.1.1         evpn      operational  9004      enabled   --     Test_
4
11.1.1.1  23.1.1.1         evpn      operational  9001      enabled   --     Test_
1
11.1.1.1  23.1.1.1         evpn      operational  9002      enabled   --     Test_
2
11.1.1.1  23.1.1.1         evpn      operational  9003      enabled   --     Test_
3
11.1.1.1  23.1.1.1         evpn      operational  9004      enabled   --     Test_
4
11.1.1.1  25.1.1.1         evpn      operational  9001      enabled   --     Test_
1
11.1.1.1  25.1.1.1         evpn      operational  9002      enabled   --     Test_
2
11.1.1.1  25.1.1.1         evpn      operational  9003      enabled   --     Test_
3
11.1.1.1  25.1.1.1         evpn      operational  9004      enabled   --     Test_
4
```

Multicast VXLAN Multi-fabric commands

For a complete list of Multicast VXLAN commands, refer to Multicast VXLAN commands.

show ip mroute detail

`show ip mroute <GROUP ADDRESS> <SOURCE ADDRESS> [all-vrfs | vrf <VRF-NAME>] detail`

Description

Shows multicast routing information from a border router where traffic from a local site is forwarded to a remote site. Optionally, you can show specific information by VRF. If no options are specified, it shows information for the default VRF.

Parameter	Description
`all-vrfs`	Shows all PIM neighbors information.
`vrf <VRF-NAME>`	Shows PIM neighbor information for a specific VRF.

Usage

The Intra-Inter Forwarded VTEP(s) tunnel field denotes which tunnel the traffic is routed to. This includes the intra or inter VTEPs based on where the joins are seen. If there is more than one site where the traffic needs to be forwarded, the corresponding site's VTEPs are listed. The Intra-Inter Forwarded VTEP (s) field is only visible at the Border router.

There are no outgoing interfaces listed in these Mroutes as they are routing withing the same L3VNI logical interface. If there are any local receivers at the border routers that are extended via L2/L3 extensions, then the same Mroute is updated with the outgoing list.

Examples

Multicast route where the border is routing from one VTEP to another VTEP. In this case, VTEP 1.1.1.1 to 3.3.3.3 in L3VNI:

```
switch# show ip mroute 225.0.0.1 100.100.1.4 all-vrfs detail
IP Multicast Route Entries

VRF : red

Group Address                 : 225.0.0.1
Source Address                : 100.100.1.4
Neighbor                      : 1.1.1.1
Incoming interface            : vni10000
Intra-Inter Forwarded VTEP(s) : 3.3.3.3
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric Pref                   : 200
Uptime (HH:MM:SS)             : 00:00:51
```

Multicast route where the border is routing from one VTEP to another VTEP in addition to an L3 interface:

```
switch# show ip mroute 225.0.0.1 100.100.1.4 all-vrfs detail
IP Multicast Route Entries

VRF : red

Group Address                 : 225.0.0.1
Source Address                : 100.100.1.4
Neighbor                      : 1.1.1.1
Incoming interface            : vni10000
Intra-Inter Forwarded VTEP(s) : 3.3.3.3
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric Pref                   : 200
Uptime (HH:MM:SS)             : 00:00:51


Outgoing Interface List
Interface       State
----------------------------
vlan1675        forwarding
```

Multicast route where the output is at the source connected leaf router. In this case, traffic ingresses on SVI10 and is routed to VTEP 2.2.2.2:

```
switch# show ip mroute 225.0.0.1 100.100.1.4 all-vrfs detail
IP Multicast Route Entries

VRF : red

Group Address                 : 225.0.0.1
Source Address                : 100.100.1.4
Neighbor                      :
Incoming interface            : vlan10
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 1
Metric Pref                   : 1
Uptime (HH:MM:SS)             : 00:00:56


Outgoing Interface List
Interface       State          Vteps
---------------------------------------
vni10000        forwarding     2.2.2.2
```

Multicast route where there is mixed L2-L3 VNI routing. In this case, traffic ingressed from VTEP 1.1.1.1 on L3VNI is routed to SVI 4007(L2VNI):

```
switch# show ip mroute 225.0.0.1 100.100.1.4 all-vrfs detail
IP Multicast Route Entries

VRF : red

Group Address                 : 225.0.0.1
Source Address                : 100.100.1.4
Neighbor                      : 1.1.1.1
Incoming interface            : vni10000
Intra-Inter Forwarded VTEP(s) :
```

```
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric Pref                   : 200
Uptime (HH:MM:SS)             : 00:00:51


Outgoing Interface List
Interface       State
------------------------------
vlan4007        forwarding
```

Command History

Release	Modification
10.12	Command introduced

Command Information

Platforms	Command context	Authority
6400 8100 8325 8360 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

ip multicast multi-fabric border

```
ip multicast multi-fabric border
no ip multicast multi-fabric border
```

Description

Enables PIM's border router functionality. This command must be enabled on the border router when iBGP-eBGP is not used.

The **no** form of the command disables forwarding of multicast data on the interface.



This configuration is global and is applicable to all host's VRFs configured in that router.

Examples

Configuring **ip multicast multi-fabric border** command:

```
switch# configure terminal
switch(config)#
switch(config)# ip multicast multi-fabric border <cr>
switch(config)# no ip multicast multi-fabric border <cr>
switch(config)#
switch(config)# ipv6 multicast multi-fabric border <cr>
switch(config)# no ipv6 multicast multi-fabric border <cr>
```

Command History

Release	Modification
10.13	Command introduced

Command Information

Platforms	Command context	Authority
8325 8360	`config-if-vlan`	Administrators or local user group members with execution rights for this command.

ip multicast multi-fabric identifier

```
ip multicast multi-fabric identifier-value <IDENTIFIER VALUE> <cr>
no ip multicast multi-fabric <IDENTIFIER-VALUE>
```

Description

Configures multicast fabric identifier (MFID) that uniquely represents the fabric/site to which this leaf router belongs. Shown in the PIM hello option field, this command is used by the border router to associate the neighbor to the fabric MFID. This command is applicable to all the regular leaf routers and not applicable at the shared border router.

The **no** form of the command disables forwarding of multicast data on the interface.



The same MFID value must be configured on all leaf routers belonging to the same fabric. However, the same MFID value cannot be reused between fabrics attached to the same border.

Configuration of an Identifier is optional on the VTEPs. If there is no manually configured Identifier, it will automatically use and announce the local AS Number as Identifier.

Parameter	Description
<IDENTIFIER VALUE>	Configures the given value as MFID

Examples

Configuring **ip multicast multi-fabric identifier-value** command:

```
switch(config)#
switch(config)# ip multicast multi-fabric identifier <identifier-value> <cr>
switch(config)# no ip multicast multi-fabric identifier <identifier-value> <cr>
switch(config)#
switch(config)# ipv6 multicast multi-fabric identifier <identifier-value> <cr>
switch(config)# no ipv6 multicast multi-fabric identifier <identifier-value> <cr>
```

Configuring MFID value of 1001 on two VTEPs using the same fabric:

```
On VTEP1:
vtep1(config)#
vtep1(config)# ip multicast multi-fabric identifier 1001 <cr>
```

```
On VTEP2:
vtep2(config)#
vtep2(config)# ip multicast multi-fabric identifier 1001 <cr>
```

Command History

Release	Modification
10.13	Command introduced

Command Information

Platforms	Command context	Authority
8325 8360	config-if-vlan	Administrators or local user group members with execution rights for this command.

Debugging and Troubleshooting

The following details the troubleshooting approach and the most common commands to be used for debugging any multicast traffic issues in multi-fabric deployments.



Most of the commands listed here are not just limited to multi-fabric and can be used for other regular PIM networks.

Check underlay network reachability and VXLAN tunnel between VTEPs

1. Ensure that the tunnel source/destination loopback IPs are correctly advertised in the underlay network.
2. Use extended pings on Border VTEPs to confirm network connectivity between tunnel source/destination loopback IPs.
3. Fix underlay connectivity issues if any.
4. Ensure that the VXLAN tunnels are discovered, and they are operational.

The following is an example of how the interface VXLAN VTEP should appear:

```
Border_VTEP# show interface vxlan vtep
Source      Destination      Origin   Status          VNI       Routing   VLAN
VRF
----------- -------------- -------- --------------- --------- --------- ----   ---
-
2.2.2.2     3.3.3.3        evpn     operational     100001    enabled   --
VRF1
2.2.2.2     3.3.3.3        evpn     operational     100002    enabled   --
VRF2
2.2.2.2     1.1.1.1        evpn     operational     100001    enabled   --
VRF1
2.2.2.2     1.1.1.1        evpn     operational     100002    enabled   --
VRF2
```

If the EVPN tunnel is down, ensure that the correct EVPN configurations are used.

Verify split-horizon rules are disabled at the Border VTEP

1. Ensure that Border VTEPS are configured with `dyn-vxlan-tunnel-bridging-mode ibgp-ebgp` to disable the split-horizon rules.



In the case of multicast, split-horizon rules must be disabled for both L2VNI and L3VNI at the Border VTEP. Without enabling `dyn-vxlan-tunnel-bridging-mode ibgp-ebgp` multicast routing at the Border VTEP is not functional and operates as a regular border VTEP.

The following is an example of a configuration with **dyn-vxlan-tunnel-bridging-mode ibgp-ebgp** enabled:

```
Border_VTEP# show running-config evpn
evpn dyn-vxlan-tunnel-bridging-mode ibgp-ebgp
```

Validate PIM Neighbors at the Border VTEP

1. Ensure that the Border VTEP learns the intra-site PIM neighbors as well as all other the inter-site Border VTEPs on the L3VNI interface.

For an L3VNI neighbor, neighbor IP is the underlay VTEP IP in the Default VRF and this is the same for all the tenant VRFs.

The following example shows the intra and inter PIM neighbor learned on the L3VNI interface:

```
Border_VTEP# show ip pim neighbor vrf VRF1
PIM Neighbor

VRF : VRF1
Total number of neighbors : 2

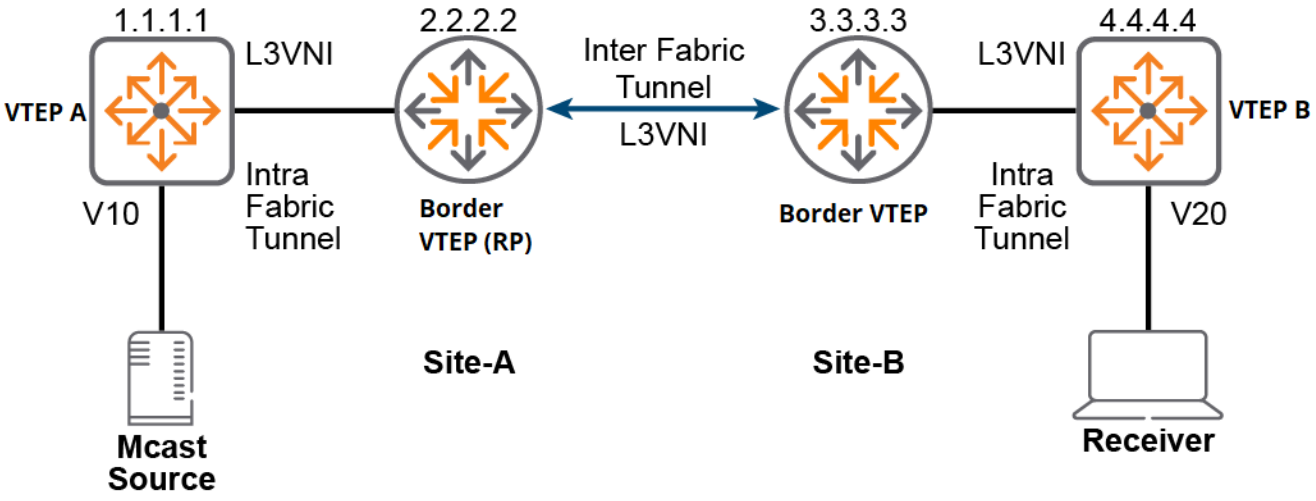
IP Address : 1.1.1.1
Interface : vni100001
Up Time (HH:MM:SS) : 00:33:30
Expire Time (HH:MM:SS) : 00:03:01
DR Priority : 1
Hold Time (HH:MM:SS) : 00:03:30

IP Address : 3.3.3.3
Interface : vni100001
Up Time (HH:MM:SS) : 00:33:30
Expire Time (HH:MM:SS) : 00:03:01
DR Priority : 1
Hold Time (HH:MM:SS) : 00:03:30
DR Priority : 1
Hold Time (HH:MM:SS) : 00:03:30
```

Validate MRoutes at the Border VTEP

Ensure multicast routes are formed correctly across VTEPS. The following MRoutes are taken from Border VTEPs shown in Figure 1, Receiver and source at different sites.

Figure 1 *Receiver and source at different sites*



Site-A Border VTEP

The route entry indicates that it is routing traffic received on the Incoming Interface vni10000(1.1.1.1) to vni10000(3.3.3.3). The Intra-Inter Forwarded VTEP(s) field in the example below indicates the egress tunnels where the traffic is forwarded in additional to any additional Outgoing list if it has. Thus, traffic from Site-A Local border VTEP is forwarded to Site-B's Border VTEP via tunnel 3.3.3.3.

```
Border_VTEP# show ip mroute 225.1.1.1 100.100.1.4  vrf red detail
Group Address                              : 225.1.1.1
Source Address                             : 100.100.1.4
Neighbor                                   : 1.1.1.1
Incoming interface                         : vni10000
Intra-Inter Forwarded VTEP(s)              : 3.3.3.3
Multicast Routing Protocol                 : PIM-SM
Unicast Routing Protocol                   : BGP
Metric                                     : 0
Metric Pref                                : 200
Uptime (HH:MM:SS)                          : 00:00:51
```

Site-B Border VTEP

The route entry indicates that it is routing traffic received on the Incoming Interface vni10000(3.3.3.3) to vni10000(4.4.4.4). The Intra-Inter Forwarded VTEP(s) field in the example below indicates the egress tunnels where the traffic is forwarded in additional to any additional Outgoing list it has. Thus, traffic from Site-A's Border VTEP is forwarded to Site-B's Local VTEP via tunnel 4.4.4.4.

```
Border_VTEP# show ip mroute 225.1.1.1 100.100.1.4  vrf red detail
Group Address                              : 225.1.1.1
Source Address                             : 100.100.1.4
Neighbor                                   : 2.2.2.2
Incoming interface                         : vni10000
Intra-Inter Forwarded VTEP(s)              : 4.4.4.4
Multicast Routing Protocol                 : PIM-SM
Unicast Routing Protocol                   : BGP
Metric                                     : 0
Metric Pref                                : 200
Uptime (HH:MM:SS)                          : 00:00:51
```

Multicast receivers not receiving traffic

1. Check if Mroutes are created from multicast source to client with the **show ip mroute** command.
2. Verify that the incoming and outgoing interfaces and or Intra-inter forwarded VTEPS reflect the path the traffic should take.
3. If the Mroutes are not present at any VTEP or if the outgoing lists/Intra-Inter Forwarded VTEPS break the path in any VTEP, start triaging it from the Receiver DR VTEP or from the Source DR VTEP side.

Troubleshooting from the reciver designated VTEP (DR)

Once the receiver DR is identified ensure that IGMP joins are present in the Receiver VLAN and check the last IGMP join Uptime in the “show ip igmp snooping” command. If IGMP joins are not present, refer the IGMP troubleshooting section.

Checking the RP for the affected flow

Identify the RP for the given multicast flow using **show ip pim rp 235.1.1.1 vrf red**.

In the example below, the selected RP for the given group is 235.1.1.1 to 31.1.1.1 as identified by **show ip pim rp 235.1.1.1 vrf red**. If **show ip pim rp 235.1.1.1 vrf red** cannot find an RP, refer to the RP troubleshooting section.

```
Site-1-VTEP# show ip pim rp 235.1.1.1 vrf red
VRF: red

PIM-SM Group-to-Resultant RP Mapping Information
Group Address          RP Address         RP Type        Up time (HH:MM:SS)
----------------       ---------------    ------------   --------------------
235.1.1.1              31.1.1.1           bsr            06:18:33
```

Checking if the VTEP has a reverse path to reach RP or Multicast Source

1. Identify if the RPF path to the RP, Source or any other interested IP by PIM can be identified using `show ip pim rpf 31.1.1.1 vrf red`.
   In the example below, the RPF nexthop neighbor towards the RP IP 31.1.1.1 is found to be the 2.2.2.2 (Border VTEP).
2. Ensure that there is a valid ‘RPF Nexthop’ and a ‘PIM neighbor’ as highlighted below..

```
Site-1-VTEP# show ip pim rpf 31.1.1.1 vrf red
Multicast RPF Details

Origin Codes: C - connected, SM - static-multicast, SU - static-unicast
              O - OSPF, B - BGP, R - RIP

VRF: red
IP Address  RPF Interface  RPF Nexthop PIM Neighbor  PRF Route/Mask  Origin  In
Use
----------  -------------- ----------- ------------  --------------  ------  -----
-
31.1.1.1    -              2.2.2.2     yes           31.1.1.1/32     B       yes
```

Similarly, check if the VTEP has a path to reach the source.

This command only displays IPs that are known by the PIM daemon. For example, the source traffic is not received bia the RPT, so the VTEP has no knowledge about the Source IP, and as a result, the output returns empty.

In this example, the Source IP for which the RPF found is 100.50.1.2:

```
Site-1-VTEP# show ip pim rpf 100.50.1.2 vrf red
Multicast RPF Details

Origin Codes: C - connected, SM - static-multicast, SU - static-unicast
              O - OSPF, B - BGP, R - RIP

VRF: red
IP Address  RPF Interface  RPF Nexthop PIM Neighbor  PRF Route/Mask  Origin  In
Use
----------  -------------- ----------- ------------  --------------  ------  -----
-
100.50.1.2  -              2.2.2.2     yes           100.50.1.0/24   B       yes
```

If the PIM Neighbor field indicates a 'no', then ensure that PIM is enabled on the link segment and a PIM neighbor with the same IP is learnt. To verify if a PIM neighbor exists with RPF Nexthop IP, use `show ip pim neighbor 2.2.2.2 vrf red`, as shown in the example below:

```
Site-1-VTEP# show ip pim neighbor 2.2.2.2 vrf red
PIM Neighbor

VRF                       : red

IP Address                : 2.2.2.2
Interface                 : vni10000
Up Time (HH:MM:SS)        : 03:20:32
Expire Time (HH:MM:SS)    : 00:03:30
DR Priority               : 1
Hold Time (HH:MM:SS)      : 00:03:30
```

If it is found that there is a valid neighbor towards the RP/Source, but the RPF Nexthop is still empty indicating an underlying unicast routing issue. In most cases, the unicast route might be missing, which can be verfied with `show ip route 31.1.1.1 vrf red`.

This can be shown in the example below:

```
Site-1-VTEP# show ip pim route 31.1.1.1 vrf red

VRF: red

    Prefix      : 31.1.1.1/32           VRF (egress)      : -
    Nexthop     : 2.2.2.2               Interface         : -
    Origin      : bgp                   Type              : bgp evpn
    Distance    : 200                   Metric            : 0
    Age         : 03h:23m:39s           Tag               : 0
    Encap type  : vxlan                 Encap Details     : 13vni 10000
```

Troubleshooting once the RPF Neighbor towards the RP/Source is found

The RPF Neighbor VTEP is the immediate upstream VTEP for traffic where the PIM joins are sent, log in to the RPF nexthop VTEP and repeat the troubleshooting steps as required. At each VTEP starting from the Receiver DR through the Source to ensure that there are corresponding Mroutes for the flow.

Verify if the Source DR has successfully registered the flow with RP

Execute **sh ip pim rp-registered-sources vrf red** to check if the RP has learned a specific flow from the Source DR via the PIM register message.

If the corresponding flow is not listed, it indicates a PIM register issue between the source DR and the RP. In that case, proceed with the next section to determine the cause.

```
SW1# sh ip pim rp-registered-sources vrf red

Multicast flows registered with this RP
VRF Name: red
Total number of entries: 5
Source Address           Group Address          RP Address
-------------------      -----------------      ---------------
15.1.1.2                 225.1.1.1              1.1.1.1
15.1.1.2                 225.1.1.2              1.1.1.1
15.1.1.2                 225.1.1.3              1.1.1.1
15.1.1.2                 225.1.1.4              1.1.1.1
15.1.1.2                 225.1.1.5              1.1.1.1
```

Troubleshooting Source DR registration issues with RP

In many cases, the problem lies with the Source traffic registration from Source DR with the RP. The most common symptoms include missing of Mroutes at the Source DR VTEP or high CPU utilization at the source DR. In VXLAN networks, the register packet (the unicast packet with destination IP as RP IP) is further encapsulated with the VXLAN header and is sent to the RP.



The Source DR should have a valid route entry towards the RP IP and a virtual-mac must be configured at the RP.

It is good practice to ensure that the virtual-mac is configured on all PIM enabled VTEPs for aiding the Tx/Rx of unicast PIM control packets (Register, Register Stop, and CRP Advertisement). Both Unicast route (**show ip route**) and PIM RPF (**show ip pim rpf**) show commands can be used to verify the unicast reachability.

In this example, **show ip pim rpf 31.1.1.1 vrf red** is used to check if the RPF path is used to reach RP 31.1.1.1 on source DR VTEP.

```
Site-2-VTEP# show ip pim rpf 31.1.1.1 vrf red

Multicast RPF Details

Origin Codes: C - connected, SM - static-multicast, SU - static-unicast
              O - OSPF, B - BGP, R - RIP

VRF: red
IP Address RPF Interface  RPF Nexthop  PIM Neighbor  RPF Route/Mask  Origin  In
Use
-------------------------------------------------------------------------------
-
31.1.1.1   -              3.3.3.3      yes           31.1.1.1/32     B       yes
Site-2-VTEP#
```

From the RP check the RPF path to reach the Source DR Interface IP. In the example below, the Source DR IP is 100.50.1.1.

```
Site-2-BGW# show ip pim rpf 100.50.1.1 vrf red

Multicast RPF Details

Origin Codes: C - connected, SM - static-multicast, SU - static-unicast
              O - OSPF, B - BGP, R - RIP

VRF: red
IP Address  RPF Interface  RPF Nexthop PIM Neighbor  RPF Route/Mask  Origin  In
Use
-------------------------------------------------------------------------------

100.50.1.1  -              4.4.4.4     yes           100.50.1.0/24   B       yes
```

In the RP interface, the register RX packet counter can be verified. If the registration is successful, the counter is nonzero and increments at about one packet per flow in a minute. However, if it is not incrementing or if increments at a high rate, it indicates that the registration is not complete between the Source DR and RP (Register stop is not sending yet, or is being dropped in transit). In that case, register packets need to be captured between the Source DR and RP to verify that the Null Register and Register Stop are exchanged.

In the example below, the RP interface is loopback 10.

```
Site-2-BGW# show ip pim interface loopback10 counters

Interface  : loopback10
VRF        : red

                                    Rx        Tx        Rx Drops
                                    --------  --------  --------
Hello                               0         0         0
BSM                                 0         0         0
Register                            569       0         0
SSM Register                        0         0         0
Register Stop                       0         0         0
SSM Register Stop                   0         0         0
Join/Prune                          0         0         0
SSM Join/Prune                      0         0         0
C-RP Advertisement                  0         0         0
Graft                               0         0         0
Graft Ack                           0         0         0
Assert                              0         0         0
State Refresh                       0         0         0
Register Drops(Register ACL hitcount)  0      0         0
Join/Prune Drops(RP ACL hitcount)   0         0         0
Unknown Multicast(Software forwarded)  0      0         44

Multicast Boundary Rx drop counters :

PIM Joins/Prunes                    0
PIM BSM                             0
PIM C-RP Advertisements             0
PIM Asserts                         0
Multicast Data Packets              0
IGMP Joins                          0
Site-2-BGW#
```

Troubleshooting RP, RP-Set and BSR Election issues

For an active multicast group, if the RP cannot be found with **show ip pim rp 235.1.1.1 vrf red**, then it could be an issue with the BSM RP-set learned or an issue in the local Static-RP configuration based on whether candidate RP or Static RP is configured.

To verify if a valid RP-Set learned information from EBSR or from Static RP configuration, use **show ip pim rp-set vrf red**. If there are n o matching RP addresses for the interested Group Address Prefix, check the Candidate RP VTEP configuration to include the group prefix. However, if **show ip pim rp-set vrf red** does not return any group prefix, it could be an Elected BSR information issue.

```
Site-1-VTEP# show ip pim rp-set vrf red

VRF: redt

Status and Counters - PIM-SM Learned RP-Set Information
Group Address    Group Mask       RP Address       Hold Time  Expire Time
Priority
---------------  ---------------  ---------------  ---------  -----------  -------
-
224.0.0.0        240.0.0.0        31.1.1.1         150        118          192
```

To verify the VTEP in question has the knowledge of the Elected BSR, use **show ip pim bsr elected vrf red** and look for the E-BSR Address field. If there are none, then this VTEP is yet to learn the EBSR information by which only the RP-Set info is learnt. Validate that the VTEP has a valid PIM neighbor to the RPF interface to the EBSR Address. If not present, follow the same steps that are followed in the RPF Neighbor section. The interface BSM counters can also be checked to see if this VTEP is receiving BSM packets on the RPF interface.



PIM interface counters are not supported in the case of L3VNI interface, so if the RPF interface is L3VNI interface, a packet capture might be needed.

```
Site-1-VTEP# show ip pim bsr elected vrf red

Status and Counters - PIM-SM Elected Bootstrap Router Information

VRF                         : red
E-BSR Address               : 31.1.1.1
E-BSR Priority              : 0
E-BSR Hash Mask Length      : 30
E-BSR Up Time               : 3 hour 46 mins 49 secs
Next Bootstrap Message      : 1 mins 23 secs
```

Troubleshooting multicast on a Two site Multi-fabric topology

Figure 2, Simplified multi-fabric topology with two sites depicts a simplified multi-fabric topology with two sites (Site-1 & Site-2). The Route Reflectors (if any) and the spines are omitted as they mostly carry the multicast traffic payload as VXLAN encapsulated and act as a passthrough device and overlay PIM is not enabled on them.

Here, L3 Rop-Ext VTEP is a non-Vtep connected with Site-1 VSX Border VTEP by Rop-1 and Rop-2 Link.

Site1 VTEP connected with Site-1 Vsx border VTEP with mclag underlay connection.

Site2 Border VTEP and Site-1 Vsx border VTEP connected with mclag underlay connection.

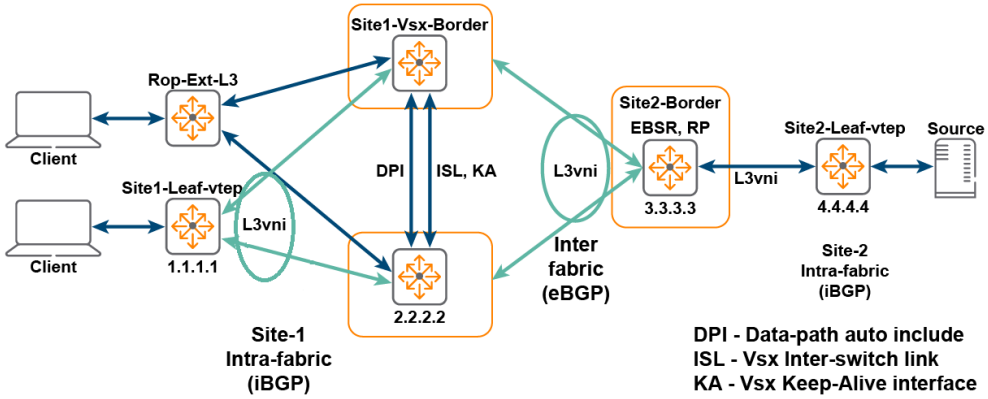
Tunnel details:

Site1-Vsx-Border – Site1-VTEP = Intra-fabric type (ibgp).

- Site1-Vsx-Border - L3 Rop Ext = Fabric terminated and overlay traffic routed to Default VRF.
- Site1-Vsx-Border – Site2-Border = Inter-fabric type (ebgp).
- Site2-Border - Site2-VTEP = Intra-fabric type (ibgp).

The Source is connected to Site2-VTEP and clients are attached to both L3Rop-Extension VTEP and Site1-VTEP. RP is configured at Site2-border VTEP. When the Source starts the traffic, it registers with RP device (Site-2-border VTEP) as unicast traffic by PIM register tunnel.

Figure 2 *Simplified multi-fabric topology with two sites*



The following section depicts the Mroute present at each hop from source to receiver VTEP and what to expect and how to troubleshoot each scenario.

At Site2-VTEP

This is a local VTEP where the multicast source is connected and it receives the traffic from a source-connected port and forwards the traffic towards its immediate Border VTEP. Here, the downstream interface is L3vni interface (Site Border vtep).

If there are no mroutes entries here, it could be a Registration issue with RP device. Refer to Verify if the Source DR has successfully registered the flow with RP.

If Downstream Interface is empty, it could be No (S,G) Joins received on downstream port from [Rp device/ clients device]. In this case, troubleshoot from the Client DR side towards the RP/Source.

Verify that the Incoming Interface is the Source connected interface (here, vni10000).

Verify that the Downstream Interfac' has the L3VNI interface with the VTEP pointing towards the Border VTEP IP (here, 3.3.3.3).

```
Site-2-VTEP# show ip mroute 235.1.1.1 100.50.1.2 vrf red detail

IP Multicast Route Entries

VRF : red
Total number of entries : 1

Group Address                 : 235.1.1.1
Source Address                : 100.50.1.2
Neighbor                      :
Incoming interface            : vlan500
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : connected
Metric                        : 0
```

```
Metric  Pref                  : 0
Uptime (HH:MM:SS)             : 01:35:50
Downstream Interface
Interface       State          Vteps
-----------     ----------     -----
vni10000        forwarding     3.3.3.3
```

At Site2-Border VTEP

Here Traffic receives from upstream port [L3vni] of Intra-fabric and bridges to another border VTEP of Inter-fabric.

If there aren't any mroutes and since this is the RP VTEP, it could be:

Source Registration issue between Source DR and RP. Refer to Troubleshooting Source DR registration issues with RP.

Joins are not received from the Site-1 Border VTEP where the receivers are present. Refer to Troubleshooting Source DR registration issues with RP.

Traffic received from Site-2 VTEP on L3VNI as indicated in the **Incoming Interface** (vni10000) field is routed to Site-1 Border VTEP as indicated in the **Intra-Inter Forwared VTEP(s)** (2.2.2.2) field.

```
Site-2-BGW# show ip mroute 235.1.1.1 100.50.1.2 vrf red detail

IP Multicast Route Entries

VRF : red
Group Address                          : 235.1.1.1
Source Address                         : 100.50.1.2
Neighbor                               : 4.4.4.4
Incoming interface                     : vni10000
Intra-Inter Forwarded VTEP(s)          : 2.2.2.2
Multicast Routing Protocol             : PIM-SM
Unicast Routing Protocol               : BGP
Metric                                 : 0
Metric  Pref                           : 200
Uptime (HH:MM:SS)                      : 01:25:07
```

At Site1- Vsx Border VTEP

This VTEP acts as a fabric termination to an L3-Extension VTEP as well as a Border VTEP for Site-1 fabric. The topology in Figure 2, Simplified multi-fabric topology with two sites has receivers joined from both L3-Extension VTEP and from the Site-1 regular VTEP.

The data-path-auto-include interface configured here is VLAN199, which is mandatory since the L3-Extension VTEPs are interconnected with the fabric with an ROP interface.

Since the interface between the L3-Extension VTEP and the Site-1's Broder VSX is an ROP extension, joins might come to either Primary or Secondary VSX VTEP but not both. In this example below, the joins are received in the Secondary VSX VTEP. Furthermore, Site-2 source traffic might receive at either Primary or Secondary VSX based on the undelay load balancing. In the example below, traffic has arrived at the Secondary VSX as indicated by the**'Incoming interface** vni10000 on VSX Secondary output. Traffic then need to be routed to:

- Its local VTEP where the receiver is present. This is identified from the 'Intra-Inter Forwarded VTEP(s)' 1.1.1.1 VTEP which is Site-1 VTEP.
- The L3 Extension VTEP that also has receivers for the same multicast flow. In this case, since the joins are received on the Primary VSX, the secondary needs to use the data-path-auto-include interface to

forward the traffic to Primary VSX. Thus, the same mroute entry has data-path-auto-include VLAN199 in **Downstream Interface**.



In this example, the traffic from Site-2 arrived at the Secondary VSX. For source traffic that arrives at the Primary VSX (based on underlay load balancing), both the L3-Extended and local VTEP Clients are served by the Primary Mroute since the PIM joins are received there.

VSX-Secondary:

```
Site-1-Vsx-Sec-BGW# show ip mroute 235.1.1.1 100.50.1.2 vrf red detail

IP Multicast Route Entries

VRF : red

Group Address                 : 235.1.1.1
Source Address                : 100.50.1.2
Neighbor                      : 3.3.3.3
Incoming interface            : vni10000
Intra-Inter Forwarded VTEP(s) : 1.1.1.1
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:36:32
Downstream Interface
Interface       State
-----------     ----------
vlan199         forwarding
Site-1-Vsx-Sec-BGW#
```

VSX-Primary:

```
Site-1-Vsx-Pri-BGW# show ip mroute 235.1.1.1 100.50.1.2 vrf red detail

IP Multicast Route Entries

VRF : red
Total number of entries : 1

Group Address                 : 235.1.1.1
Source Address                : 100.50.1.2
Neighbor                      : 199.199.1.2
Incoming interface            : vlan199
Intra-Inter Forwarded VTEP(s) :
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 00:34:56
Downstream Interface
Interface       State
-----------     ----------
vni10000        forwarding
1/1/5           forwarding
```

At Site1-VTEP

The Site-1 Border VSX Secondary VTEP forwards the traffic to this VTEP as shown At Site1- Vsx Border VTEP and as indicated by Intra-Inter Forwarded VTEP(s). This VTEP then routes traffic from vni10000 to the receiver VLAN400 as indicated from the highlighted fields in the example below. If mroutes are missing or not as expected, refer to Troubleshooting from the reciver designated VTEP (DR).

```
Site-1-VTEP# show ip mroute 235.1.1.1 100.50.1.2 vrf red detail

IP Multicast Route Entries

VRF : red

Group Address                 : 235.1.1.1
Source Address                : 100.50.1.2
Neighbor                      : 2.2.2.2
Incoming interface            : vni10000
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : BGP
Metric                        : 0
Metric  Pref                  : 200
Uptime (HH:MM:SS)             : 01:38:48
Downstream Interface
Interface       State
-----------     ----------
vlan400         forwarding
```

At L3-Extension VTEP

The Site-1 Border VSX Primary VTEP forwards the traffic to this VTEP via the ROP interface. This VTEP then routes traffic from ROP 1/1/16 to the receiver VLAN10 as indicated from the highlighted fields in the example below. If mroutes are missing or not as expected refer to Troubleshooting from the reciver designated VTEP (DR).

```
Site-1-ROP-EXT# show ip mroute 235.1.1.1 100.50.1.2 detail
IP Multicast Route Entries

VRF : default

Total number of entries : 1
Group Address                 : 235.1.1.1
Source Address                : 100.50.1.2
Neighbor                      : 200.1.1.1
Incoming interface            : 1/1/16
Multicast Routing Protocol    : PIM-SM
Unicast Routing Protocol      : OSPF
Metric                        : 25
Metric  Pref                  : 110
Uptime (HH:MM:SS)             : 01:38:04
Downstream Interface
Interface       State
-----------     ----------
vlan10          forwarding
```

Troubleshooting Multicast Shared Border Router Issues

Refer to the configuration below as shown from Route-reflectors and Shared Border Router.

1. At Route-Reflector: configure **next-hop-unchanged** Cli towards the SBR neighbor.
2. At Shared Border Router: map **route-map with Broadcast group** to the corresponding RR neighbor.

Figure 3 *Route-Reflector and Shared Border*



1. Configure the **ip multicast multi-fabric border** CLI at the Shared Border.
2. Verify the **Shared Border Status** is enabled. See example shown below.

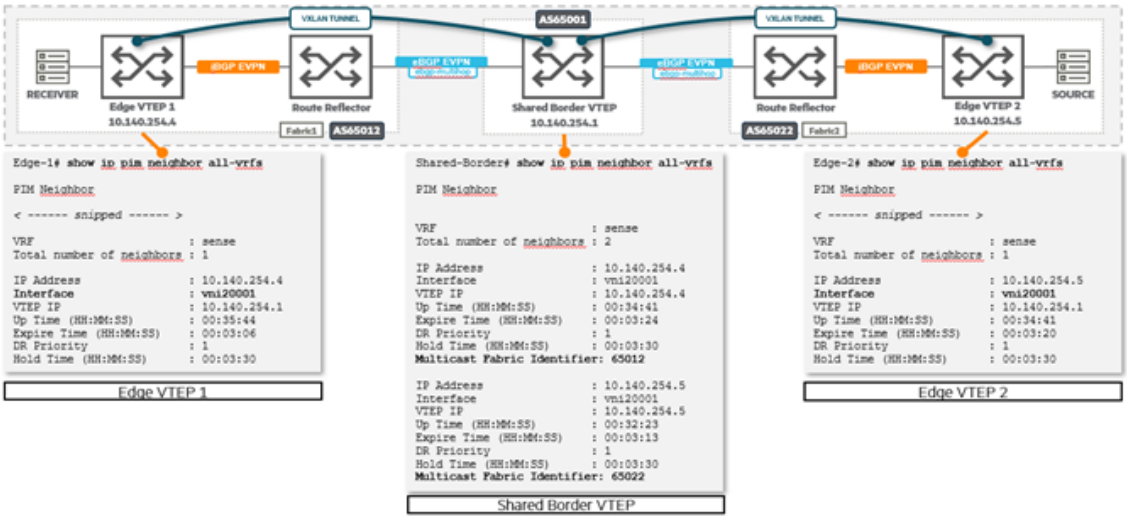
```
Shared-Border(config)# show ip pim all-vrfs

PIM Global Parameters

VRF                              : sense
PIM Status                       : Enabled
PIM SSM Status                   : Disabled
PIM SSM Range ACL                : Not Configured
Join/Prune Interval (sec)        : 60
SPT Threshold                    : Enabled
State Refresh Interval (sec)     : 60
PIM NSF Status                   : Inactive
PIM BIDI NSF Status              : Inactive
Shared Border Status             : Enabled
Multicast Fabric Identifier      : 65001
```

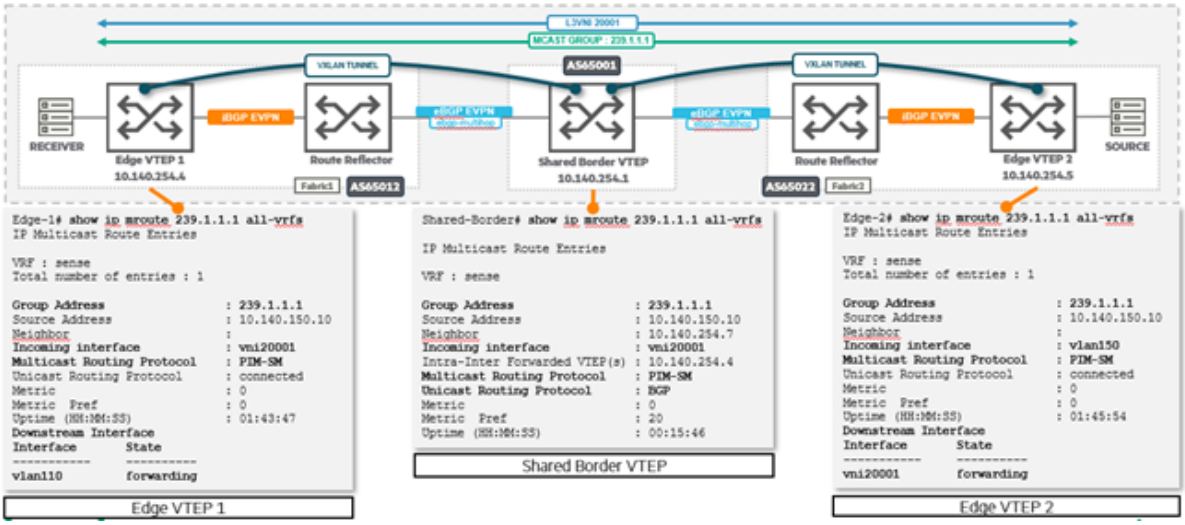
3. At the Shared Border router, verify the PIM neighbors are created with MFID details.

Figure 4 *PIM Neighbors with MFD details*



1. Ensure that intra-inter forwarded VTEPs and multicast fabrics show across the fabrics at the Shared Border router, as shown in Figure 5, Intra-inter forwarded VTEPs and multicast fabrics.

Figure 5 *Intra-inter forwarded VTEPs and multicast fabrics*



Frequently Asked Questions

1. When does the ip pim-sparse datapath-auto-include command need to be enabled?

This command is applicable only in the case of VSX VTEP, where Primary or Secondary has an L3 connection (P2P or ROP) to the non-VXLAN routed network.

2. Is orphan port on primary and secondary VSX VTEP supported?

Yes, orphan ports are supported only in the form of ROP and P2P ports.

Additionally, `datapath-auto-include` needs to be provisioned between the VSX peers in those scenarios.

3. Which command is specific to Border VTEP?

The **dyn-vxlan-tunnel-bridging-mode ibgp-ebgp** command is specific to the border VTEP. It must be configured on the border router to allow multicast routing between iBGP and eBGP. Unlike for unicast

routing, this command must be enabled regardless of whether the VLAN is stretched across fabrics, ensuring proper functioning of multicast on the border router.

4. Why are redistribute-local-mac or redistribute-local-svi commands required for IGMP/MLD?

IGMP/MLD running in a VSX VTEP is interested in the local MAC address of remote VTEPs for proper synchronization of IGMP/MLD states between them. These commands are needed when at least one VSX VTEP is present in the fabric and must be configured on all VTEPs (standalone and VSX VTEPs). These commands are applicable for both single and multi-fabric topology.

Chapter 14
Multicast Routing and Bridging

The multicast datapath feature is related to the forwarding engine, where it consolidates the information received over a multicast control plane such as PIM or any other multicast routing protocol to formulate the multicast forwarding information base. It is responsible for:

- Forwarding multicast packets
- Registering with the multicast routing protocols to learn the entry and status set by the control plane
- Handling data-driven events that must be sent to the control plane
- Maintaining the programming status of multicast routing and bridging entries

This section provides additional verification commands that can be used to verify L2 and L3 multicast forwarding entries. Continue to utilize the verification commands in the PIM and IGMP chapters as required.

Supported platforms and standards

Multicast routing and bridging is supported by the 6200, 6300, 6400, 8100, 8320, 8325, 8360, 8400, 9300 and 10000 Switch Series.

Multicast datapath commands for IPv4

show ip multicast bridging datapath

```
show ip multicast bridging datapath {group <GROUP-IP> {source <SOURCE-IP>
{vlan <VLAN-ID>}}}[vrf <VRF_NAME>] [vsx-peer]
```

Description

Displays the multicast bridge control forwarding entries on a device including replication details and hardware programming status. Displays bridging datapath details for the specified multicast flow (the group, source, VLAN, and VRF).

Parameter	Description
`group <GROUP-IP>`	Specifies a group IP address in IPv4 format (x.x.x.x), where x is a decimal number from 0 to 255. Shows bridging datapath details for the specified group.
`source <SOURCE-IP>`	Specifies a source IP address in IPv4 format (x.x.x.x), where x is a decimal number from 0 to 255. Shows bridging datapath details for the specified source.
`vlan <VLAN-ID>`	Specifies a VLAN. Values: 1-4094.

Parameter	Description
	Shows bridging datapath details for the specified VLAN.
`vrf <VRF-NAME>`	Specifies a VRF. Shows datapath information for groups joined in the specified VRF. If the **<VRF-NAME>** is not specified, it shows the default VRF information.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Usage

A multicast bridge control forwarding table comprises of the IP multicast destination address, source address and its association with a list of ports on which the multicast packets are replicated in a Layer 2 domain. The switch floods/ replicates the multicast packet on these ports by matching the multicast destination address, source address, and the virtual local network identifier (VLAN ID). The **show ip multicast bridging datapath** command displays the multicast bridge control forwarding entries on a device including replication details and hardware programming status.

Examples

Showing detailed bridging datapath information for the specified multicast flow:

```
switch# show ip multicast bridging datapath group 232.1.1.10 source 100.100.1.10
vlan 10
Multicast Bridging Datapath Details
VRF                         : default
Source                      : 100.100.1.10/32
Group                       : 232.1.1.10/32
Replication Group Index     : 70
Hardware Status             : active
Error Code                  : None
Retries for programming     : 0
Vlan                        : VLAN10
State                       : forwarding

VNI                         : vni1000
State                       : operational
Replication Details:
Tunnel Endpoints      State
----------------      ----------
2.2.2.2               operational
4.4.4.4               operational
```

Command History

Release	Modification
10.09.1000	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip multicast routing datapath

```
show ip multicast routing datapath {group <GROUP-IP> {source <SOURCE-IP>
{port <INCOMING-PORT>}}}[vrf <VRF_NAME>] [vsx-peer]
```

Description

Displays the multicast Layer 3 forwarding entries with replication details and hardware programming status. Displays routing datapath details for the specified multicast flow (group, source, incoming port, and VRF).

Parameter	Description
`group <GROUP-IP>`	Specifies a group IP address in IPv4 format (x.x.x.x), where x is a decimal number from 0 to 255. Shows datapath details for the specified group.
`source <SOURCE-IP>`	Specifies a source IP address in IPv4 format (x.x.x.x), where x is a decimal number from 0 to 255. Shows datapath details for the specified source.
`port <INCOMING-PORT>`	Specifies the incoming port. Shows datapath details for the specified port.
`vrf <VRF-NAME>`	Specifies a VRF. Shows datapath information for the specified VRF. If the ***<VRF-NAME>*** is not specified, it shows the default VRF information.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Usage

A multicast routing protocol such as PIM populates the multicast Layer 3 forwarding table and forwards multicast traffic to clients throughout the network. A multicast forwarding table comprises of the IP multicast destination address, source address, interface on which the traffic is received, and the list of interfaces on which multicast traffic is replicated. The **show ip multicast routing datapath** command displays the multicast Layer 3 forwarding entries with replication details and hardware programming status.

Examples

Showing detailed routing datapath information for the specified multicast flow:

```
switch# show ip multicast routing datapath group 225.20.0.1 source 20.0.0.2 port
vlan20
Multicast Routing Datapath Details
VRF                         : default
Source                      : 20.0.0.2/32
Group                       : 225.20.0.1/32
Primary Upstream Interface  : vlan20
From                        : pim_sm
Type                        : route
Replication Group Index     : 38923
Hardware Status             : active
Error Code                  : None
Retries for programming     : 0
Upstream Interface          : vlan20
        State               : forwarding
        Replication Details:
        L2 Ports        State
        -----------     ----------
        1/1/4           forwarding
Downstream Interface        : vlan30
        State               : forwarding
        Replication Details:
        L2 Ports        State
        -----------     ----------
        1/1/1           forwarding
Downstream Interface        : vlan40
        State               : forwarding
        Replication Details:
        L2 Ports        State
        -----------     ----------
        1/1/2           forwarding
        1/1/3           forwarding
```

Command History

Release	Modification
10.09.1000	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 9300 8400 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

Multicast datapath commands for IPv6

show ipv6 multicast bridging datapath

```
show ipv6 multicast bridging datapath {group <GROUP-IP> {source <SOURCE-IP>
{vlan <VLAN-ID>}}}[vrf <VRF_NAME>]]]] [vsx-peer]
```

Description

Displays the multicast bridge control forwarding entries on a device including replication details and hardware programming status. Displays bridging datapath details for the specified multicast flow (the group, source, VLAN, and VRF).

Parameter	Description
`group <GROUP-IP>`	Specifies a group IP address in IPv6 format (xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx), where x is a hexadecimal number from 0 to F. Shows bridging datapath details for the specified group.
`source <SOURCE-IP>`	Specifies a source IP address in IPv6 format (xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx), where x is a hexadecimal number from 0 to F. Shows bridging datapath details for the specified source.
`vlan <VLAN-ID>`	Specifies a VLAN. Range 1 to 4094. Shows bridging datapath details for groups joined in the specified VLAN.
`vrf <VRF-NAME>`	Specifies a VRF. Shows bridging datapath information for groups joined in the specified VRF. If the ***<VRF-NAME>*** is not specified, it shows the default VRF information.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Usage

A multicast bridge control forwarding table comprises of the IP multicast destination address, source address and its association with a list of ports on which the multicast packets are replicated in a Layer 2 domain. The switch floods/ replicates the multicast packet on these ports by matching the multicast destination address, source address, and the virtual local network identifier (VLAN ID). The **show ipv6 multicast bridging datapath** command displays the multicast bridge control forwarding entries on a device including replication details and hardware programming status.

Examples

Showing detailed bridging datapath information for the specified multicast flow:

```
switch# show ipv6 multicast bridging datapath group ff03::0 source 1010:22::4 vlan
10
Multicast Bridging Datapath Details
VRF                          : default
Source                       : 1010:22::4/128
Group                        : ff03::/128
Replication Group Index      : 70
Hardware Status              : active
```

```
Error Code                  : None
Retries for programming     : 0
Vlan                        : VLAN10
        State               : forwarding
        Replication Details:
        L2 Ports        State
        -----------     ----------
        1/1/6           forwarding
        1/1/7           forwarding
VNI                         : vni1000
        State               : operational
        Replication Details:
        Tunnel Endpoints     State
        ----------------     ----------
        2.2.2.2              operational
        4.4.4.4              operational
```

Command History

Release	Modification
10.09.1000	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 multicast routing datapath

`show ipv6 multicast routing datapath {group <GROUP-IP> {source <SOURCE-IP> {port <INCOMING-PORT>}}} [vrf <VRF_NAME>] [vsx-peer]`

Description

Displays the multicast Layer 3 forwarding entries with replication details and hardware programming status. Displays routing datapath details for the specified multicast flow (group, source, incoming port, and VRF).

Parameter	Description
`group <GROUP-IP>`	Specifies a group IP address in IPv6 format (xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx), where x is a hexadecimal number from 0 to F. Shows datapath details for the specified group.

Parameter	Description
`source <SOURCE-IP>`	Specifies a source IP address in IPv6 format (xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx), where x is a hexadecimal number from 0 to F. Shows datapath details for the specified source.
`port <INCOMING-PORT>`	Specifies the incoming port. Shows datapath details for the specified port.
`vrf <VRF-NAME>`	Specifies a VRF. Shows datapath information for groups joined in the specified VRF. If the ***<VRF-NAME>*** is not specified, it shows the default VRF information.
`vsx-peer`	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Usage

A multicast routing protocol such as PIM populates the multicast Layer 3 forwarding table and forwards multicast traffic to clients throughout the network. A multicast forwarding table comprises of the IP multicast destination address, source address, interface on which the traffic is received, and the list of interfaces on which multicast traffic is replicated. The **show ipv6 multicast routing datapath** command displays the multicast Layer 3 forwarding entries with replication details and hardware programming status.

Examples

Showing detailed routing datapath information for the specified multicast flow:

```
switch# show ip multicast routing datapath group 225.20.0.1 source 20.0.0.2 port
vlan20
Multicast Routing Datapath Details
VRF                         : default
Source                      : 20.0.0.2/32
Group                       : 225.20.0.1/32
Primary Upstream Interface  : vlan20
From                        : pim_sm
Type                        : route
Replication Group Index     : 38923
Hardware Status             : active
Error Code                  : None
Retries for programming     : 0
Upstream Interface          : vlan20
        State               : forwarding
        Replication Details:
        L2 Ports        State
        -----------     ----------
        1/1/4           forwarding
Downstream Interface        : vlan30
        State               : forwarding
        Replication Details:
        L2 Ports        State
        -----------     ----------
        1/1/1           forwarding
Downstream Interface        : vlan40
```

```
State               : forwarding
Replication Details:
L2 Ports        State
-----------     ----------
1/1/2           forwarding
1/1/3           forwarding
```

Command History

Release	Modification
10.09.1000	Command introduced.

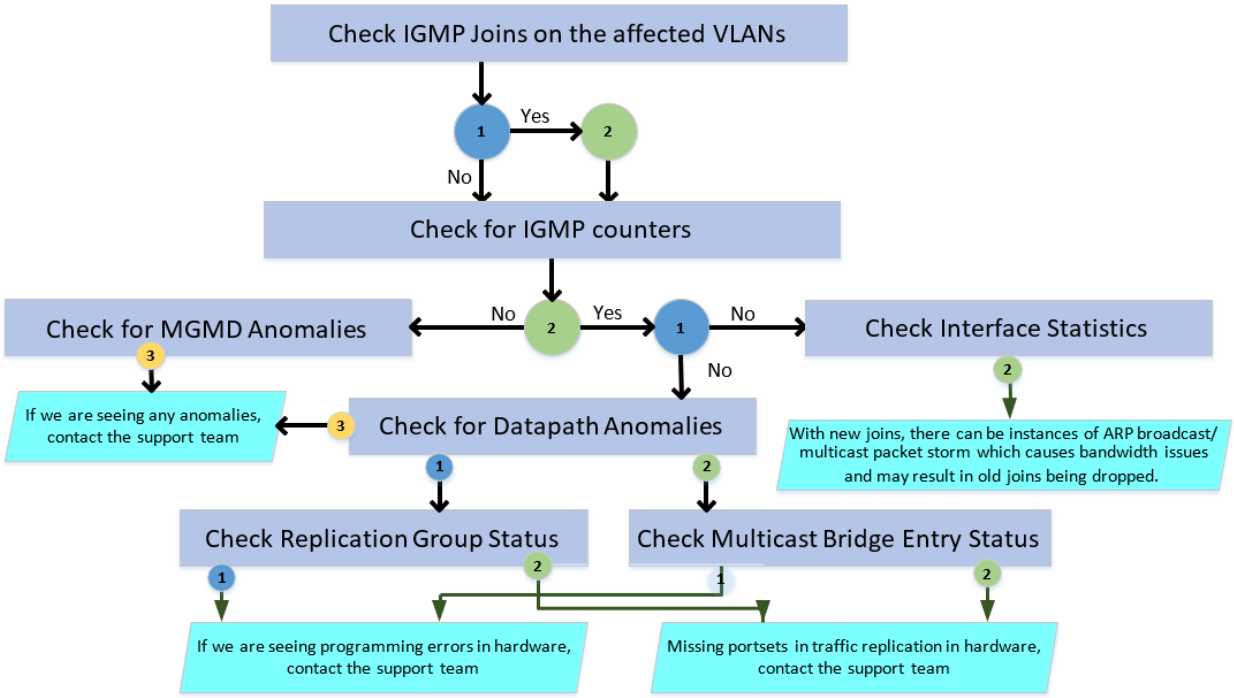
Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

The following procedures describe workflows for debugging common multicast issues.

Issue: A user switching channels impacts traffic on other channels.

Figure 1 *Workflow overview*



Step one: check IGMP joins on the affected VLANs.

```
switch# show ip igmp snooping vlan 100 detail
 IGMP Snooping Protocol Info

 Total VLANs with IGMP enabled            : 1
 Current count of multicast groups joined  : 3

 IGMP Drop Unknown Multicast              : Global
 VLAN ID : 100
 VLAN Name : VLAN100
 IGMP Configured Version : 3
 IGMP Operating Version : 3
 Querier Address : 15.1.1.1
 Querier Port : vxlan1(100.1.1.1)
 Querier UpTime :59m 21s
 Querier Expiration Time :3m 57s
 Router Detected Port(s) :

 Active Group Address   Tracking  Vers Mode Uptime    Expires    Ports/Vteps
 --------------------- ---------- ---- ---- --------- ---------- ----------------
 225.1.1.1              Filter    3    EXC   0m 14s   4m 8s      100.1.1.1
                                                                 1/3/8
 225.1.1.2              Filter    3    EXC  51m 54s   4m 8s      100.1.1.1
                                                                 1/3/8
 225.1.1.3              Filter    3    EXC   0m 17s   4m 8s      100.1.1.1
                                                                 1/3/8
```

1 Check if IGMP Joins are present for the affected group

2 Check uptime of the affected group and new group. If it is same/adjacent, then one group may be affecting the other.

Step two: check for IGMP counters.

```
switch# show ip igmp snooping vlan 100 counters
IGMP Snooping VLAN Counters

VLAN ID   : 100
VLAN Name : VLAN100

Rx Counters :

V1 All Hosts Queries                          0
V2 All Hosts Queries                          0
V3 All Hosts Queries                          3
V2 Group Specific Queries                     0
V3 Group Specific Queries                     0
Group And Source Specific Queries             0
V1 Member Reports                             0
V2 Member Reports                             134
V3 Member Reports                             2
V2 Member Leaves                              116

Tx Counters :

Flood on vlan                                 71
V2 Group Specific Queries                     0
V3 Group Specific Queries                     0

Errors:

Unknown Message Type                          0
Malformed Packets                             0
Bad Checksum                                  0
Packet received on IGMP-disabled Interface    0
Interface Wrong Version Queries               0
Packet dropped by ACL                         0

Port Counters:

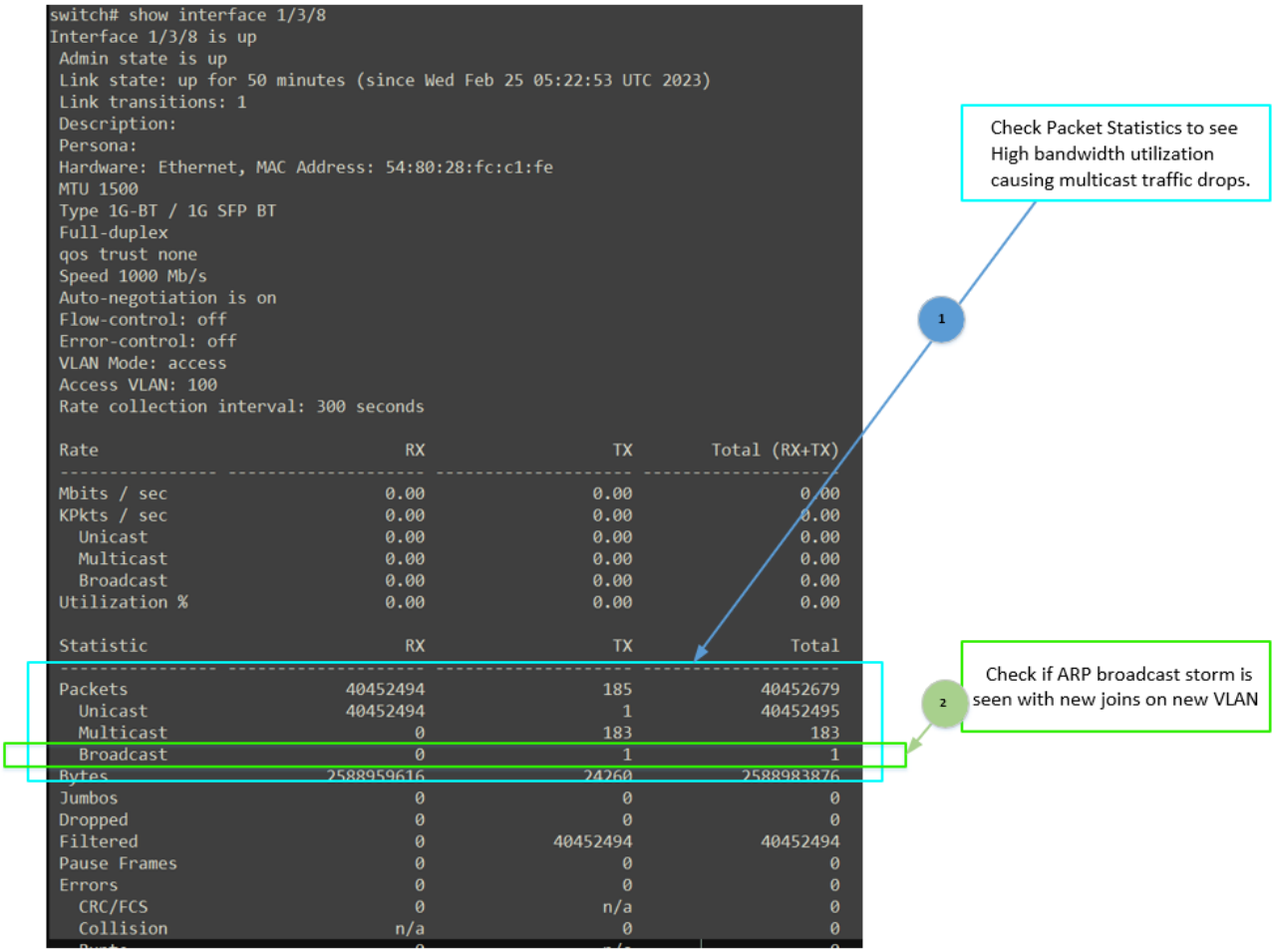
Membership Timeout                            0
```

1 Check Rx Join Counters to see if reports are incremented.

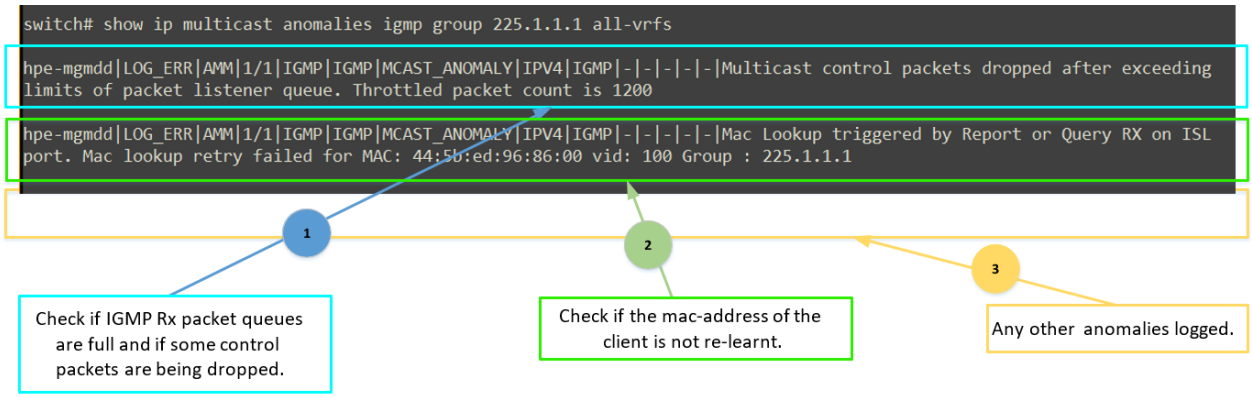
2 Check if the flood on vlan is increasing at a high rate, this could cause control packet loss and hence traffic impact.

3 Check if there are MGMD packets received with errors.

Step three: check interface statistics.



Step four: check for MGMD anomalies.



Step five: check for datapath anomalies.

```
switch# show ip multicast anomalies data-path all-vrfs

ops-switchd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|DATA-PATH|-|-|-|-|Failed to create the multicast ingress group.
Group = 33554433,  Error = DUNE_RET_ALREADY.
ops-switchd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|DATA-PATH|-|-|-|-|Creation of multicast egress group failed for
group = 33554433,  Error = DUNE_RET_ALREADY.
ops-switchd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|DATA-PATH|-|-|-|-|Failed to update the multicast ingress group.
Group = 33554433,  Error = DUNE_TL_PARTIAL_FATAL.
ops-switchd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|DATA-PATH|-|-|-|-|Failed to set gport while adding gport to multicast
group | Gport = 1/3/8, group = 225.1.1.1 | Err = BCM_E_NOT_FOUND.
ops-switchd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|DATA-PATH|-|-|-|-|Could not create replication group for VLAN |
Err = HW_ERROR.
ops-switchd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|DATA-PATH|-|-|-|-|Unable to program IPMC entry | sip = 172.16.40.135/32,
dip = 225.1.1.1/32, vrf = default, vlan = ITVPAX, hw_id = 42, error = Entry not processed
```

1

Check if there is a replication group programming error.

2

Check if there is an IPMC programming error.

3

Any other anomalies logged.

Step six: check replication group status.

```
switch# show replication-groups multicast

Replication Group Information

Replication Group Index       : 68
Type                          : bridge_control
Hardware Status               : success
Error Code                    : None
Coalescence Id                : 3423822172
Replication Portset Information
    L3 interface                  : VLAN100
    Type                          : upstream
    L2 portset                    : 1/3/8
    Replication portset behavior  : filter_when_empty

Replication Group Index       : 69
Type                          : mcast_routing
Hardware Status               : success
Error Code                    : None
Coalescence Id                : 517784941
Replication Portset Information
    L3 interface                  : vlan100
    Type                          : upstream
    L2 portset                    : 1/3/8
    Replication portset behavior  : filter_when_empty

    L3 interface                  : vlan20
    Type                          : downstream
    L2 portset                    : 1/1/22
    Replication portset behavior  : filter_when_empty
    L2 tunnel portset             :
        VNI           Tunnel Endpoint
        -------       ------------------
        2000          2.2.2.2, 3.3.3.3

    L3 interface                  : vlan30
    Type                          : downstream
    L2 portset                    : None
    Replication portset behavior  : flood
```

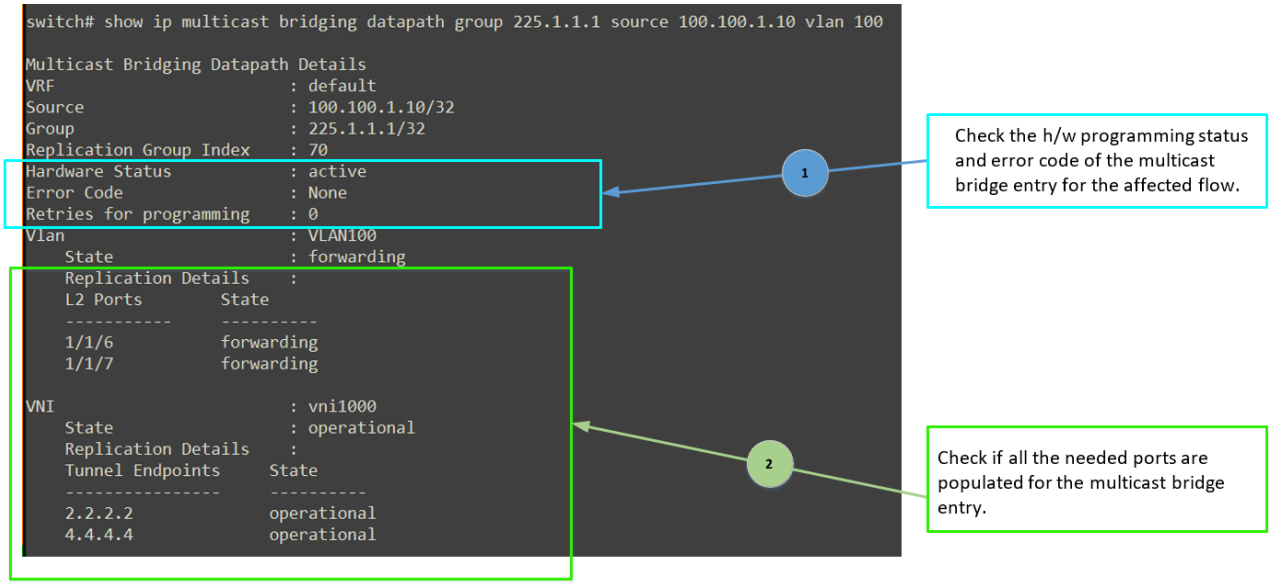
1

Check the h/w programming status and error code of the replication group entry for the affected flow.

2

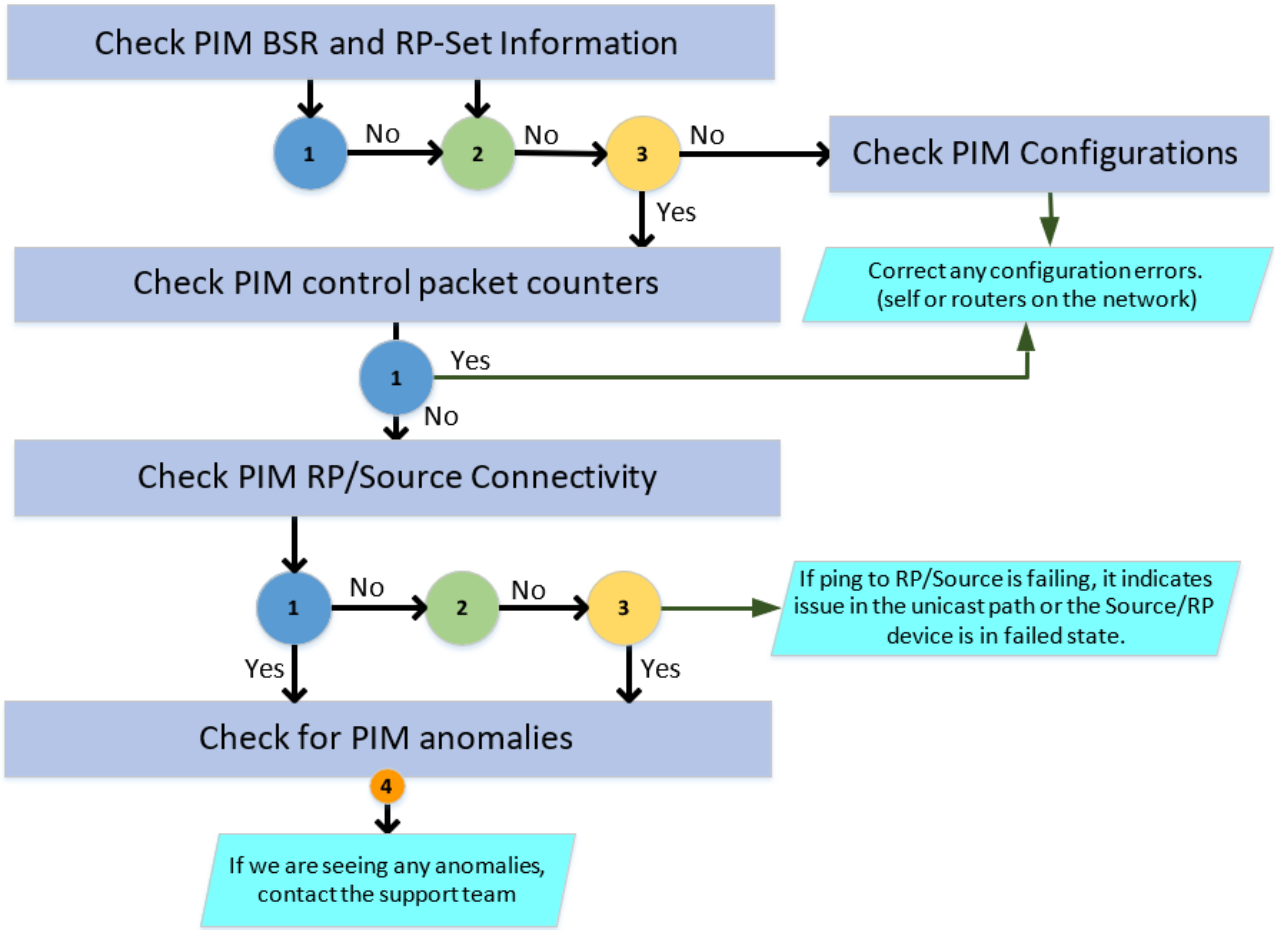
Check if all the portsets are populated for the replication group.

Step seven: check for multicast bridge entry status.

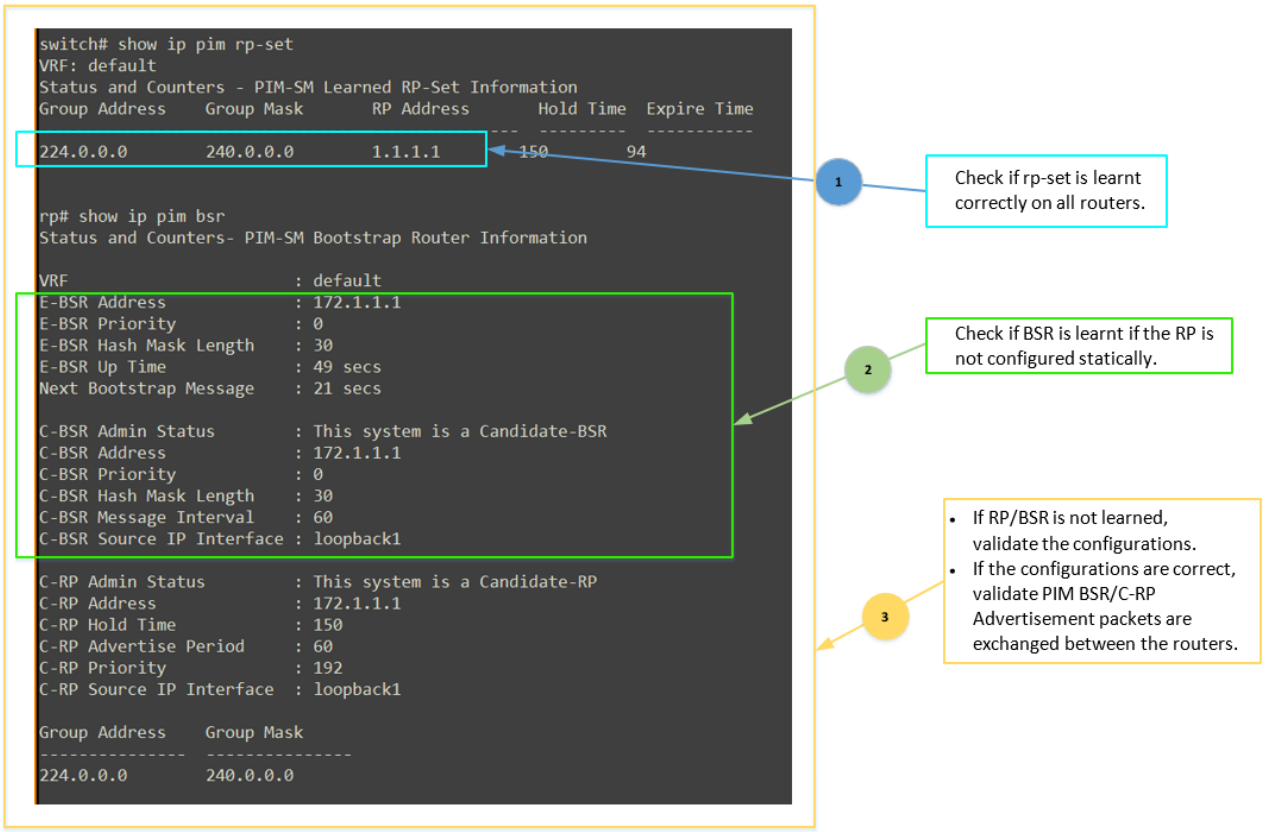


Issue two: Momentary/Permanent traffic drops, RP (Rendezvous Point) not reachable

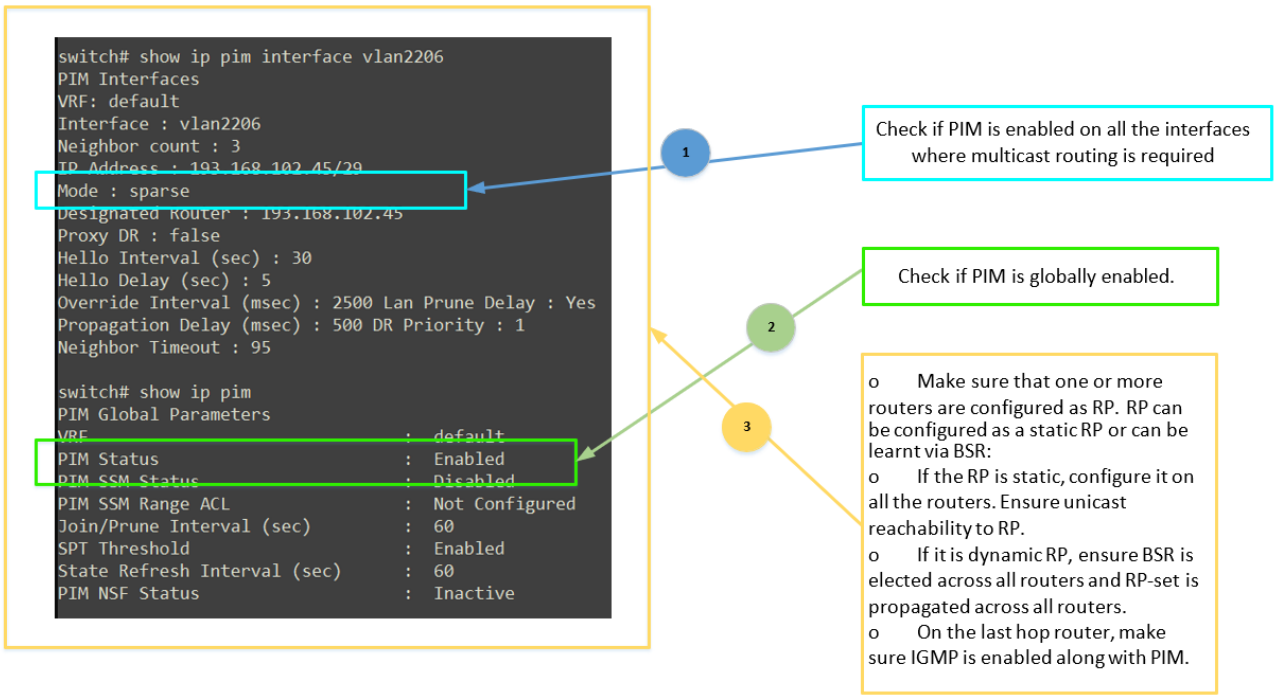
Figure 2 *Workflow Overview*



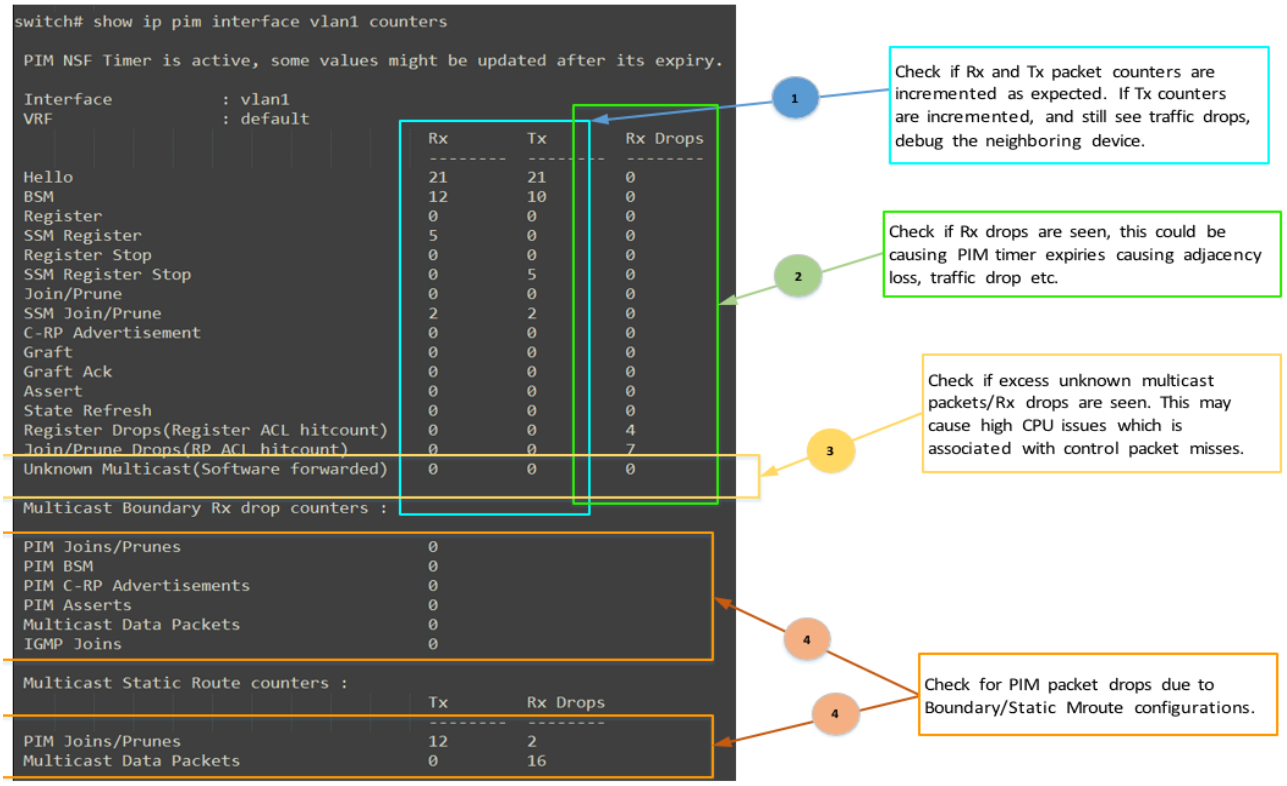
Step one: check PIM BSR and RP-Set information.



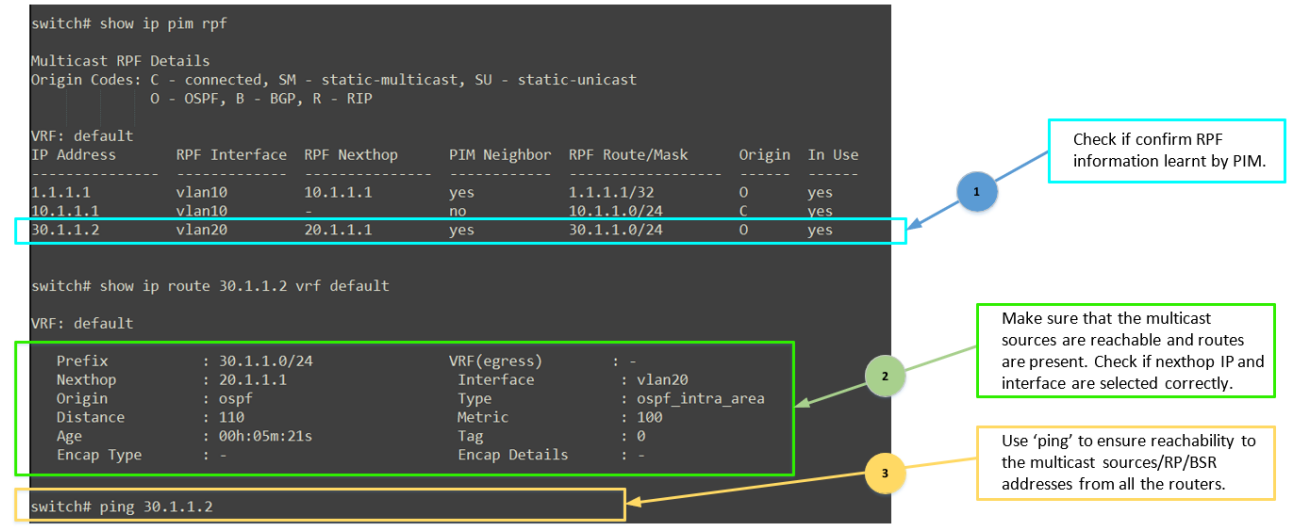
Step two: check PIM configurations.



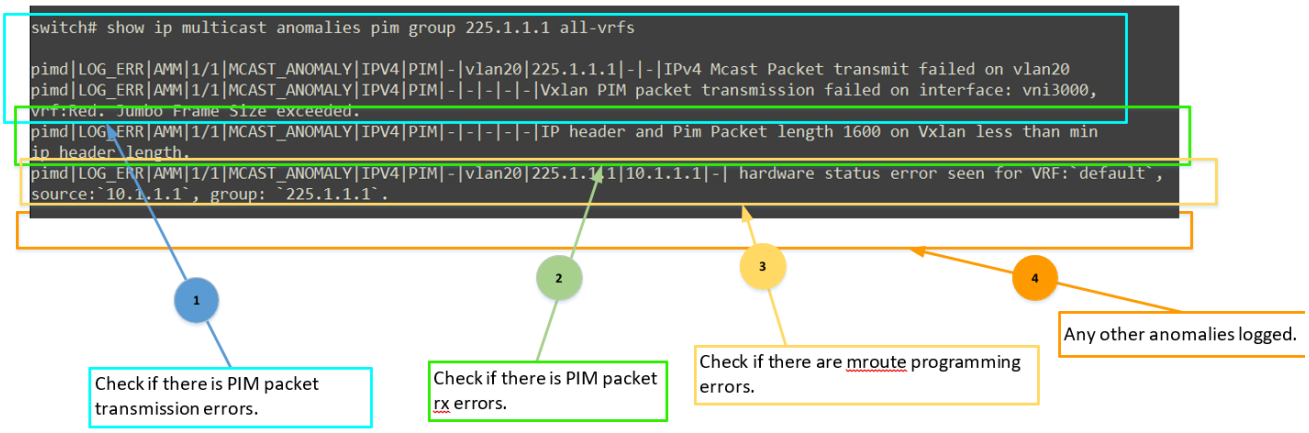
Step three: check PIM control packet counters.



Step four: check PIM RP/source connectivity.

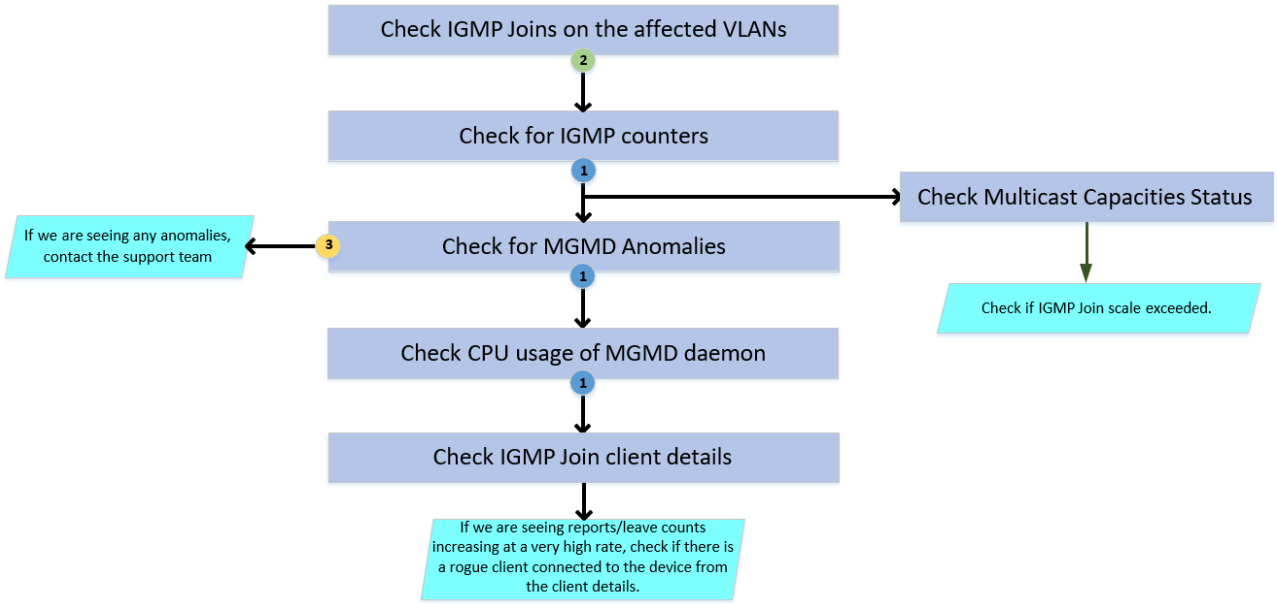


Step five: check for PIM anomalies.

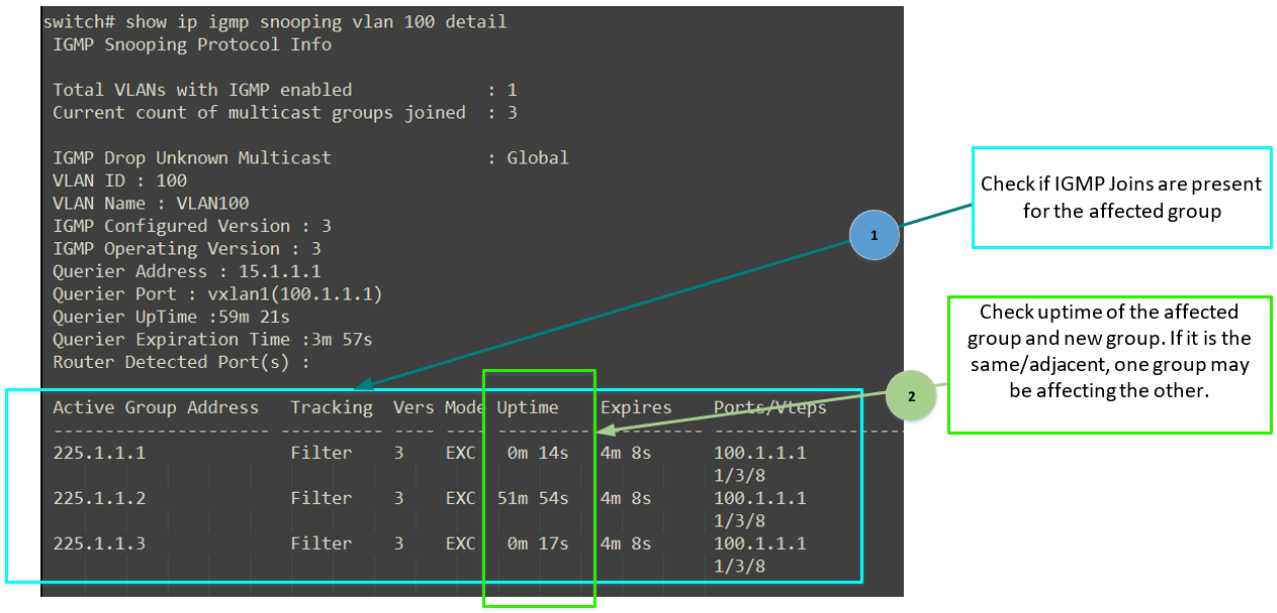


Issue three: Multicast Join Latency

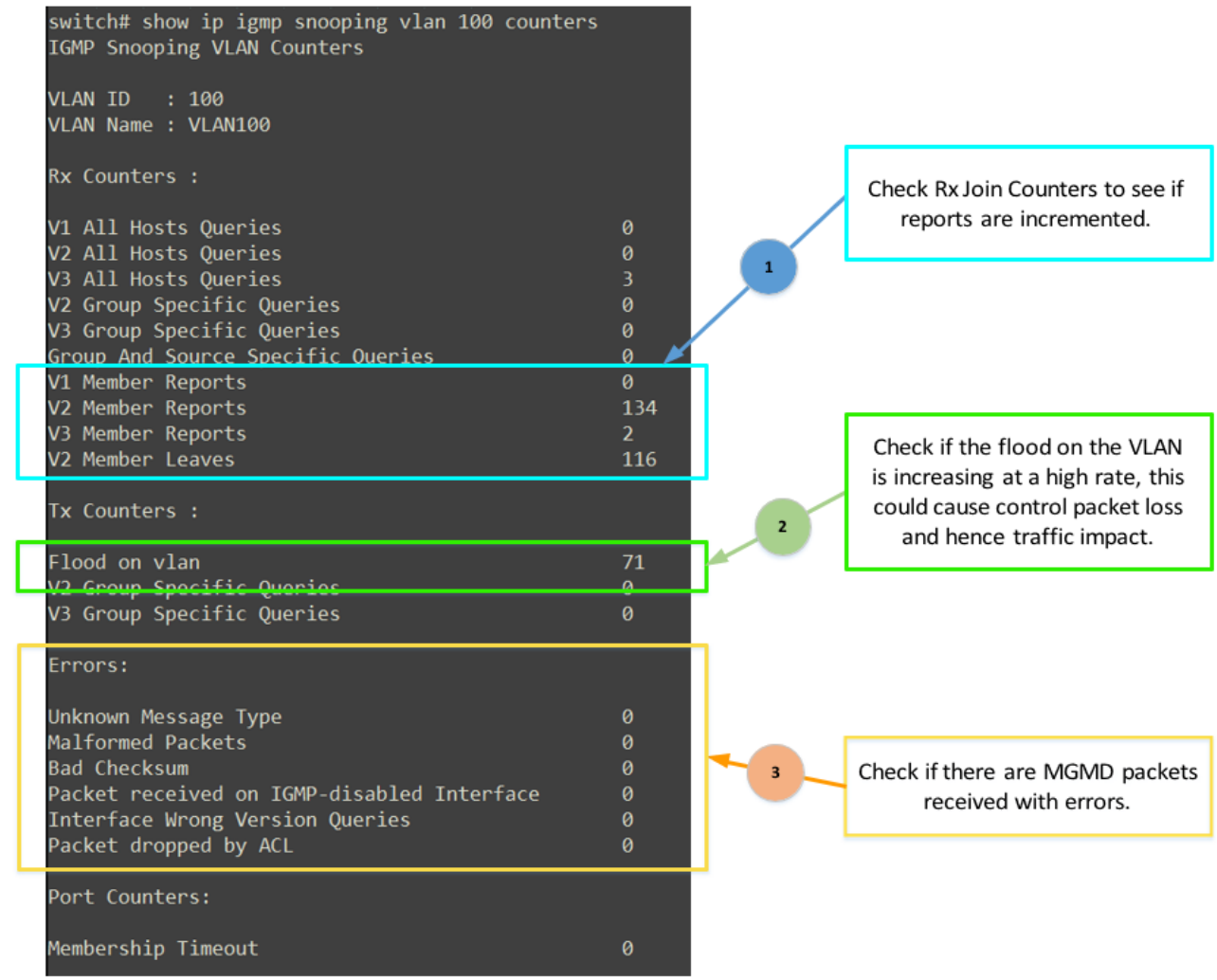
Figure 3 *Workflow overview*



Step one: Check IGMP joins on the affected VLANs.



Step two: check for IGMP counters.



Step three: check multicast capacities status.

```
switch# show capacities-status

System Capacities Status
Capacities Status Name                                                                                                                                  Value Maximum
--------------------------------------------------------------------------------------------------------------------------------------------------------------
                                        ::::::::::::::::::::::::::::::::
Number of L3 Destinations for Mcast, Neighbors, Routes and Nexthops in ECMP groups (VXLAN enabled)                                                          2   32766
                                        ::::::::::::::::::::::::::::::::
Number of IGMP/MLD groups                                                                                                                                   1    8192
Number of IGMP/MLD snooping groups                                                                                                                          0    8192
Number of IGMP/MLD static groups                                                                                                                            0    8192
                                        ::::::::::::::::::::::::::::::::
Number of MSDP Peers                                                                                                                                        0      64
Number of MSDP SA Cache entries                                                                                                                             0   32768
                                        ::::::::::::::::::::::::::::::::
Number of PIM/PIMv6 mroutes                                                                                                                                 0    8192
Number of PIM/PIMv6 nexthops                                                                                                                                0   65536
                                        ::::::::::::::::::::::::::::::::
Number of IPv4/IPv6 Static multicast nexthops                                                                                                               1   65536
Number of IPv4/IPv6 Static multicast routes                                                                                                                 0    8192
Number of IPv4/IPv6 Summarized static multicast routes                                                                                                      1    2048
                                        ::::::::::::::::::::::::::::::::
```

1

Check if the capacities status value has reached the maximum supported value.

Step four: check for MGND anomalies.

```
switch# show ip multicast anomalies igmp group 225.1.1.1 all-vrfs

hpe-mgmdd|LOG_ERR|AMM|1/1|IGMP|IGMP|MCAST_ANOMALY|IPV4|IGMP|-|-|-|-|Multicast control packets dropped after exceeding
limits of packet listener queue. Throttled packet count is 1200

hpe-mgmdd|LOG_ERR|AMM|1/1|IGMP|IGMP|MCAST_ANOMALY|IPV4|IGMP|-|-|-|-|Mac Lookup triggered by Report or Query RX on ISL
port. Mac lookup retry failed for MAC: 44:50:ed:96:86:00 vid: 100 Group : 225.1.1.1
```

1

Check if IGMP Rx packet queues are full and if some control packets are being dropped.

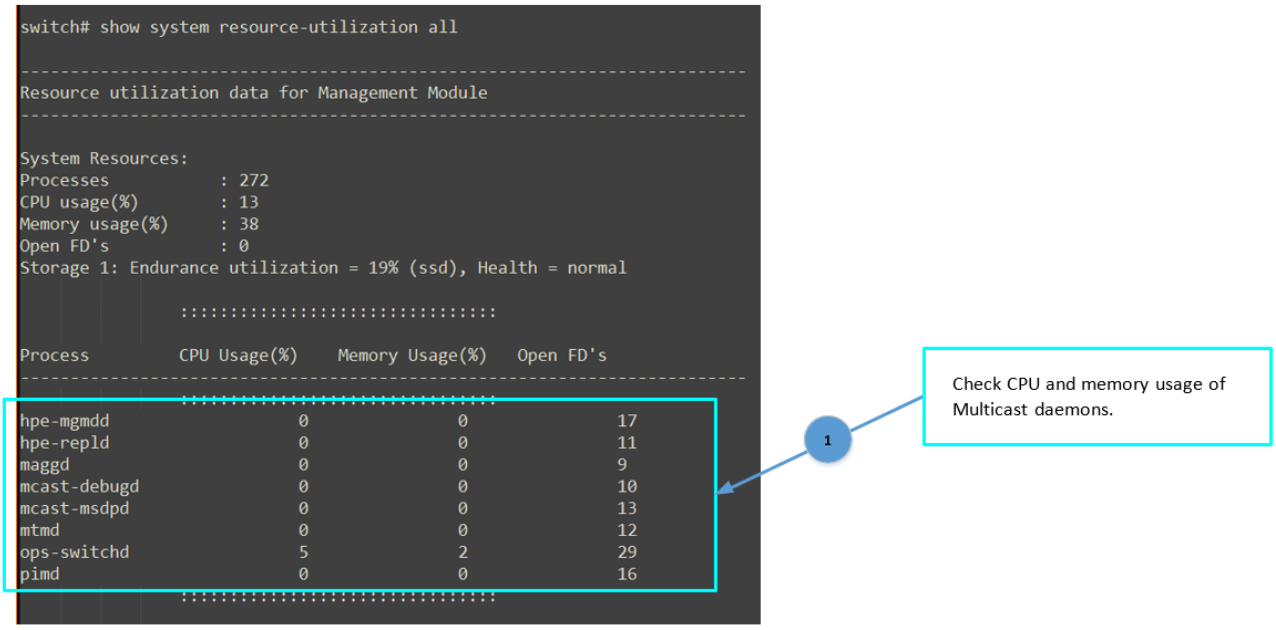
2

Check if the mac-address of the client is not re-learnt.

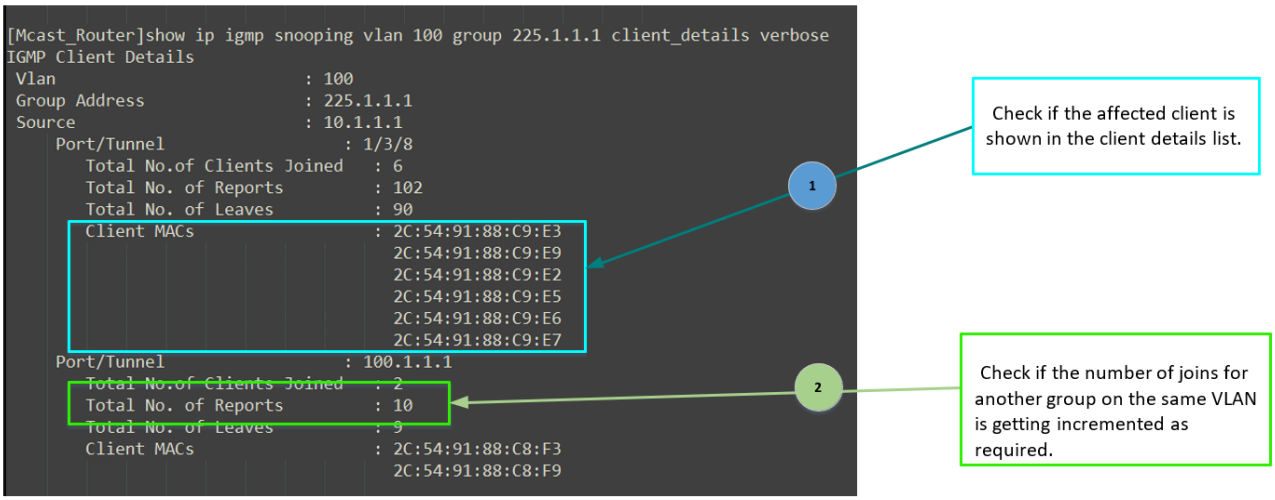
3

Any other anomalies logged.

Step five: check the CPU utilization of multicast daemons

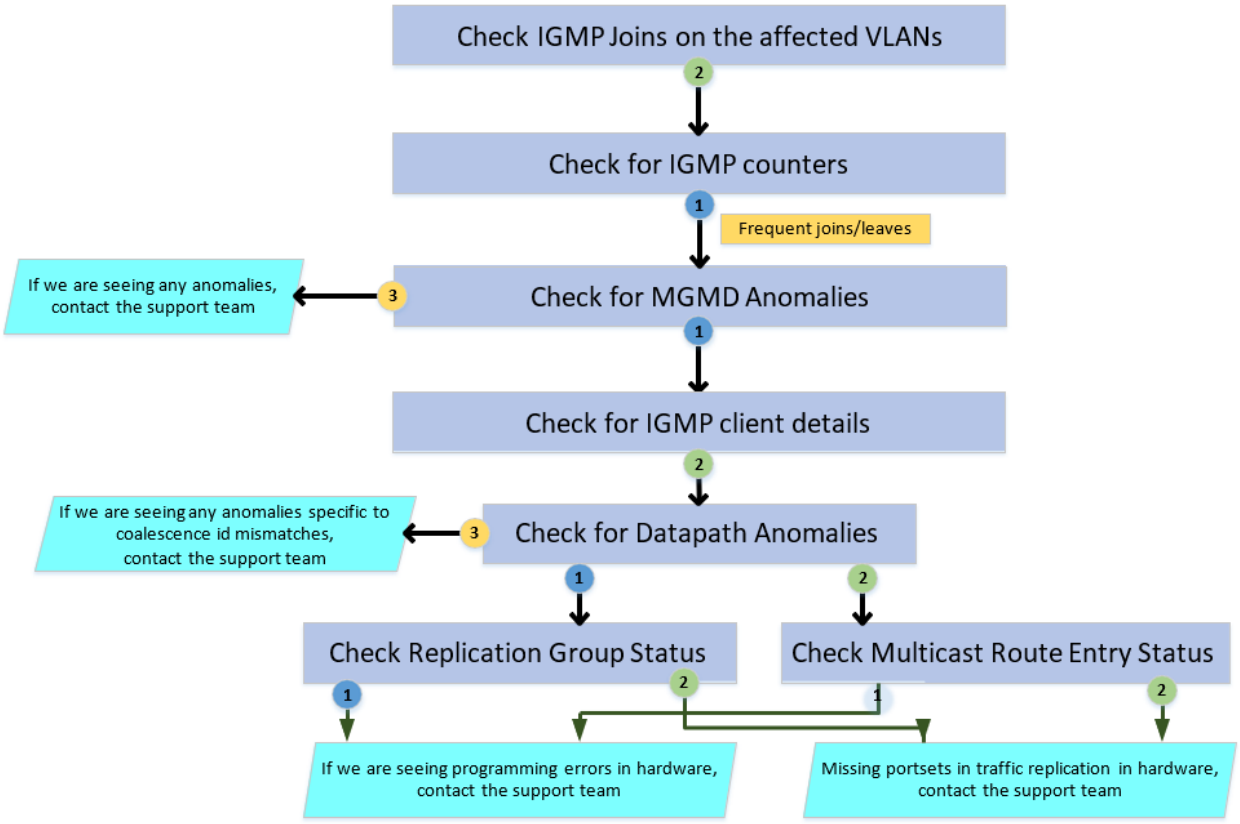


Step six: check IGMP joins for affected client(s).

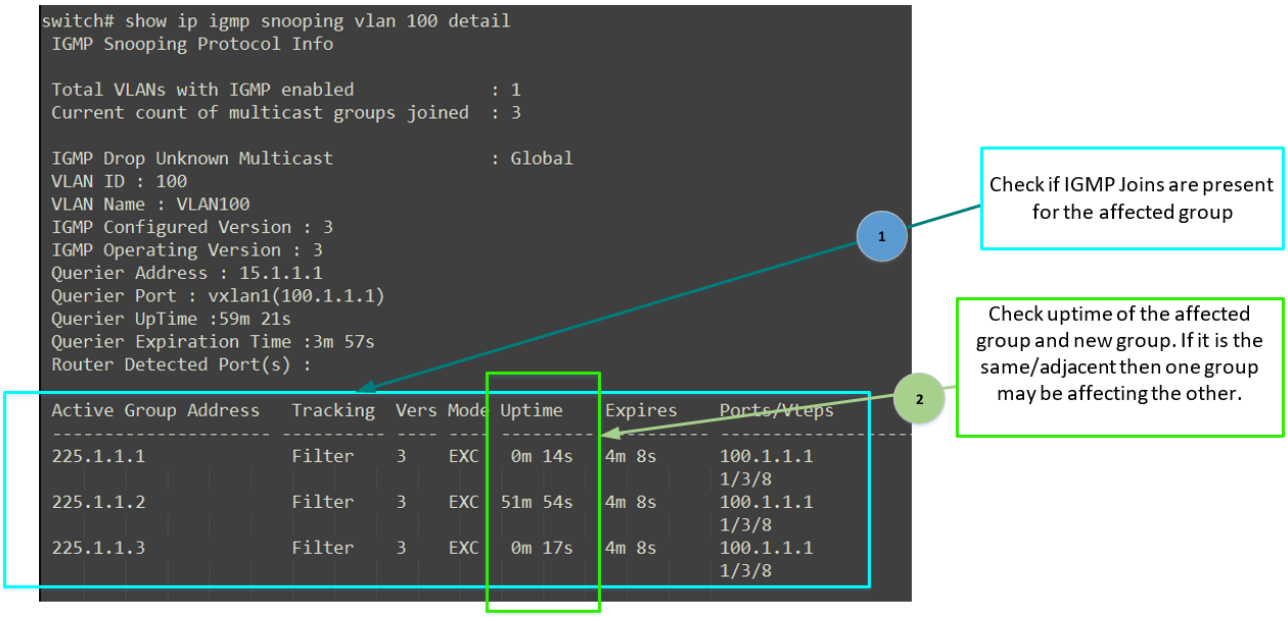


Issue four: traffic loss, pixelization issues (L2)

Figure 4 *Workflow overview*



Step one: check IGMP joins on the affected VLANs.



Step two: check for IGMP counters.

```
switch# show ip igmp snooping vlan 100 counters
IGMP Snooping VLAN Counters

VLAN ID   : 100
VLAN Name : VLAN100

Rx Counters :

V1 All Hosts Queries                          0
V2 All Hosts Queries                          0
V3 All Hosts Queries                          3
V2 Group Specific Queries                     0
V3 Group Specific Queries                     0
Group And Source Specific Queries             0
V1 Member Reports                             0
V2 Member Reports                             134
V3 Member Reports                             2
V2 Member Leaves                              116

Tx Counters :

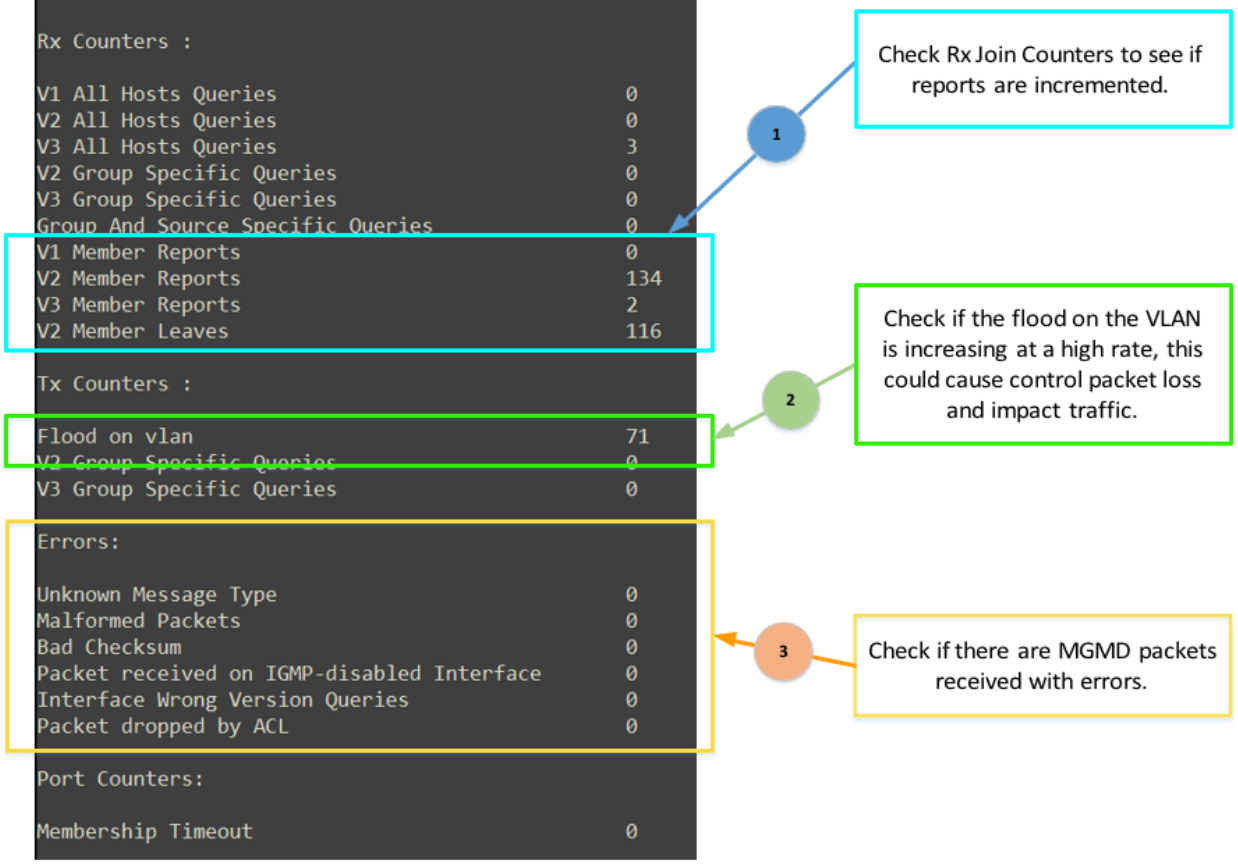
Flood on vlan                                 71
V2 Group Specific Queries                     0
V3 Group Specific Queries                     0

Errors:

Unknown Message Type                          0
Malformed Packets                             0
Bad Checksum                                  0
Packet received on IGMP-disabled Interface    0
Interface Wrong Version Queries               0
Packet dropped by ACL                         0

Port Counters:

Membership Timeout                            0
```

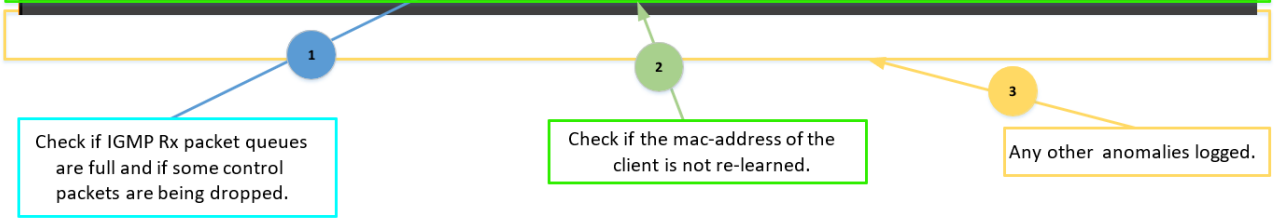


Step three: check for MGMD anomalies.

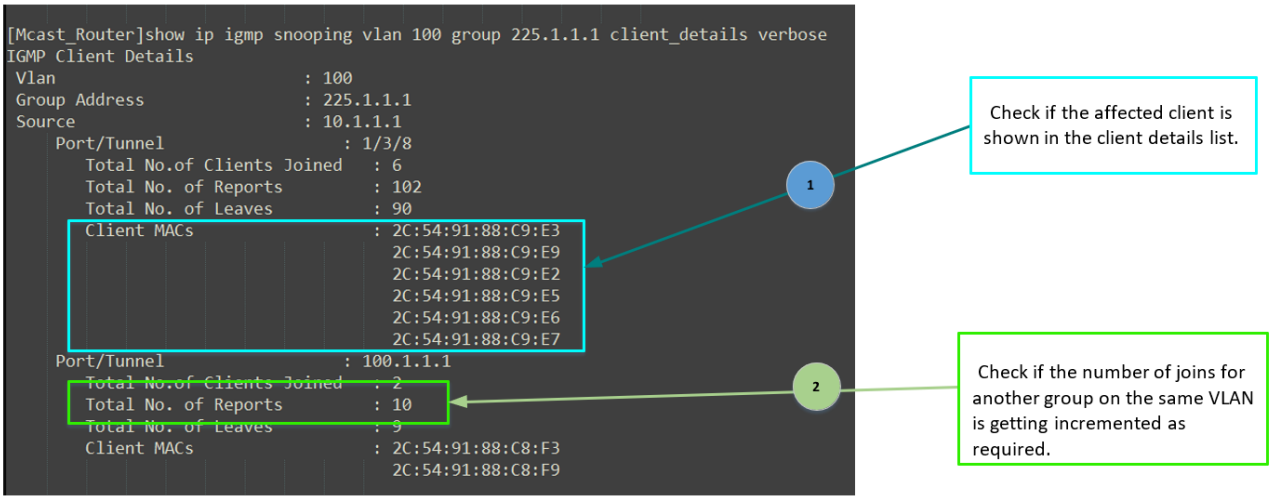
```
switch# show ip multicast anomalies igmp group 225.1.1.1 all-vrfs

hpe-mgmdd|LOG_ERR|AMM|1/1|IGMP|IGMP|MCAST_ANOMALY|IPV4|IGMP|-|-|-|-|-|Multicast control packets dropped after exceeding
limits of packet listener queue. Throttled packet count is 1200

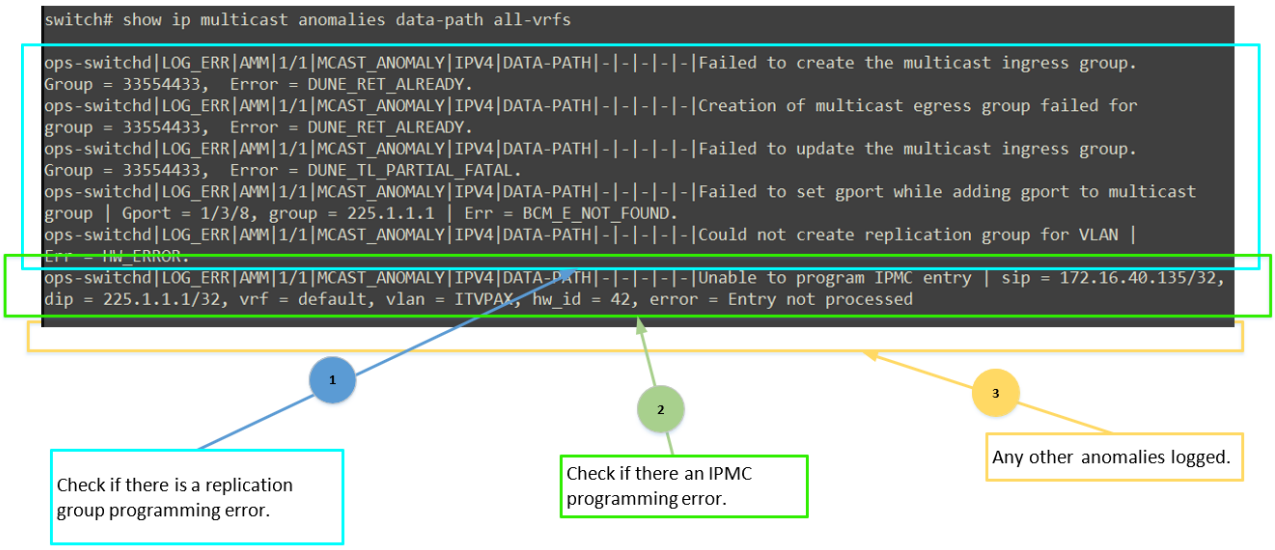
hpe-mgmdd|LOG_ERR|AMM|1/1|IGMP|IGMP|MCAST_ANOMALY|IPV4|IGMP|-|-|-|-|-|Mac Lookup triggered by Report or Query RX on ISL
port. Mac lookup retry failed for MAC: 44:5b:ed:96:86:00 vid: 100 Group : 225.1.1.1
```



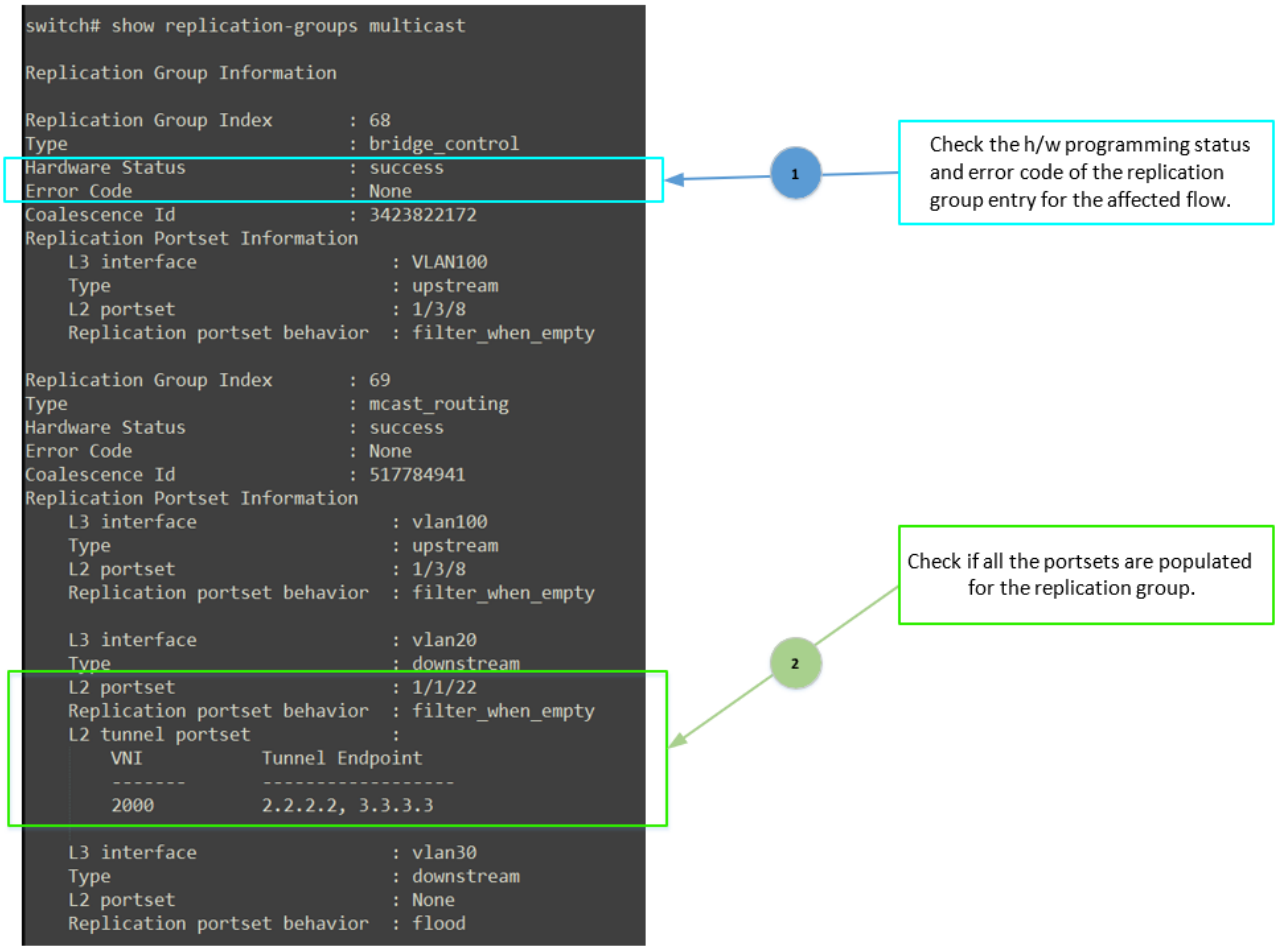
Step four: check IGMP Joins for affected client(s).



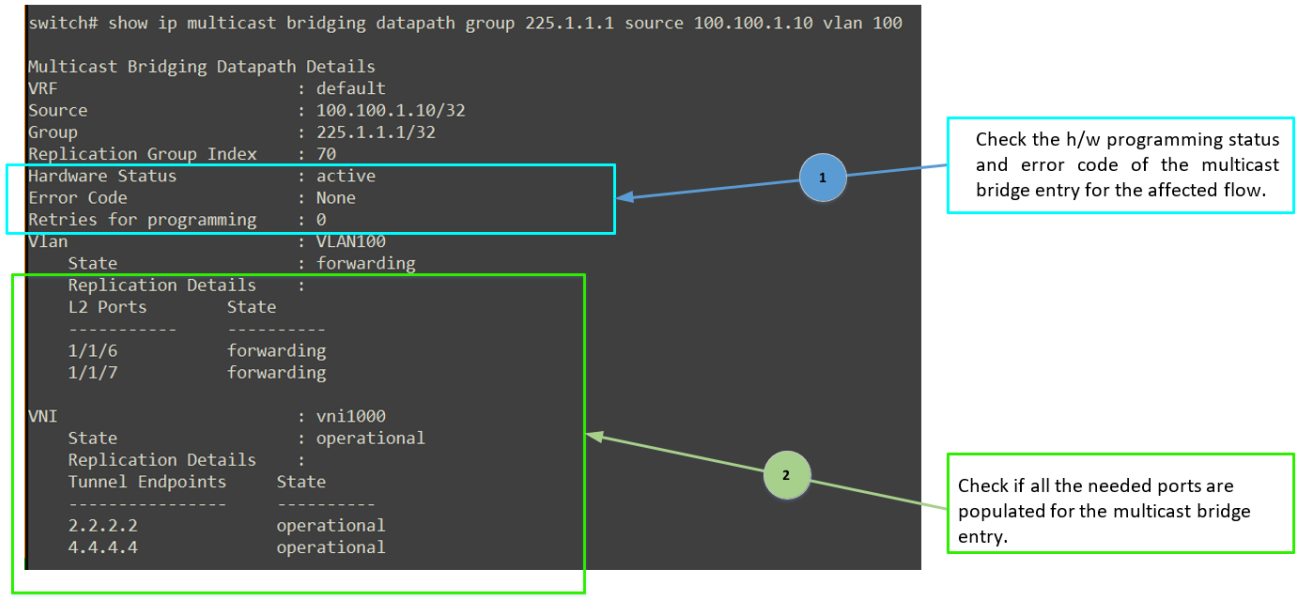
Step five: check for multicast datapath anomalies.



Step six: check replication group status.

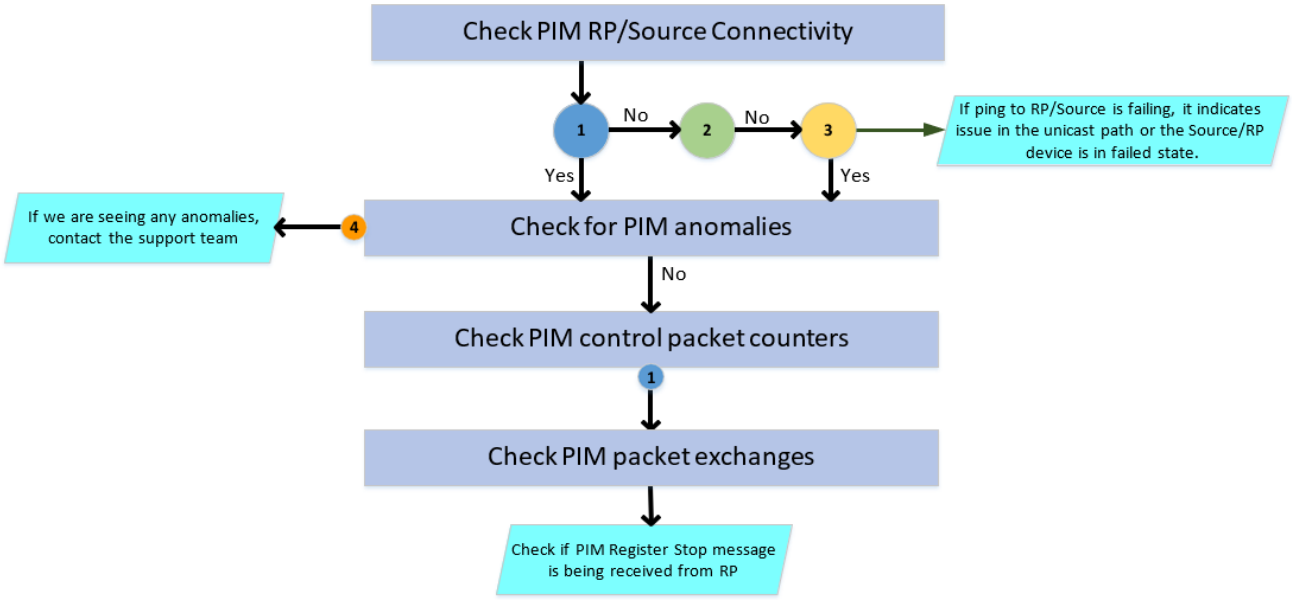


Step seven: check themulticast bridge entry status.

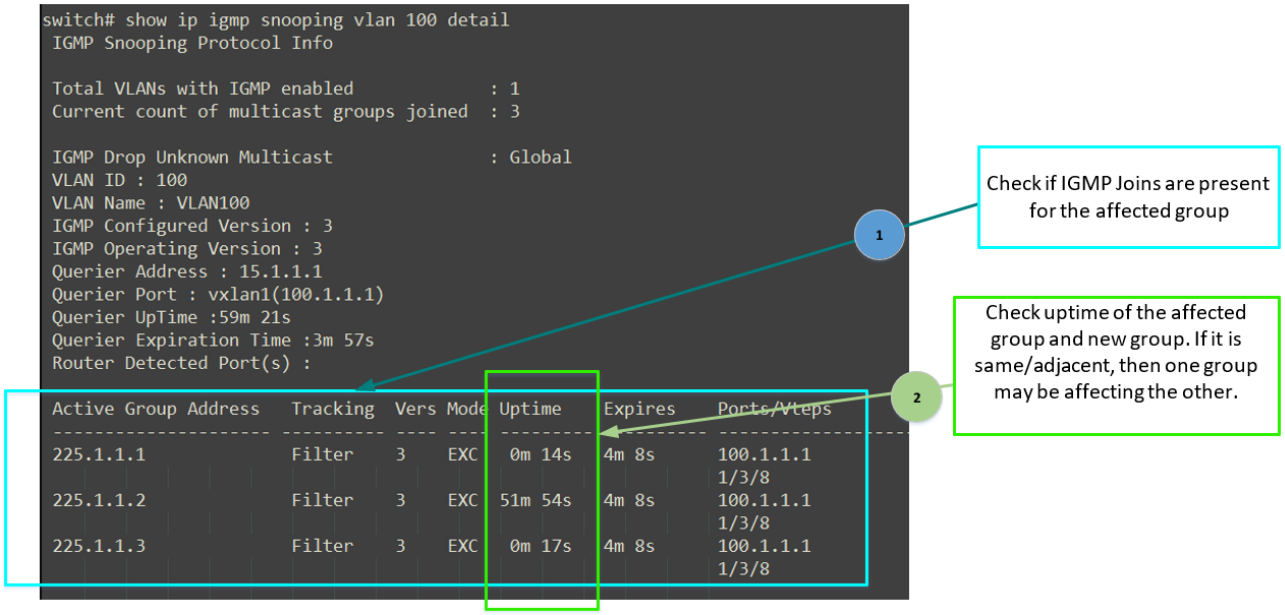


Issue five: Interoperability issues with other vendors (Cisco)

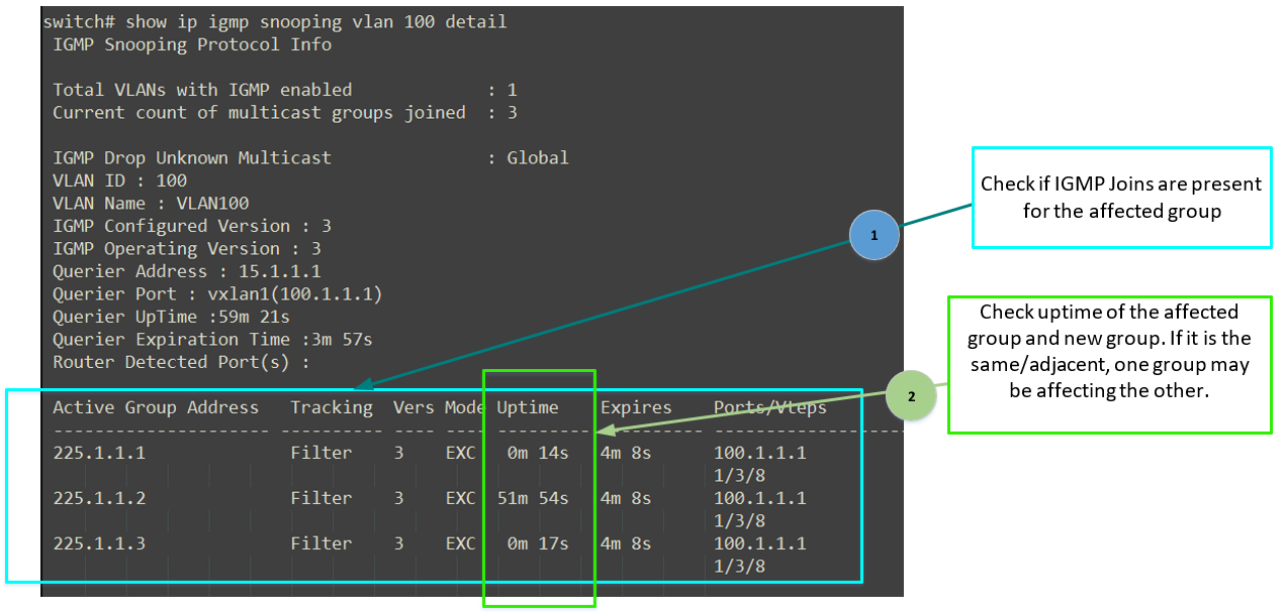
Figure 5 *Workflow overview*



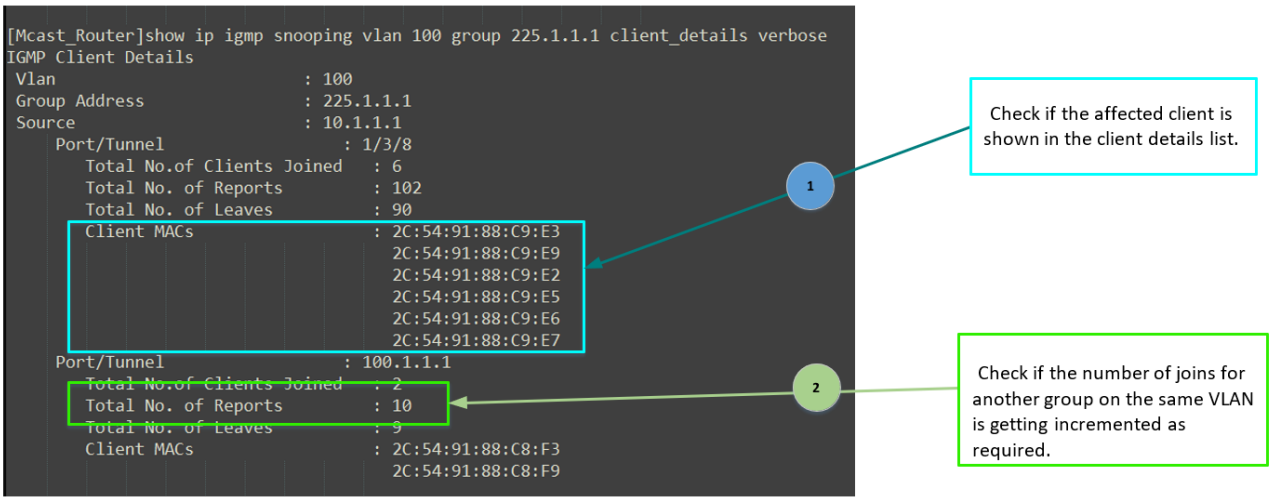
Step one: check IGMP joins on the affected VLANs.



Step two: check IGMP joins on the affected VLANs



Step three: check IGMP Joins for affected client(s).



Step four: check for IGMP counters

```
switch# show ip igmp snooping vlan 100 counters
IGMP Snooping VLAN Counters

VLAN ID   : 100
VLAN Name : VLAN100

Rx Counters :

V1 All Hosts Queries                          0
V2 All Hosts Queries                          0
V3 All Hosts Queries                          3
V2 Group Specific Queries                     0
V3 Group Specific Queries                     0
Group And Source Specific Queries             0
V1 Member Reports                             0
V2 Member Reports                             134
V3 Member Reports                             2
V2 Member Leaves                              116

Tx Counters :

Flood on vlan                                 71
V2 Group Specific Queries                     0
V3 Group Specific Queries                     0

Errors:

Unknown Message Type                          0
Malformed Packets                             0
Bad Checksum                                  0
Packet received on IGMP-disabled Interface    0
Interface Wrong Version Queries               0
Packet dropped by ACL                         0

Port Counters:

Membership Timeout                            0
```

1. Check Rx Join Counters to see if reports are incremented.
2. Check if the flood on vlan is increasing at a high rate, this could cause control packet loss and hence traffic impact.
3. Check if there are MGMD packets received with errors.

Step five: check querier details.

```
switch# show ip igmp interface vlan 2

 IGMP Configured Version  : 3
 IGMP Operating Version   : 3
 Querier State            : Querier
 Querier IP [this switch] : 20.1.1.1
 Querier Uptime           : 1m 46s
 Querier Expiration Time  : 0m 1s
 Snoop Enabled on VLAN    : True


switch# show ip igmp interface vlan 2 counters

 IGMP Counters

 Interface Name      : vlan2
 VRF Name            : default
 Membership Timeout  : 0
                                        Rx          Tx
                                        ----------  ----------
 V1 All Hosts Queries                   0           0
 V2 All Hosts Queries                   0           0
 V3 All Hosts Queries                   0           29
 V2 Group Specific Queries              0           0
 V3 Group Specific Queries              0           2
 Group And Source Specific Queries      0           2
 V3 Member Reports                      0           N/A
 V2 Member Reports                      0           N/A
 V1 Member Reports                      0           N/A
 V2 Member Leaves                       0           N/A
 Packets dropped by ACL                 0           N/A
```

1. Check if querier is elected, querier IP, querier uptime and expiry time.
2. Check if the queries are incrementing as expected.
3. Check if there are packet drops due to ACL config

Step six: check for PIM anomalies.

```
switch# show ip multicast anomalies pim group 225.1.1.1 all-vrfs

pimd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|PIM|-|vlan20|225.1.1.1|-|-|IPv4 Mcast Packet transmit failed on vlan20
pimd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|PIM|-|-|-|-|-|Vxlan PIM packet transmission failed on interface: vni3000,
vrf:Red. Jumbo Frame Size exceeded.
pimd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|PIM|-|-|-|-|-|IP header and Pim Packet length 1600 on Vxlan less than min
ip header length.
pimd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|PIM|-|vlan20|225.1.1.1|10.1.1.1|-| hardware status error seen for VRF:`default`,
source:`10.1.1.1`, group: `225.1.1.1`.
```

1. Check if there is PIM packet transmission errors.
2. Check if there is PIM packet rx errors.
3. Check if there are mroute programming errors.
4. Any other anomalies logged.

Step seven: check PIM RP/source connectivity.

```
switch# show ip pim rpf

Multicast RPF Details
Origin Codes: C - connected, SM - static-multicast, SU - static-unicast
              O - OSPF, B - BGP, R - RIP

VRF: default
IP Address       RPF Interface  RPF Nexthop      PIM Neighbor  RPF Route/Mask      Origin  In Use
---------------  -------------  ---------------  ------------  ------------------  ------  ------
1.1.1.1          vlan10         10.1.1.1         yes           1.1.1.1/32          O       yes
10.1.1.1         vlan10         -                no            10.1.1.0/24         C       yes
30.1.1.2         vlan20         20.1.1.1         yes           30.1.1.0/24         O       yes


switch# show ip route 30.1.1.2 vrf default

VRF: default

  Prefix           : 30.1.1.0/24               VRF(egress)       : -
  Nexthop          : 20.1.1.1                   Interface         : vlan20
  Origin           : ospf                       Type              : ospf_intra_area
  Distance         : 110                        Metric            : 100
  Age              : 00h:05m:21s                Tag               : 0
  Encap Type       : -                          Encap Details     : -

switch# ping 30.1.1.2
```

1. Check if confirm RPF information learnt by PIM.
2. Make sure that the multicast sources are reachable and routes are present. Check if nexthop IP and interface are selected correctly.
3. Use 'ping' to ensure reachability to the multicast sources/RP/BSR addresses from all the routers.

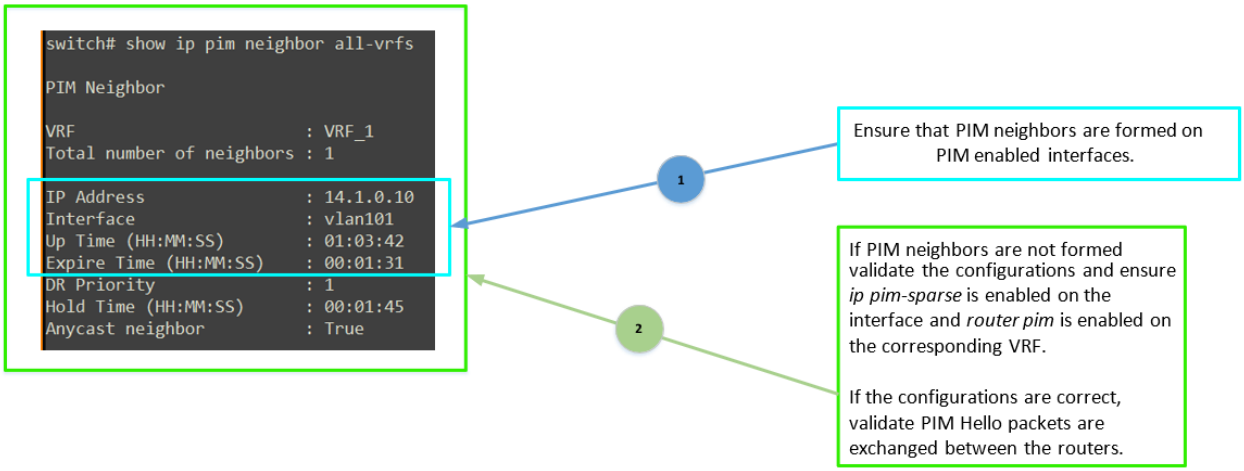
Step eight: check PIM configurations

```
switch# show ip pim interface vlan2206
PIM Interfaces
VRF: default
Interface : vlan2206
Neighbor count : 3
IP Address : 193.168.102.45/29
Mode : sparse
Designated Router : 193.168.102.45
Proxy DR : false
Hello Interval (sec) : 30
Hello Delay (sec) : 5
Override Interval (msec) : 2500 Lan Prune Delay : Yes
Propagation Delay (msec) : 500 DR Priority : 1
Neighbor Timeout : 95

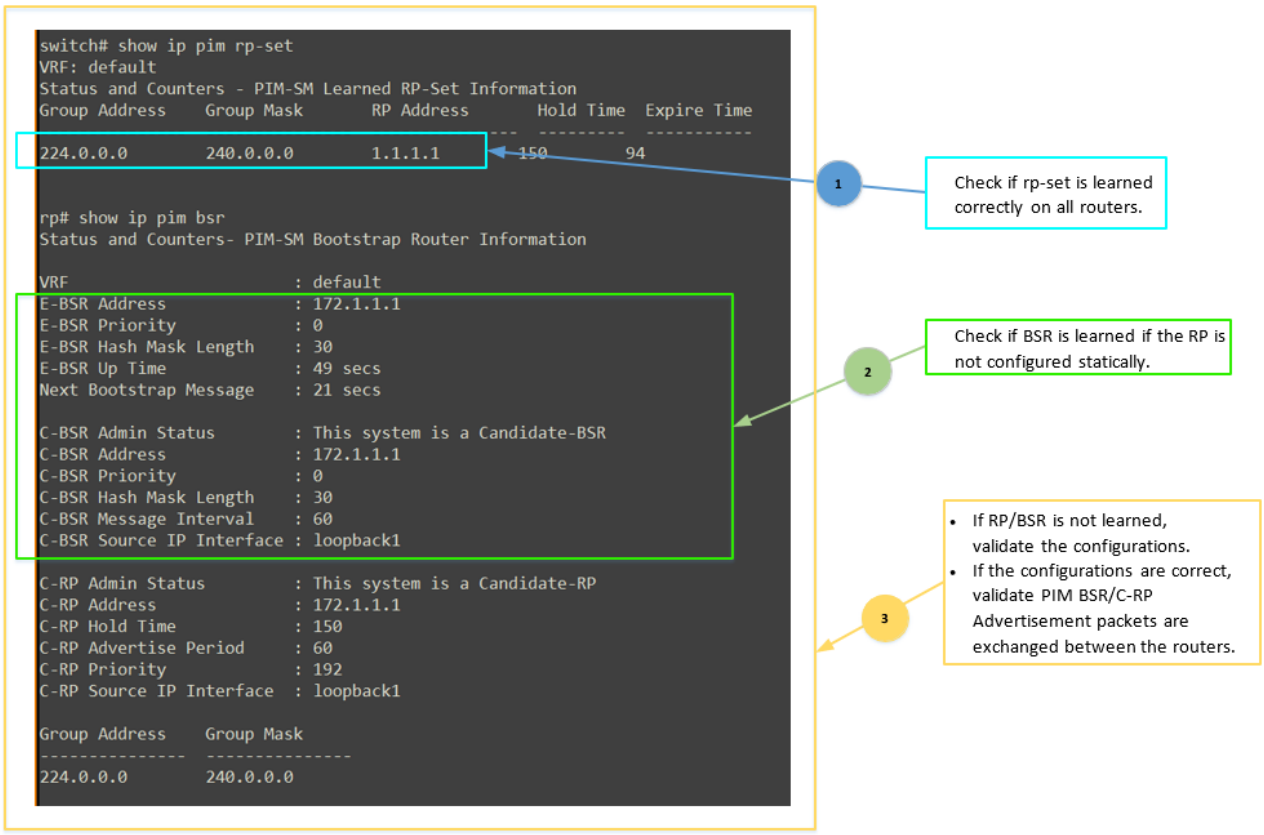
switch# show ip pim
PIM Global Parameters
VRF                              :  default
PIM Status                       :  Enabled
PIM SSM Status                   :  Disabled
PIM SSM Range ACL                :  Not Configured
Join/Prune Interval (sec)        :  60
SPT Threshold                    :  Enabled
State Refresh Interval (sec)     :  60
PIM NSF Status                   :  Inactive
```

1. Check if PIM is enabled on all the interfaces where multicast routing is required
2. Check if PIM is globally enabled.
3. o Make sure that one or more routers are configured as RP. RP can be configured as a static RP or can be learnt via BSR:
   o If the RP is static, configure it on all the routers. Ensure unicast reachability to RP.
   o If it is dynamic RP, ensure BSR is elected across all routers and RP-set is propagated across all routers.
   o On the last hop router, make sure IGMP is enabled along with PIM.

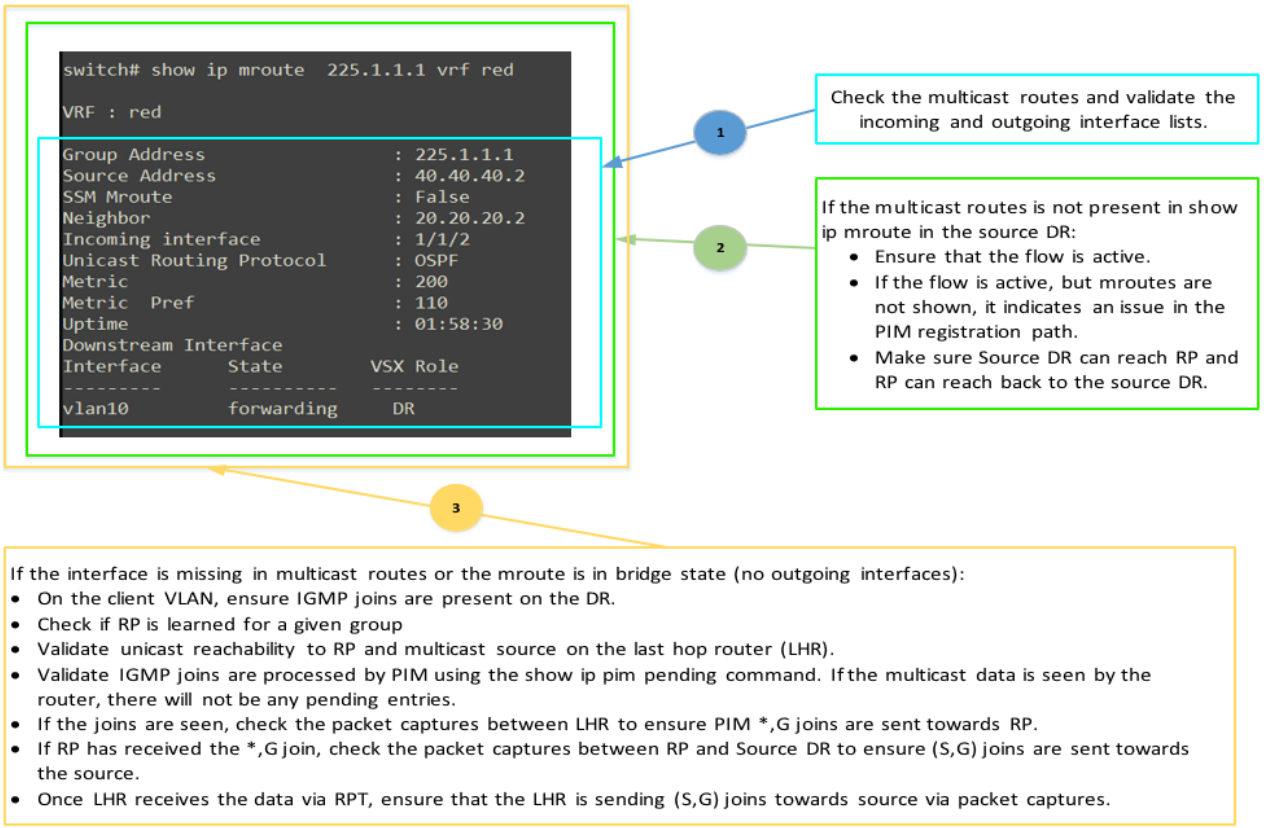
Step nine: check PIM neighbors.



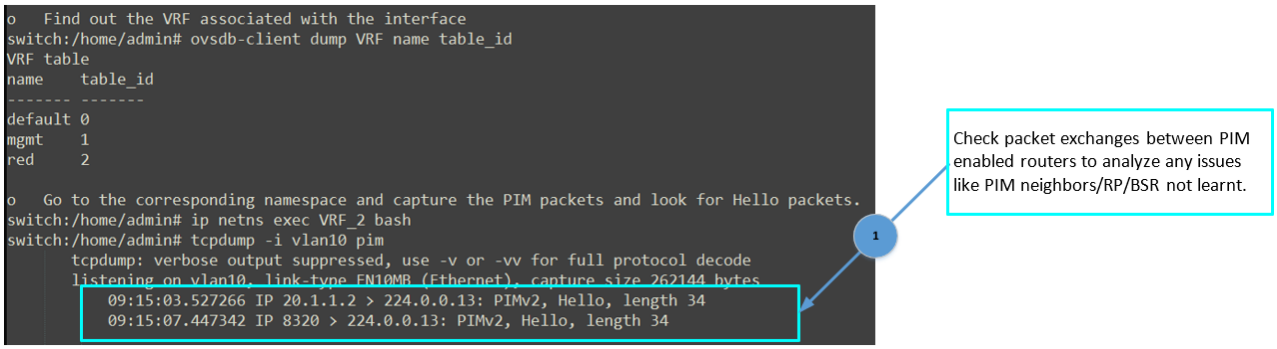
Step 10: check PIM BSR and RP-set information



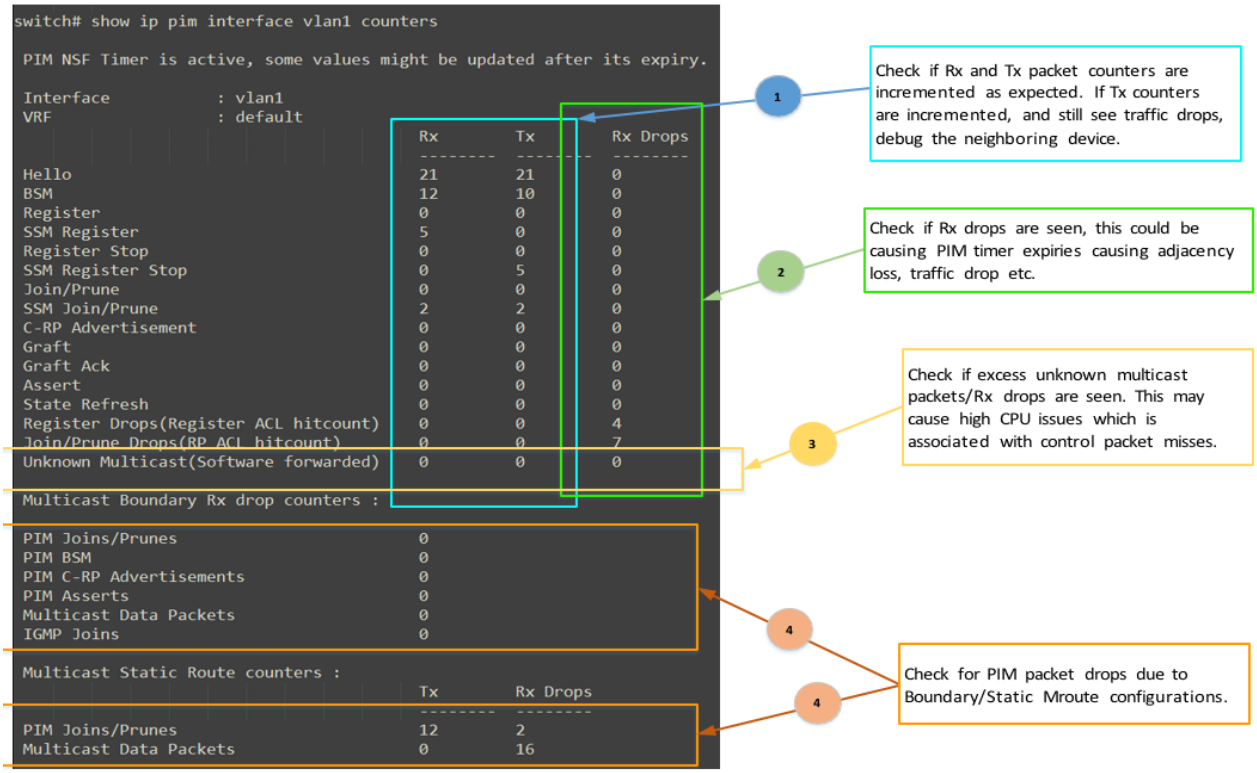
Step 11: check multicast routes (PIM).



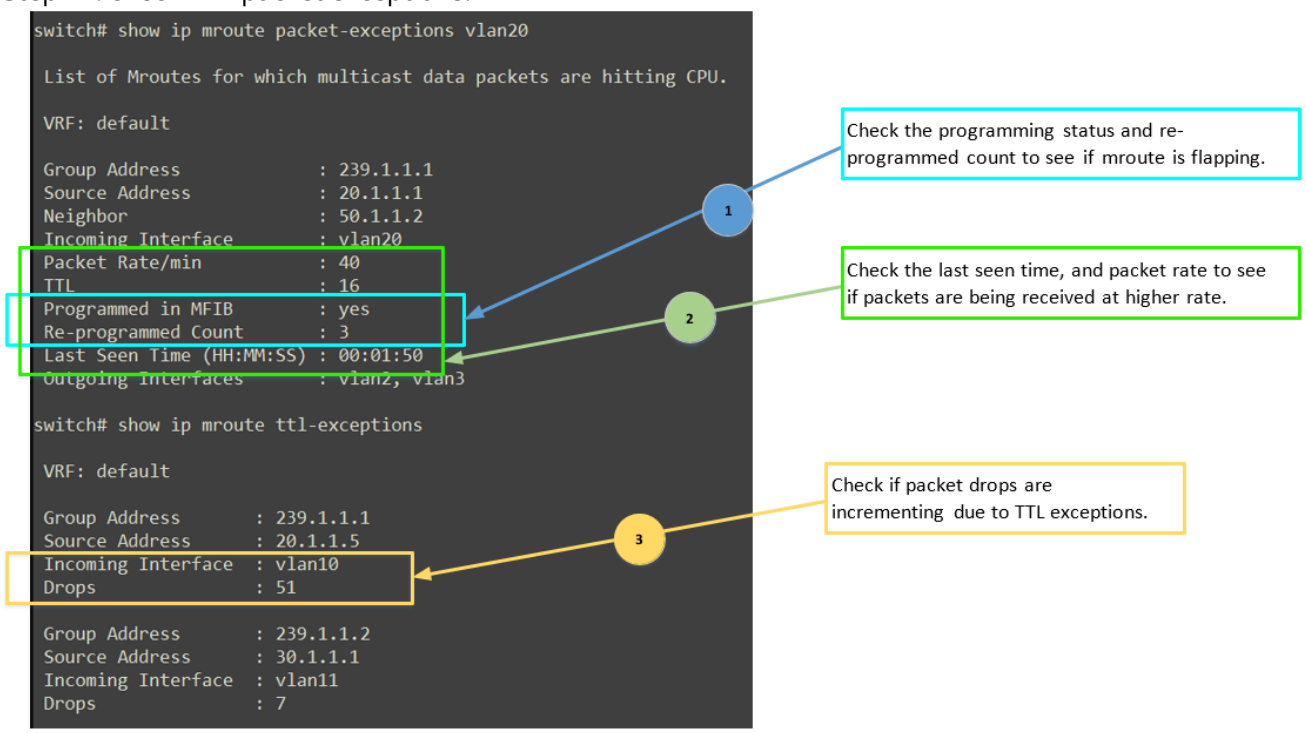
Step 12: check PIM packet exchanges.



Step 13: check PIM control packet counters.



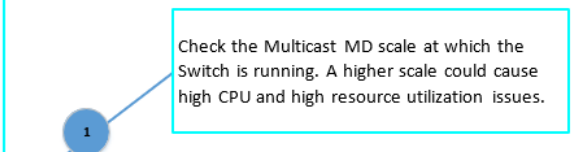
Step 14: check PIM packet exceptions.



Step 15: check multicast MD scale.

```
switch# show ip multicast summary

 Total number of IGMP interfaces                          : 128
 Total number of IGMP snooping VLANS                      : 128
 Total number of IGMP joins                               : 129
 Total number of IGMP snooping joins                      : 129
 Total number of PIM SM enabled VRFs                      : 8
 Total number of PIM DM enabled VRFs                      : 0
 Total number of PIM SM interfaces                        : 138
 Total number of PIM DM interfaces                        : 0
 Total number of PIM SM neighbors                         : 130
 Total number of PIM DM neighbors                         : 0
 Total number of PIM A/A enabled VRF                      : 2
 Total number of PIM A/A enabled interfaces               : 128
 Total number of PIM SM Mroutes in route state            : 640
 Total number of PIM SM Mroutes in bridge state           : 640
 Total number of PIM DM Mroutes in route state            : 0
 Total number of PIM DM Mroutes in bridge state           : 0
 Total number of local multicast flows registered in this RP  : 0
 Total number of MLD interfaces                           : 128
 Total number of MLD snooping VLANS                       : 128
 Total number of MLD joins                                : 131
 Total number of MLD snooping joins                       : 131
 Total number of PIMv6 SM enabled VRFs                    : 8
 Total number of PIMv6 DM enabled VRFs                    : 0
 Total number of PIMv6 SM interfaces                      : 138
 Total number of PIMv6 DM interfaces                      : 0
 Total number of PIMv6 SM neighbors                       : 130
 Total number of PIMv6 DM neighbors                       : 0
 Total number of PIMv6 A/A enabled VRF                    : 2
 Total number of PIMv6 A/A enabled interfaces             : 128
 Total number of PIMv6 SM Mroutes in route state          : 0
 Total number of PIMv6 SM Mroutes in bridge state         : 0
 Total number of PIMv6 DM Mroutes in route state          : 0
 Total number of PIMv6 DM Mroutes in bridge state         : 0
 Total number of MSDP peers                               : 0
 Total number of SA's learned by MSDP                     : 0
```

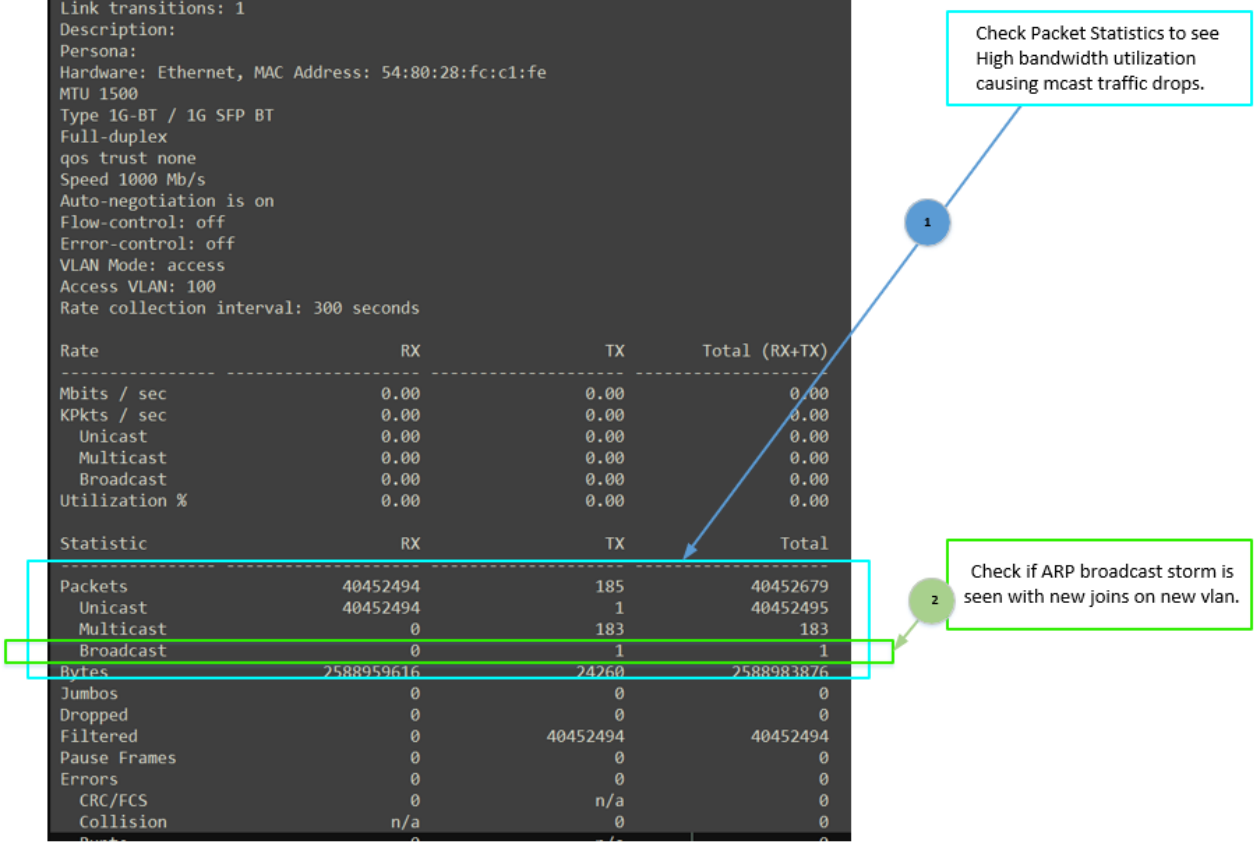


Step 16: check interface statistics.

```
switch# show interface 1/3/8
Interface 1/3/8 is up
 Admin state is up
 Link state: up for 50 minutes (since Wed Feb 25 05:22:53 UTC 2023)
 Link transitions: 1
 Description:
 Persona:
 Hardware: Ethernet, MAC Address: 54:80:28:fc:c1:fe
 MTU 1500
 Type 1G-BT / 1G SFP BT
 Full-duplex
 qos trust none
 Speed 1000 Mb/s
 Auto-negotiation is on
 Flow-control: off
 Error-control: off
 VLAN Mode: access
 Access VLAN: 100
 Rate collection interval: 300 seconds

 Rate                              RX                  TX        Total (RX+TX)
 ---------------- -------------------- -------------------- --------------------
 Mbits / sec                     0.00                 0.00                 0.00
 KPkts / sec                     0.00                 0.00                 0.00
   Unicast                       0.00                 0.00                 0.00
   Multicast                     0.00                 0.00                 0.00
   Broadcast                     0.00                 0.00                 0.00
 Utilization %                   0.00                 0.00                 0.00

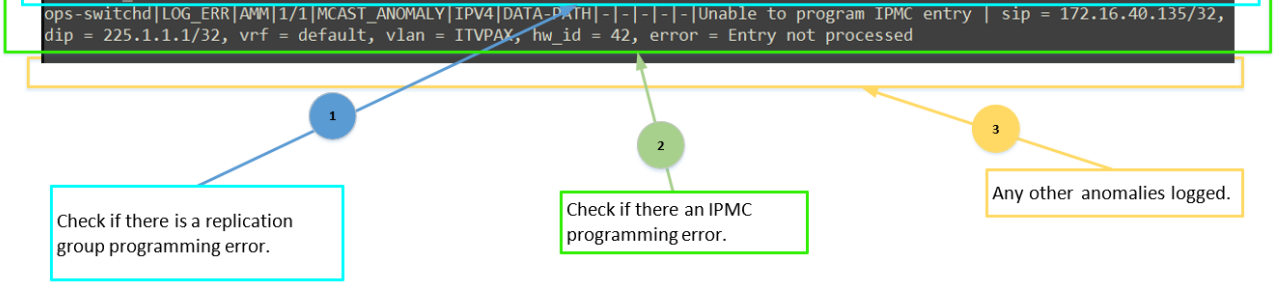
 Statistic                         RX                  TX                Total
 ---------------- -------------------- -------------------- --------------------
 Packets                     40452494                  185             40452679
   Unicast                   40452494                    1             40452495
   Multicast                        0                  183                  183
   Broadcast                        0                    1                    1
 Bytes                     2588959616                24260           2588983876
 Jumbos                           0                    0                    0
 Dropped                          0                    0                    0
 Filtered                         0             40452494             40452494
 Pause Frames                     0                    0                    0
 Errors                           0                    0                    0
   CRC/FCS                        0                  n/a                    0
   Collision                    n/a                    0                    0
```



Step 17: check for multicast datapath anomalies.

```
switch# show ip multicast anomalies data-path all-vrfs

ops-switchd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|DATA-PATH|-|-|-|-|Failed to create the multicast ingress group.
Group = 33554433,  Error = DUNE_RET_ALREADY.
ops-switchd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|DATA-PATH|-|-|-|-|Creation of multicast egress group failed for
group = 33554433,  Error = DUNE_RET_ALREADY.
ops-switchd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|DATA-PATH|-|-|-|-|Failed to update the multicast ingress group.
Group = 33554433,  Error = DUNE_TL_PARTIAL_FATAL.
ops-switchd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|DATA-PATH|-|-|-|-|Failed to set gport while adding gport to multicast
group | Gport = 1/3/8, group = 225.1.1.1 | Err = BCM_E_NOT_FOUND.
ops-switchd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|DATA-PATH|-|-|-|-|Could not create replication group for VLAN |
Err = HW_ERROR.
ops-switchd|LOG_ERR|AMM|1/1|MCAST_ANOMALY|IPV4|DATA-PATH|-|-|-|-|Unable to program IPMC entry | sip = 172.16.40.135/32,
dip = 225.1.1.1/32, vrf = default, vlan = ITVPAX, hw_id = 42, error = Entry not processed
```



Step 18: check replication group status.

```
switch# show replication-groups multicast

Replication Group Information

Replication Group Index       : 68
Type                          : bridge_control
Hardware Status               : success
Error Code                    : None
Coalescence Id                : 3423822172
Replication Portset Information
    L3 interface                  : VLAN100
    Type                          : upstream
    L2 portset                    : 1/3/8
    Replication portset behavior  : filter_when_empty

Replication Group Index       : 69
Type                          : mcast_routing
Hardware Status               : success
Error Code                    : None
Coalescence Id                : 517784941
Replication Portset Information
    L3 interface                  : vlan100
    Type                          : upstream
    L2 portset                    : 1/3/8
    Replication portset behavior  : filter_when_empty

    L3 interface                  : vlan20
    Type                          : downstream
    L2 portset                    : 1/1/22
    Replication portset behavior  : filter_when_empty
    L2 tunnel portset             :
        VNI           Tunnel Endpoint
        -------       ------------------
        2000          2.2.2.2, 3.3.3.3

    L3 interface                  : vlan30
    Type                          : downstream
    L2 portset                    : None
    Replication portset behavior  : flood
```

1

Check the h/w programming status and error code of the replication group entry for the affected flow.

2

Check if all the portsets are populated for the replication group.

Step 19: check multicast route entry status.

```
switch# show ip multicast routing datapath group 225.1.1.1 source 20.0.0.2 port vlan100

Multicast Routing Datapath Details
VRF                       : default
Source                    : 20.0.0.2/32
Group                     : 225.1.1.1/32
Primary Upstream Interface : vlan100
From                      : pim_sm
Type                      : route
Replication Group Index   : 38923
Hardware Status           : active
Error Code                : None
Retries for programming   : 0
Upstream Interface        : vlan100
    State                 : forwarding
    Replication Details   :
    L2 Ports        State
    -----------     ----------
    1/3/8           forwarding
Downstream Interface      : vlan30
    State                 : forwarding
    Replication Details   :
    L2 Ports        State
    -----------     ----------
    1/1/1           forwarding
Downstream Interface      : vlan40
    State                 : forwarding
    Replication Details   :
    L2 Ports        State
    -----------     ----------
    1/1/2           forwarding
    1/1/3           forwarding
```

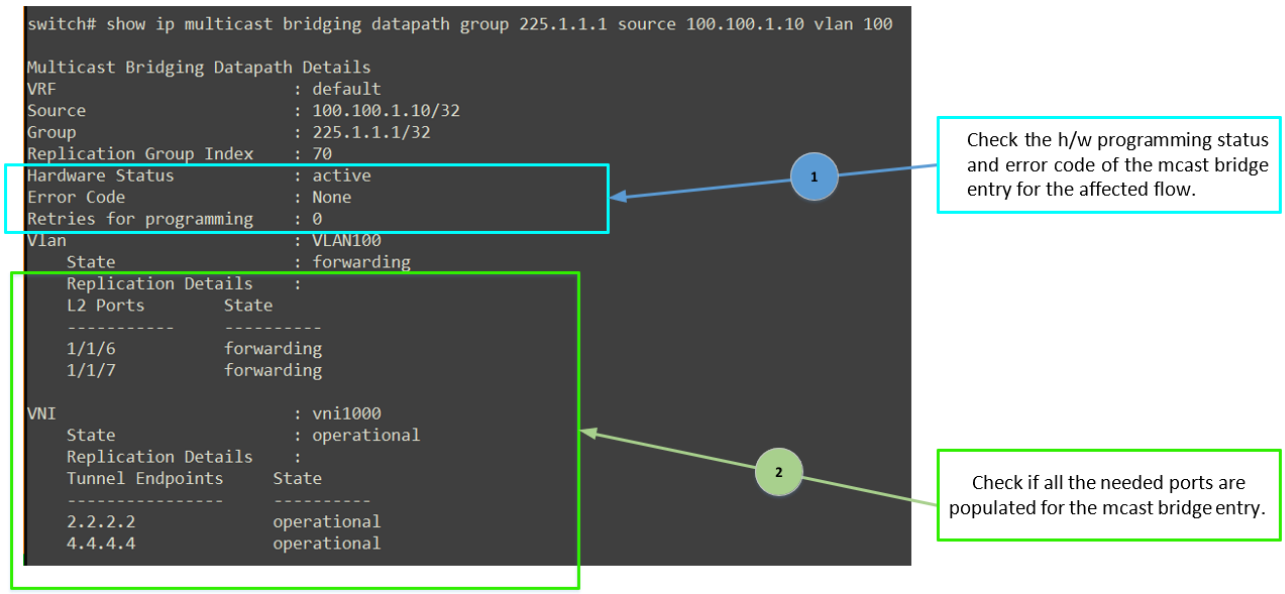
1

Check the h/w programming status and error code of the mcast route entry for the affected flow.

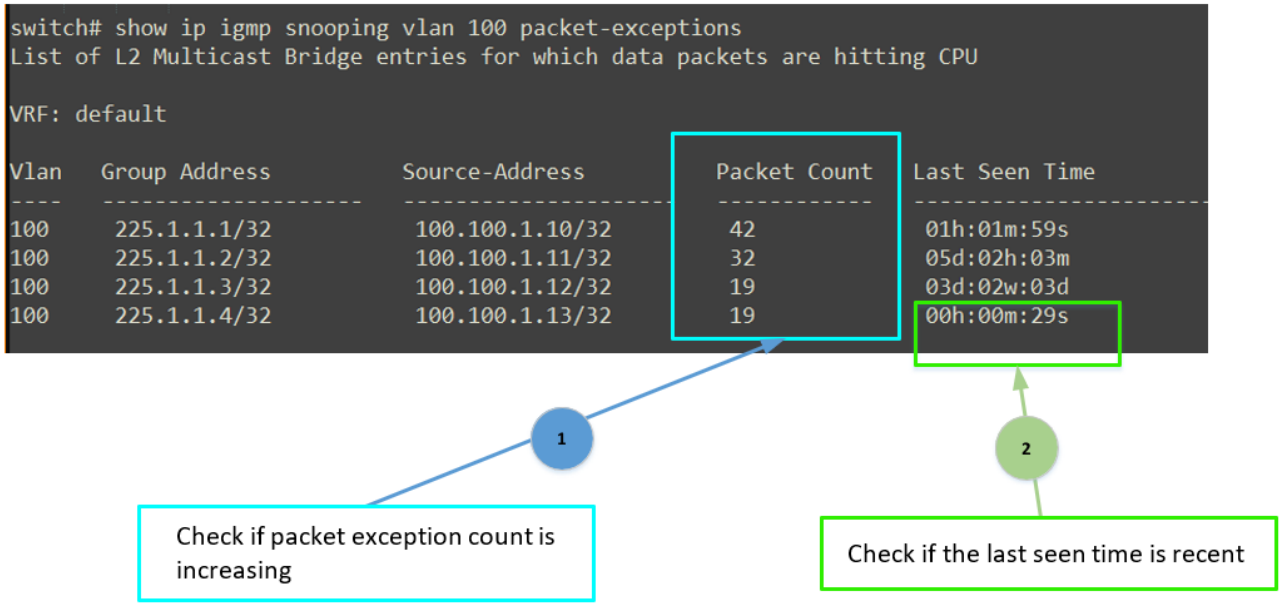
2

Check if all the needed ports are populated for the mcast route entry.

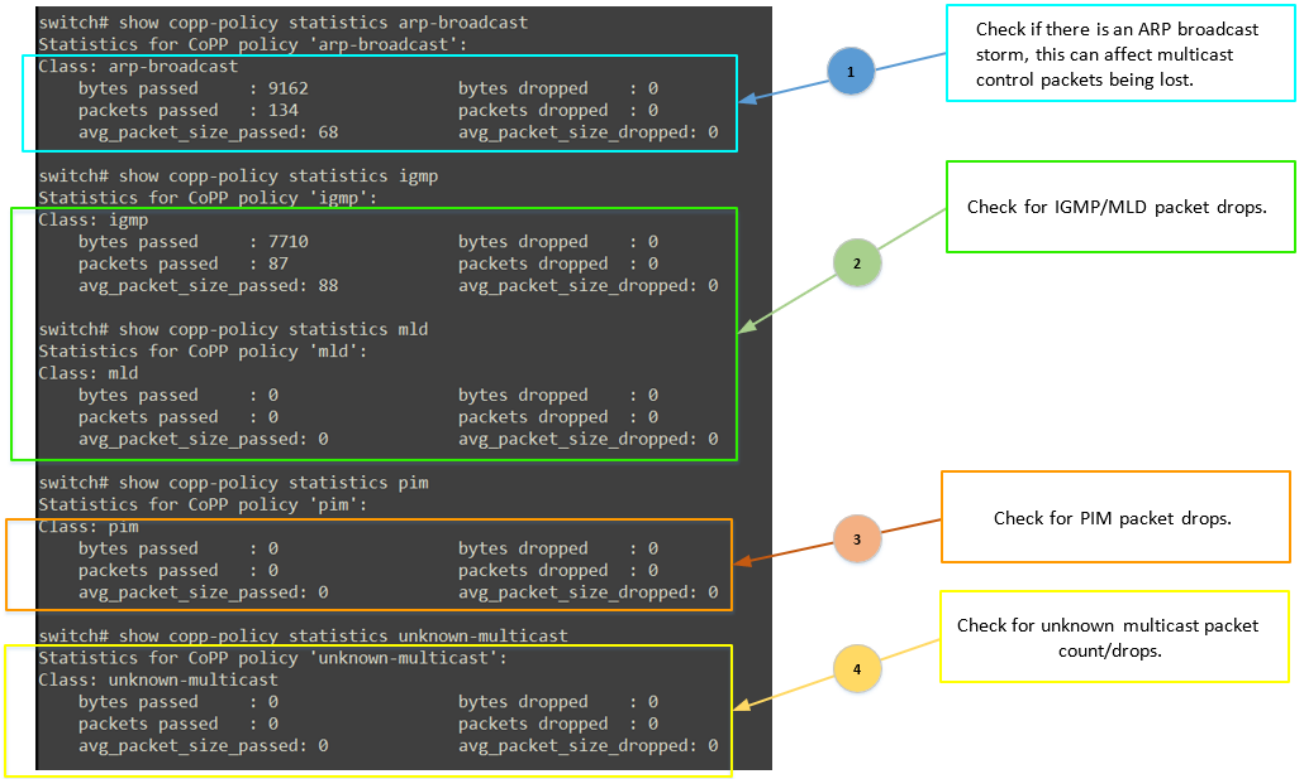
Step 20: check multicast bridge entry status.



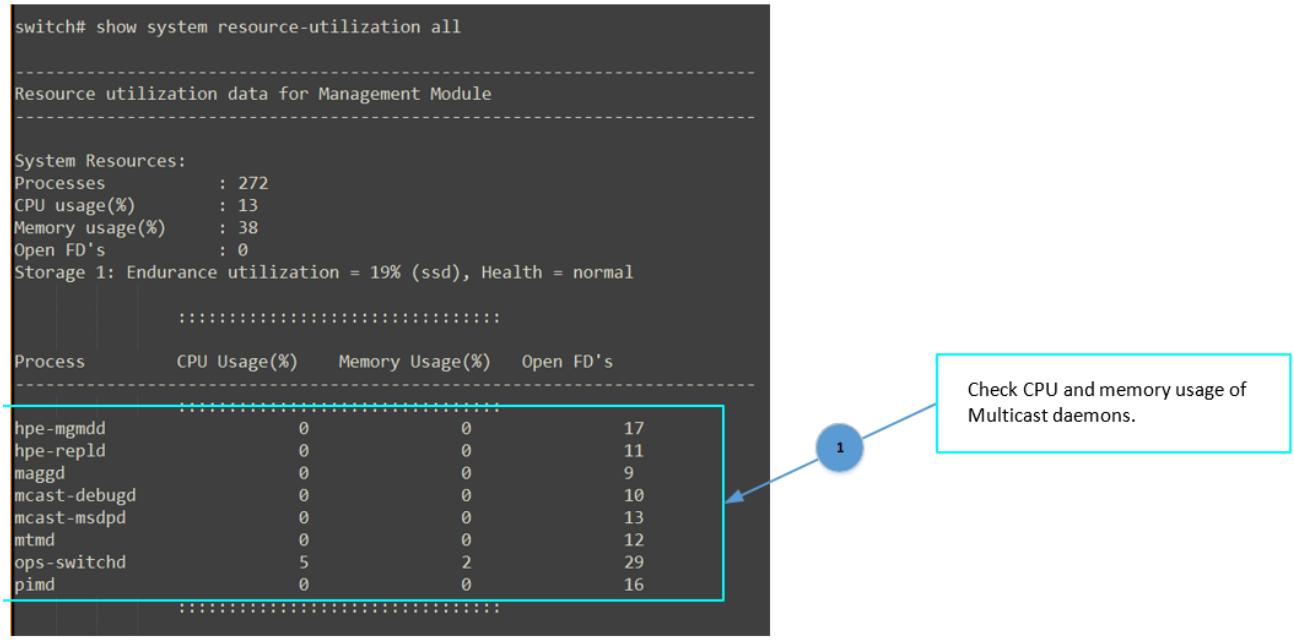
Step 21:check for L2 multicast packet exceptions.



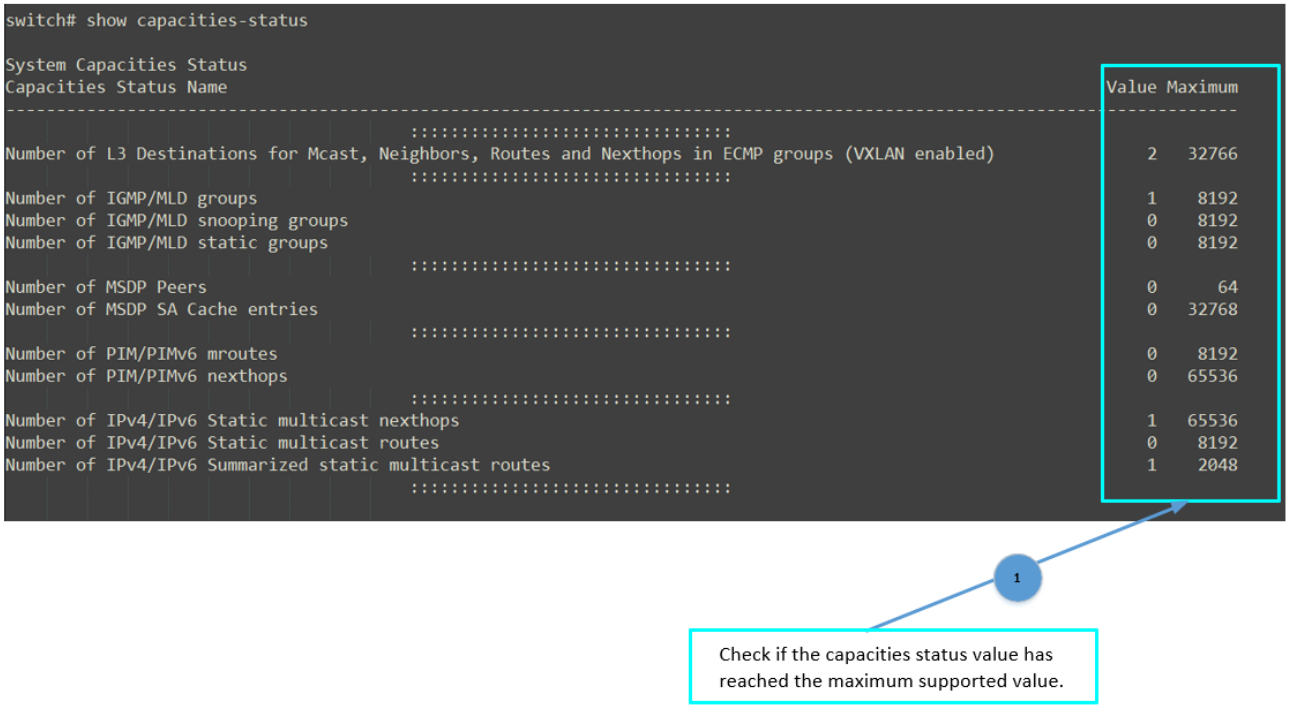
Step 22: check for multicast CoPP drops.



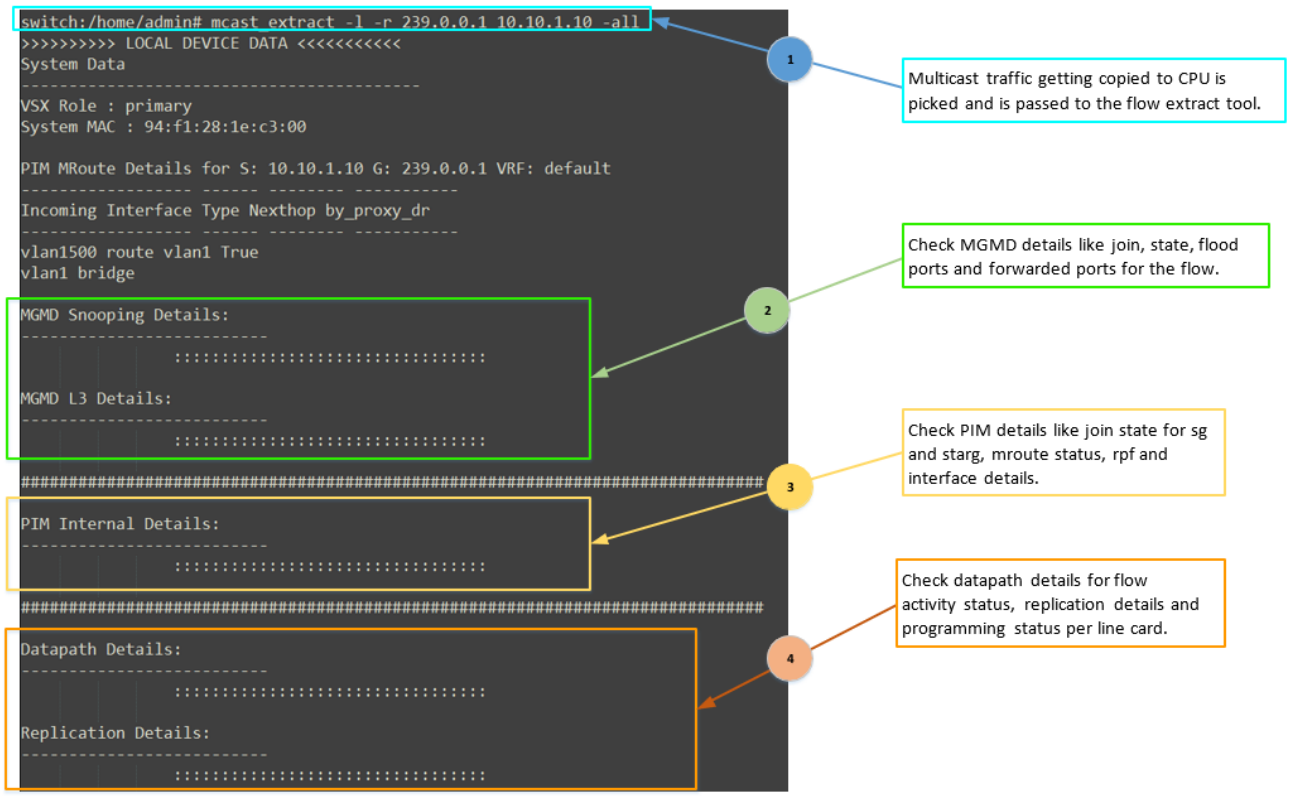
Step 23: check for CPU utilization of multicast daemons.



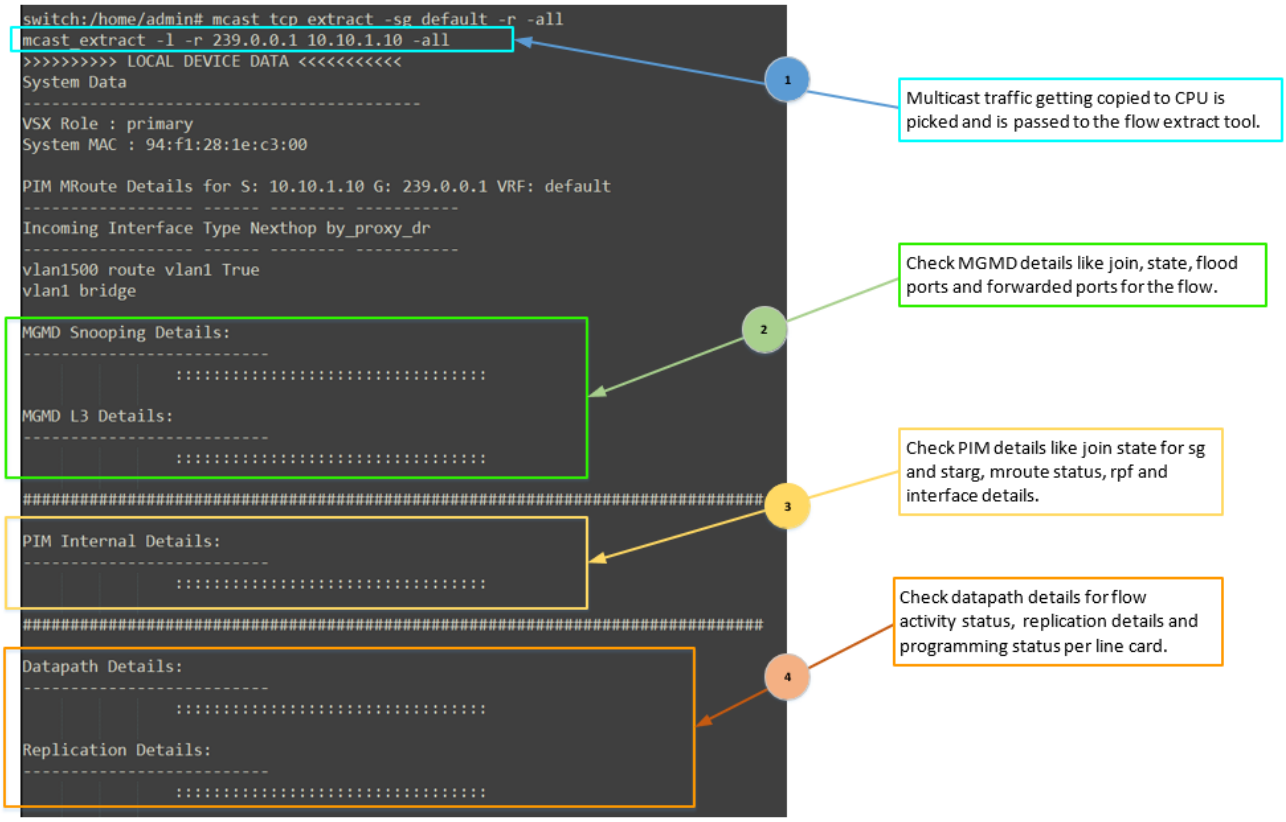
Step 24: check multicast capacties status.



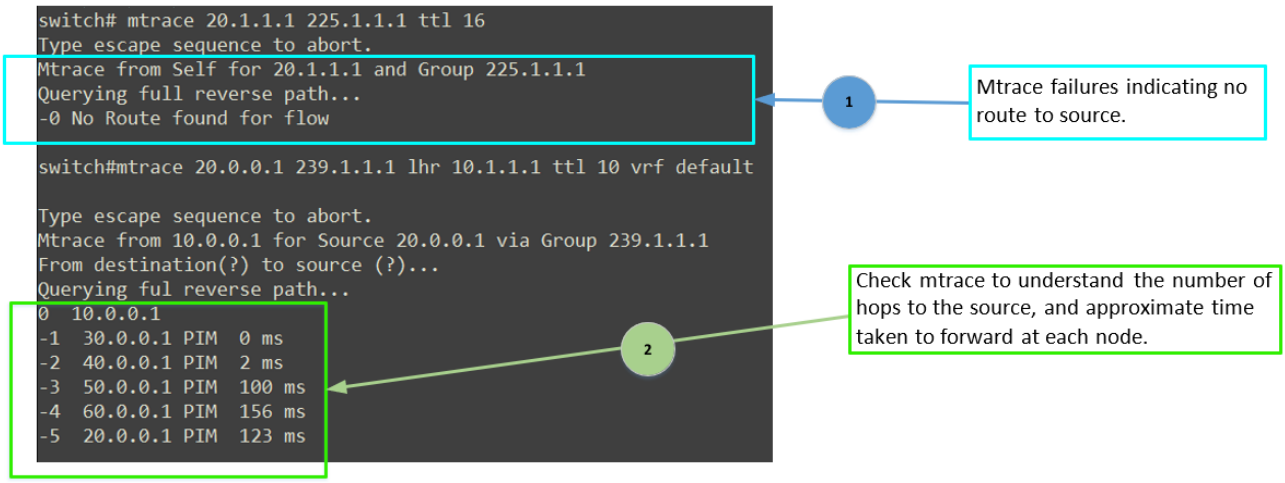
Step 25: check multicast flow extract details.



Step 26: check multicast flow extract - Tcpdump details.



Step 27: check multicast traces for the affected group.



Chapter 16
Static routes

Static multicast routing is not supported on the 9300 switch series.

Route summarization is not supported on the 8400 and 9300 switch series.

Static multicast routes can be configured by specifying the incoming interface, source, group, and outgoing interfaces. Multicast static routes can be used to configure a static multicast flow and program it directly into the IP multicast forwarding tables instead of running dynamic multicast protocols. Unlike PIM, this feature does not depend on Unicast Routing Protocols to build the Multicast tree. Instead, it works as a standalone Multicast Route provisioning feature that can interoperate with the dynamic Multicast protocols like PIM-SM and L2 protocols like IGMP.

Protocol and Feature Details

Static multicast routing avoids processing overhead on routers by providing the flexibility to program a specific path for mutlicast traffic from the source to the client without having to rely on underlying protocols. Static multicast routes require users to explicitly specify the incoming interface, source address, group address, and the set of downstream interfaces where the traffic needs to be replicated.

A static multicast route for both IPv4 and IPv6 protocol stacks can be programmed in the following configurations:

- On a specified source. Traffic is forwarded from a specific source or a summarized entry for a specific multicast group address from any source.
- No specified outgoing interface. This is used if there is a need to drop traffic without relaying traffic to any of the downstream interfaces or to bridge traffic on the upstream interface.

A static multicast route is considered active as far as the incoming interface and the port(s) on which the incoming traffic is replicated is operational. The interfaces that are down are not included in the forwarding port list of the multicast entry programmed.

When a static multicast route is configured, it stays until the user removes it. It is recommended to use static multicast routes for persistent traffic flows or in scenarios where resource usage needs to be optimized by summarizing the static multicast route. Static multicast route does not timeout based on traffic inactivity and the user should unconfigure the static multicast route configured promptly to avoid stale routes or unwanted traffic misdirection.

To match on any source for a group, **any** can be specified, instead of a IP address for the source. Multiple multicast routes having the same portset (incoming interface, group, outgoing interfaces and l2) can be summarized to a single route to avoid multiple routes and efficiently utilize the hardware resources. Summarization is enabled by default and is applied only on /32 or 0.0.0.0/0 multicast routes.

When a multicast static route is configured on the source connected router, PIM registration process for that route will be suppressed and PIM joins will be dropped.

When a multicast static route is configured on the RP router, it sends a PIM register stop message if it receives a PIM register message and clears pending registrations for that source and group. This feature can be used for handling SSDP traffic in a network.

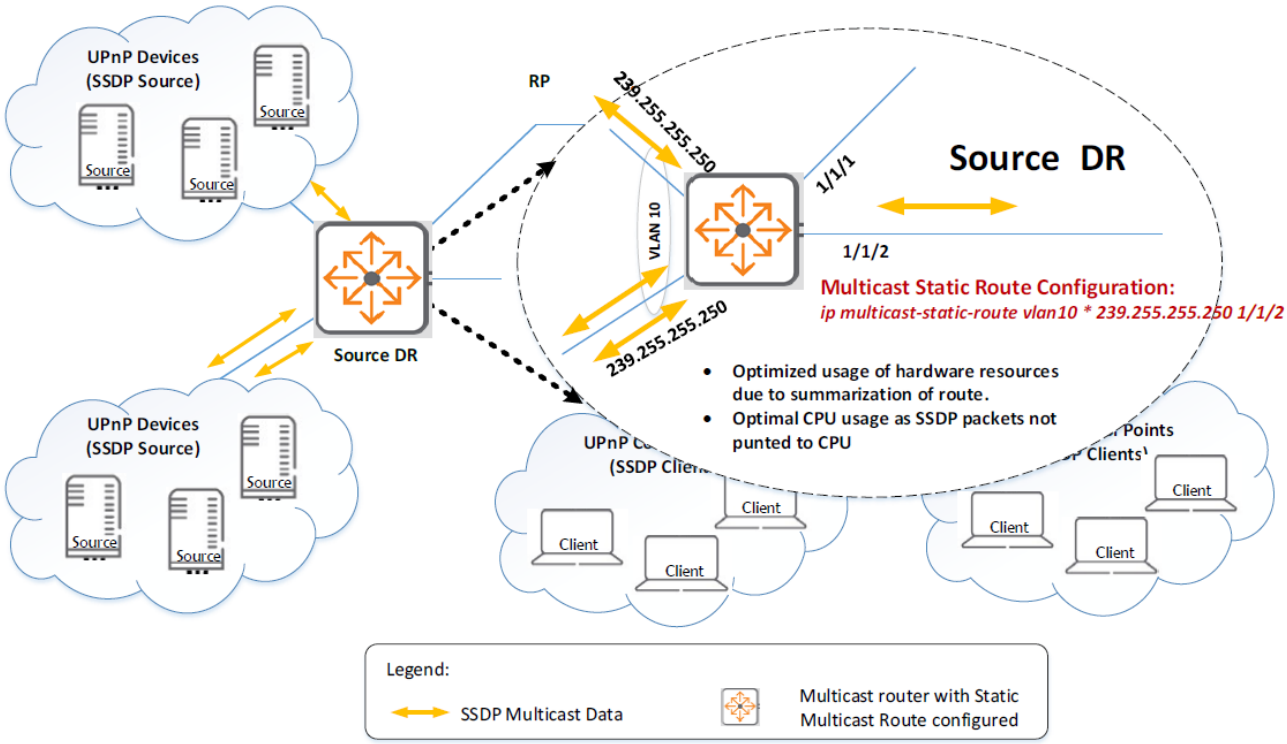
Summarized static routes can be used in the end-to-end path between multicast source and clients in such cases. It is highly recommended to not use static multicast routes to replace PIM in existing deployments for other group addresses and usecases.

The following is an example of a typical static multicast route:

```
[Incoming interface, Source, Group] > [Set of downstream interfaces]
```

In this example, the **Incoming interface** is the L3 interface from which the traffic is received on the router, **Source** is the source IP address of the stream device, and **Group** is the multicast IP address of the group for which the traffic is streamed. The downstream interfaces are the L3 interfaces on which PIM joins are received or to which the receivers are connected.

Figure 1 *Configuring summarized static multicast route to prevent high resource utilization*



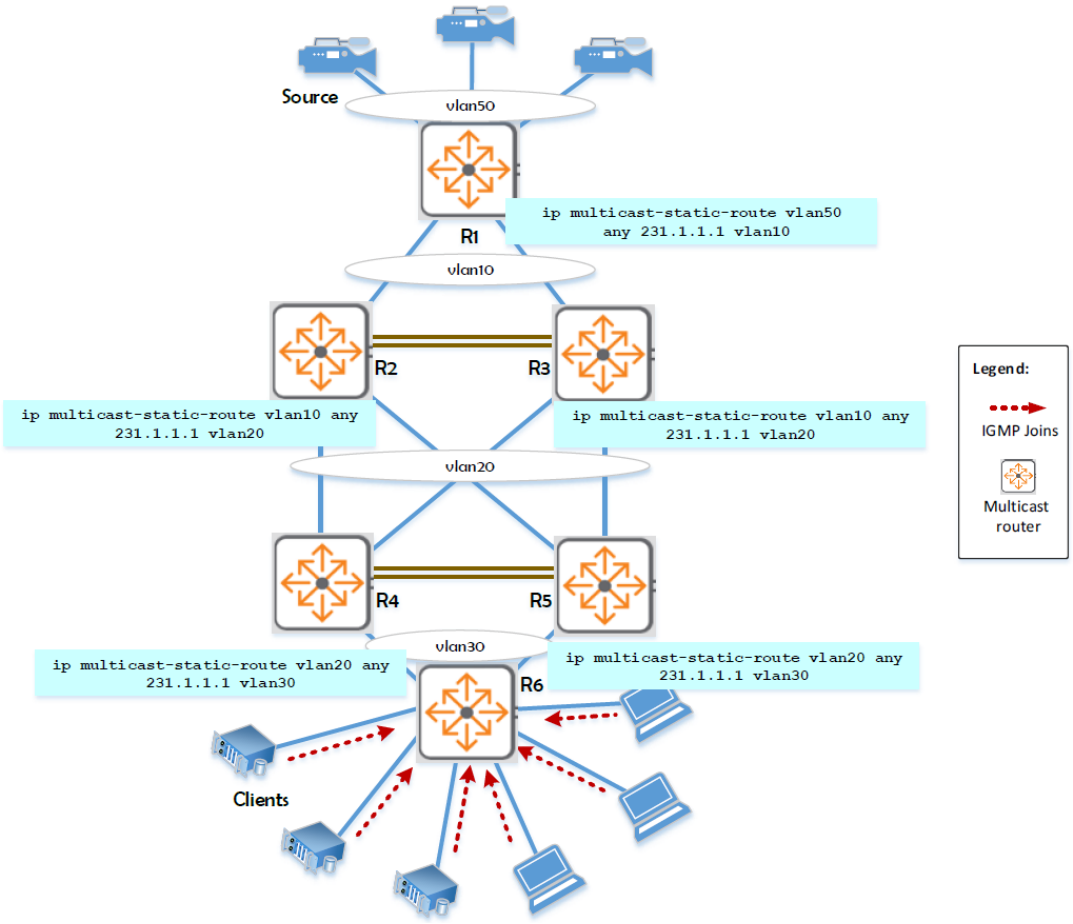
Deployments

Static Multicast Routes can be used in static-only mode, hybrid mode with PIM, and Redistribution into PIM.

Static-only mode

Only multicast static routes are used to route multicast packets between Source and Client designated router. All the devices are configured with static multicast routes for all the multicast flows, and PIM does not need not be enabled on the network. IGMP/MLD is enabled on this network to learn joins from clients. This may not be deployed in common and only small-sized networks where the multicast source and clients are only a few hops apart should be configured to run in this mode. Dynamic multicast routing protocols like PIM are not used in this network for multicast routing. IGMP/MLD is enabled on this network to learn joins from clients.

Figure 2 *Static-only mode*

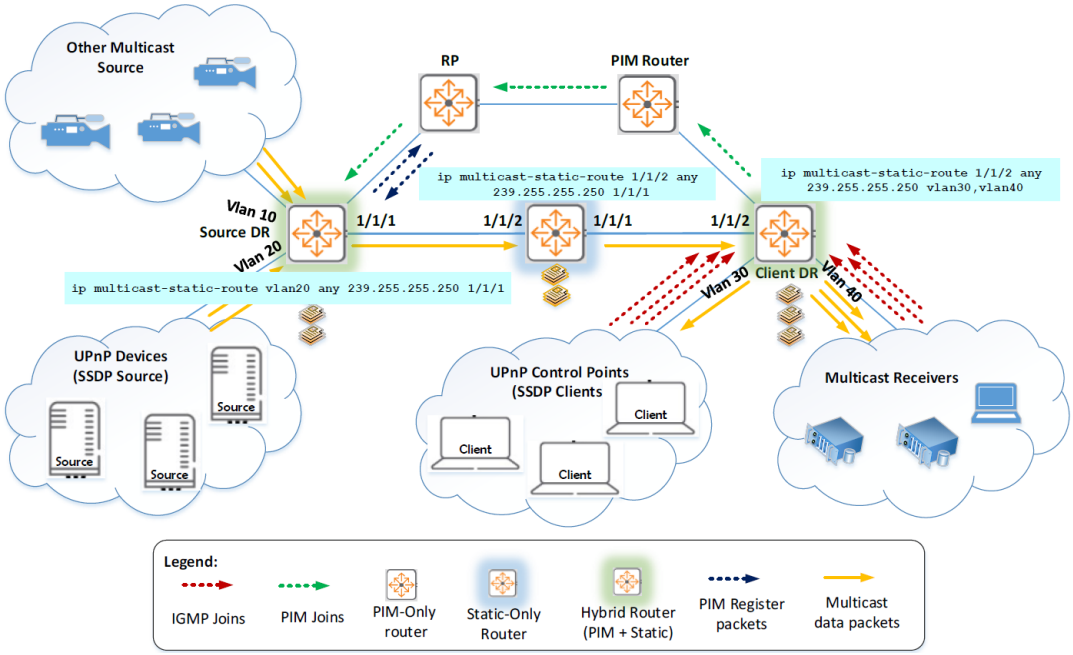


Hybrid mode with PIM

In this mode, multicast static routes are configured on all devices between Source and Client designated routers to route multicast packets for some specific flows. Dynamic multicast routing protocols, like PIM, are also enabled in these devices to route multicast traffic for other flows. The multicast routers have both static multicast routes and PIM mroutes programmed in the multicast forwarding table, but the entries are mutually exclusive. IGMP/MLD is enabled on this network to learn joins from clients. Only the flows that have scope of summarization or the flows for which the multicast network seldom changes can be picked to be configured as static multicast routes in all the devices along the path.

In hybrid networks, the routers including RP and all routers towards Source from RP should be part of the PIM enabled network. Static multicast routing can be enabled on the routers connected towards Client side. If deployed in hybrid mode, all the border routers between Static and PIM networks operate in hybrid mode. This mode works with PIM-SM, PIM-DM and PIM-SSM.

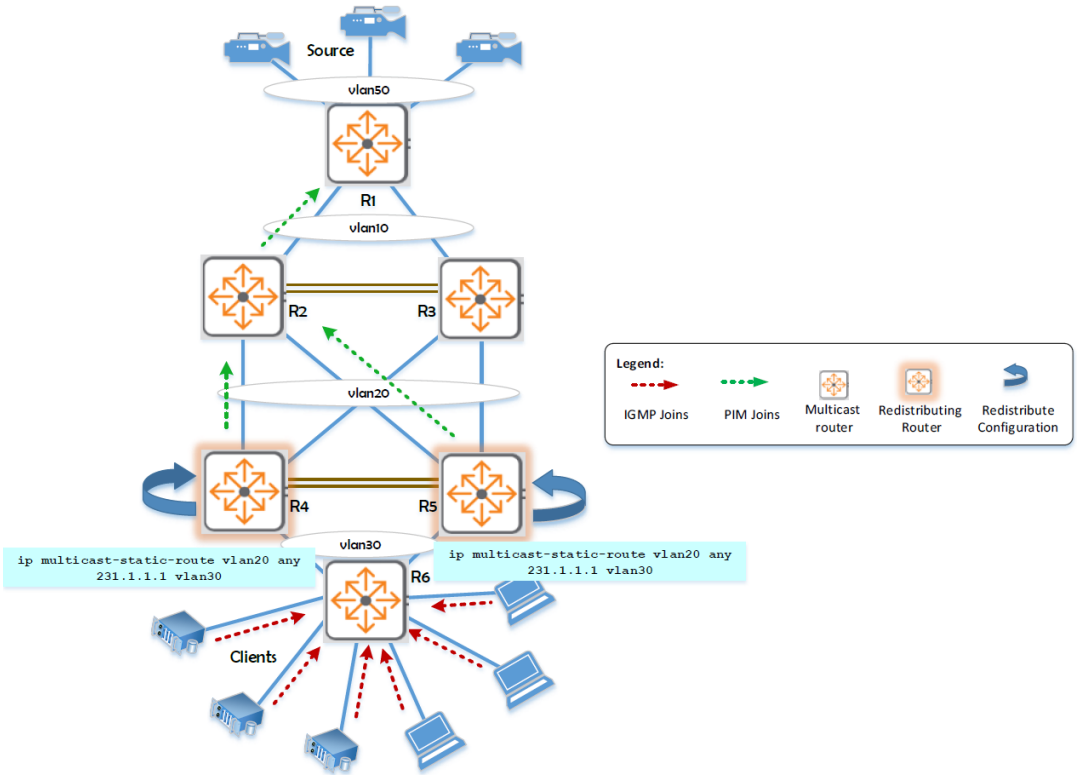
Figure 3 *Hybrid mode with PIM*



Redistribution mode into PIM

In this mode, a combination of PIM and multicast static routes are used in the network to route multicast packets from Source to clients that are interested in multicast traffic. In this mode, the routers, including RP and all routers towards Source from RP, should be part of the PIM enabled network. Static multicast routing is enabled on the routers connected towards Client side with a redistributing router that is enabled for static multicast route stitching the PIM and Static multicast route domains. IGMP/MLD is enabled on this network to learn joins from clients. If deployed in redistribution mode, all the border routers between Static and PIM networks should operate in redistribution mode and care should be taken while configuring to avoid duplicate packets caused by multiple routers redistributing PIM joins for the same multicast flow. This mode is recommended in cases where the device is connected towards the multicast receivers that are affected by join/leave latency issues due to high multicast route scale.

Figure 4 *Redistribution mode into PIM*



Supported platforms and standards

Multicast static routes is supported by the 6200, 6300, 6400, 8100, 8320, 8325, 8360, 8400, and 10000 Switch Series. Summarized multicast static routes are not supported on the 8400 switch series.

Standards

The AOS-CX multicast static route is a proprietary feature and there are no existing standards.

Static multicast scenarios

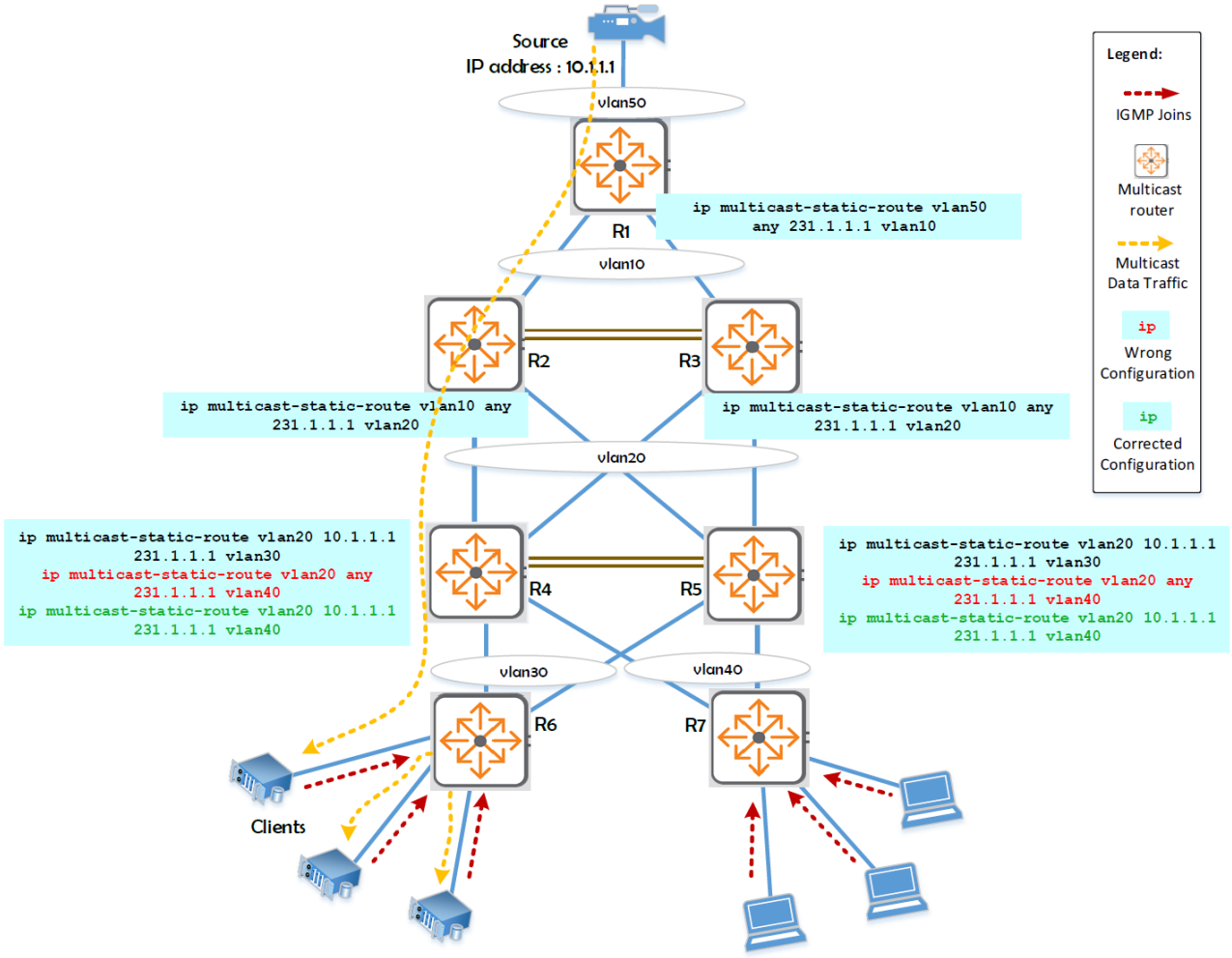
Overlapping Static Multicast Routes

Static multicast routes should be configured with care as they can cause traffic loss or duplicate traffic if not properly configured. Configuring static multicast routes with overlapping source and group address on a router can cause such issues. Overlapping static multicast routes occure when the source IP address and the group IP address are matching or overlapping even if the upstream/incoming interface is different. A summarized static route {*,G} always overlap with all the {S1..n, G} static multicast routes configured. If {*, G} and {S, G} static multicast routes are configured on the same device, traffic from Source S always chooses the {S, G} route to forward the traffic based on the longest prefix match (LPM).

Scenario 1: Traffic is dropped due to {S, G} preferrence over {*, G}

In this scenario, a summarized static multicast route {*, G} is configured with the outgoing interface as vlan40, while {S,G} entry is configured with the outgoing interface as vlan30 on the same device. Due to longest prefix match (LPM), traffic from Source S is not forwarded to vlan40 as it always chooses the {S, G} route configured. The multicast static route should be configured as **{I, S, G} > vlan30, vlan40** where **I** is the incoming interface.

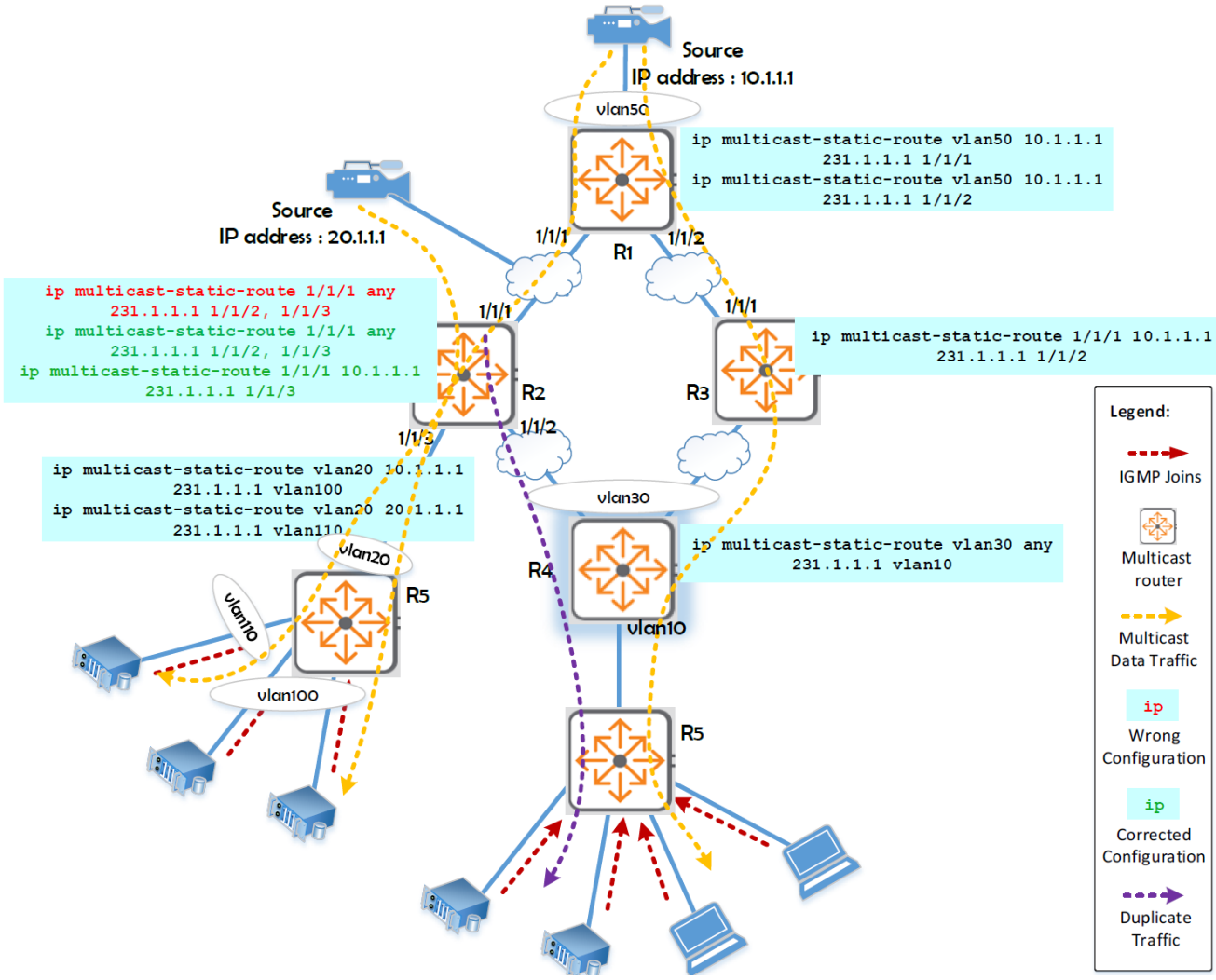
Figure 1 *Traffic drop due to {S, G} preferrence over {*, G}*



Scenario 2: Traffic is duplicated due to {S, G} and {*, G} from different upstreams

In this scenario, a summarized static multicast route {*, G} is configured on Router1 and {S, G} is configured on Router2 where the downstream of these routers intersects at a certain point. Traffic coming on both Router1 and Router2 forwards traffic to the downstream and the device where these traffic intersects sends duplicate traffic downstream. Overlapping multicast static routes should not be configured in these cases to avoid duplicate traffic.

Figure 2 *Traffic is duplicated due to {S, G} and {*, G} from different upstreams*



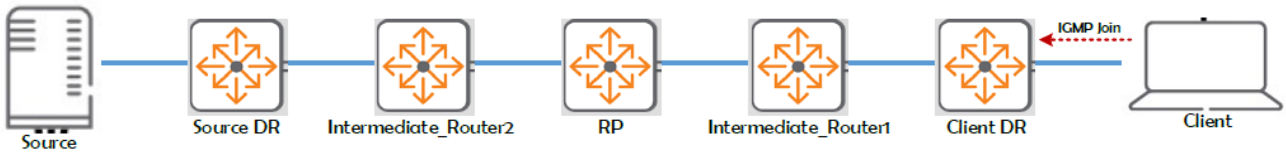
PIM + Static Scenarios

This section explains the multicast traffic flow and protocol behavior for various combinations of PIM and Static multicast route enabled in a network. These scenarios are not recommended.

The following notations are used in this section:

- Static {*, G}: Summarized static route “ip multicast-static-route <upstream_interface> any <group_ip == G> <downstream_interface>” configured on the device.
- Static {S, G}: Summarized static route “ip multicast-static-route <upstream_interface> <source_ip == S> <group_ip == G> <downstream_interface>” configured on the device.
- PIM: PIM is enabled on all interfaces of the device.
- PIM-SSM: PIM-SSM is enabled for the group G.
- Redistribute: Static multicast routes are redistributed into PIM domain on this device.
- Forward: Traffic sent from the Source is received by the Client successfully.
- Drop: Traffic sent from the Source is not received by the Client.
- RPT: Root Path Tree.
- SPT: Source Path Tree.

Figure 3 *Sample multicast network*



PIM + Static without redistribution

Table 1, PIM + Static without redistribution behaviors describes the network behavior for various combinations of static multicast route when configured with PIM on the topology shown in Figure 3, Sample multicast network.

Table 1: *PIM + Static without redistribution behaviors*

Case	Client DR	Inter-mediate Router1	RP	Inter-mediate Router2	Source DR	Traffic Flow	Traffic Path	Traffic For-ward/Drop Reason
1	Static {*, G} + PIM	Static {*, G} + PIM	Static {*, G} + PIM	Static {*, G} + PIM	Static {*, G} + PIM	Forward	SPT	PIM mroute formed for all groups other than G. Static mroute used to forward traffic for group G.
2	Static {S, G} + PIM	Static {S, G} + PIM	Static {S, G} + PIM	Static {S, G} + PIM	Static {S, G} + PIM	Forward	SPT	PIM mroute formed for all flows other than {S, G}. Static mroute used to forward traffic for {S, G}.
3	Static {S, G} + PIM-SSM	Static {*, G} + PIM-SSM	Static {S, G} + PIM-SSM	Static {S, G} + PIM-SSM	Static {S, G} + PIM-SSM	Forward	SPT	PIM mroute formed for all flows other than {S, G}. Static mroute used to forward traffic for {S, G}.
4	Static {S, G} + PIM	PIM	PIM	PIM	PIM	Forward	SPT	PIM forwards start joins towards RP.
5	PIM	Static {S, G} + PIM	PIM	PIM	PIM	Forward	RPT	PIM forwards start joins towards RP.
6	PIM	PIM	Static {S, G} + PIM	PIM	PIM	Drop	NA	RP has a static {S, G} which causes upstream {S, G} joins not to be sent.
7	PIM	PIM	PIM	Static {S,	PIM	Drop	NA	Intermediate Router2 has a

Case	Client DR	Inter-mediate Router1	RP	Inter-mediate Router2	Source DR	Traffic Flow	Traffic Path	Traffic For-ward/Drop Reason
				G} + PIM				static {S,G} which causes upstream {S,G} joins not to be sent to Source_ DR.
8	PIM	PIM	PIM	PIM	Static {S, G} + PIM	Drop	NA	Source DR forwards traffic using static mroute. Intermediate_ Router2 does not receive a join as Register is not done. RP does not receive multicast traffic.
9	PIM	PIM	PIM	Static {S, G} + PIM	Static {S, G} + PIM	Drop	NA	Source DR and Intermediate_ Router2 forwards traffic using static mroute. RP does not program a pim mroute as registration process is not completed.
10	Static {S, G} + PIM or Static {*, G} + PIM-SSM	PIM-SSM	PIM-SSM	PIM-SSM	PIM-SSM	Drop	NA	PIM does not send sg joins towards RP on Client DR.
11	PIM-SSM	Static {S, G} + PIM or Static {*, G} + PIM-SSM	PIM-SSM	PIM-SSM	PIM-SSM	Drop	NA	PIM does not send sg joins towards RP on Intermediate Router1.
12	PIM-SSM	PIM-SSM	PIM-SSM	PIM-SSM	Static {S, G} + PIM or Static {*, G} + PIM-SSM	Forward	RPT	Source DR forwards traffic using static mroute. Intermediate Router2 has a join and forms the mroute

Case	Client DR	Inter-mediate Router1	RP	Inter-mediate Router2	Source DR	Traffic Flow	Traffic Path	Traffic For-ward/Drop Reason
								when it receives traffic.
13	PIM-SSM	PIM-SSM	PIM-SSM	Static {S, G} + PIM or Static {*, G} + PIM-SSM	Static {S, G} + PIM or Static {*, G} + PIM-SSM	Forward	RPT	Source DR forwards traffic using static mroute. Intermediate Router2 has a join and forms the mroute when it receives traffic.

It is not recommended to deploy static multicast routes as in cases 4 through 13.

In some cases, traffic may be fowarded throught RPT instead of SPT.

Based on PIM configuration and alternate links, joins may be sent over PIM enabled paths even when static multicast routes are configured. Configure static multicast routes carefully to avoid duplicate traffic.

PIM + Static with redistribution

Table 1, PIM + Static without redistribution behaviors describes the network behavior for various combinations of static multicast route when configured with PIM on the topology shown in Figure 3, Sample multicast network when the redistribution option is enabled on a router.

Table 2: *PIM + Static with redistribution behaviors*

Case	Client DR	Inter-mediate Router1	RP	Inter-mediate Router2	Source DR	Traffic Flow	Traffi-c Path	Traffic For-ward/Drop Reason
1	Static {*, G} + PIM + Redistribu te	PIM	PIM	PIM	PIM	Forwar d	RPT	Static mroute is redistributed into PIM on Client DR, and PIM creates mroutes on all the other devices.
2	Static {S, G} + PIM/PIM-SSM + Redistribu	PIM/PIM-SSM	PIM/PIM-SSM	PIM/PIM-SSM	PIM/PI M-SSM	Forwar d	SPT	Static mroute is redistributed into PIM on Client DR, and PIM will

Case	Client DR	Inter-mediate Router1	RP	Inter-mediate Router2	Source DR	Traffic Flow	Traffi-c Path	Traffic For-ward/Drop Reason
	te							take care of creating mroutes on all the other devices.
3	Static {*, G} + PIM-SSM	PIM-SSM	PIM-SSM	PIM-SSM	PIM-SSM	Drop	NA	{*, G} static mroutes are not redistributed into PIM-SSM.
4	Static {*, G} + PIM	Static {*, G} + PIM + Redistribute	PIM	PIM	PIM	Forwar d	RPT	Static mroute is redistributed into PIM on Intermediate Router1, and PIMcreates mroutes on all the other upstream devices.
5	Static {S, G}	Static {S, G} + PIM/PIM-SSM + Redistribute	PIM/PIM-SSM	PIM/PIM-SSM	PIM/PI M-SSM	Forwar d	SPT	Static mroute is redistributed into PIM on Intermediate Router1, and PIMcreates mroutes on all the other upstream devices.
6	Static {*, G}	Static {*, G}	Static {*, G} + PIM + Redistribu te	PIM	PIM	Drop	NA	Static mroute {*, G} is redistributed into PIM on RP, but register process cannot complete as {S, G} join is not sent by RP.
7	Static {S, G}	Static {S, G}	Static {S, G} + PIM/PIM-SSM +	PIM/PIM-SSM	PIM/PI M-SSM	Forwar d	SPT	Static mroute {S, G} is redistributed into

Case	Client DR	Inter-mediate Router1	RP	Inter-mediate Router2	Source DR	Traffic Flow	Traffi-c Path	Traffic For-ward/Drop Reason
			Redistribute					upstream towards Source.
8	Static {*, G}	Static {*, G}	Static {*, G}	Static {*, G} + PIM + Redistribute	PIM	Drop	NA	Register processis not completed, {S,G} join is not received by Source DR, and traffic is not sent downstream by Source DR.
9	Static {S, G}	Static {S, G}	Static {S, G}	Static {S, G} + PIM/PIM-SSM + Redistribute	PIM/PIM-SSM	Forward	SPT	Static mroute {S, G} is redistributed into upstream towards Source.
10	Static {*, G} + PIM	Static {*, G} + PIM + Redistribute	PIM	PIM	PIM	Forward	RPT	Static mroute is redistributed into PIM on Intermediate Router1, and PIMcreates mroutes on all the other upstream devices.
11	Static {S, G} + PIM/PIM-SSM	Static {S, G} + PIM/PIM-SSM + Redistribute	PIM/PIM-SSM	PIM/PIM-SSM	PIM/PIM-SSM	Forward	SPT	Static mroute is redistributed into PIM on Intermediate Router1, and PIMcreates mroutes on all the other upstream devices.
12	Static {*, G} + PIM + Redistribute	Static {*, G} + PIM + Redistribute	PIM	PIM	PIM	Forward	RPT	Static mroute is redistributed into PIM on Intermediate

Case	Client DR	Inter-mediate Router1	RP	Inter-mediate Router2	Source DR	Traffic Flow	Traffi-c Path	Traffic For-ward/Drop Reason
								Router1, and PIM creates mroutes on all the other upstream devices. Redistirbution on Client_ DR sends a Join to Intermediate Router1 whichis dropped.
13	Static {S, G} + PIM/PIM-SSM + Redistribute	Static {S, G} + PIM/PIM-SSM + Redistribute	PIM/ PIM-SSM	PIM/ PIM-SSM	PIM/ PIM-SSM	Forward	SPT	Static mroute is redistributed into PIM on Intermediate Router1, and PIM creates mroutes on all the other upstream devices. Redistirbution on Client_ DR sends a Join to Intermediate Router1 whichis dropped.
14	Static {*, G1}, Static {S, G2}	Static {*, G1}, Static {S, G2} + PIM + Redistribute	PIM	PIM	PIM	Forward	RPT	Static mroute is redistributed into PIM on Intermediate_Router1, and PIM creates mroutes on all the other upstream devices.



It is not recommended to deploy static multicast routes with redistribution as in cases 1, 2, 4, and 5. All other cases are strictly not recommended.



In some cases, traffic may be fowarded throught RPT instead of SPT.

VSX Scenarios

Static multicast route configuration on VSX based networks is supported. There are configuration constraints related to static multicast routes on the primary and secondary devices in the VSX pair. On a symmetric VSX network, traffic is always routed by the primary device on a mc-lag and the secondary device programs bridge entries for multicast traffic. In cases where the the primary fails, the other device in the VSX pair starts routing traffic on mc-lag.

The following notations are used in this section:

- Symmetric Upstream: Symmetric upstream indicates the upstream interface for multicast traffic is the same on both primary and secondary devices for the VSX pair.
- Asymmetric Upstream (Primary): Asymmetric upstream indicates the upstream interface for multicast traffic is not the same on both primary and secondary devices for the VSX pair. The multicast source is connected on an upstream interface which is specific to VSX primary device.
- Asymmetric Upstream (Secondary): Asymmetric upstream indicates the upstream interface for multicast traffic is not the same on both primary and secondary devices for the VSX pair. The multicast source is connected on an upstream interface which is specific to VSX secondary device.
- Symmetric Downstream: Symmetric downstream indicates that the downstream interface for multicast traffic is the same on both primary and secondary devices for the VSX pair. The multicast receivers are reachable through the same interface from both VSX primary and secondary devices.
- Asymmetric Downstream: Asymmetric downstream indicates that the downstream interface on which the multicast receivers are connected is specific to either VSX primary or secondary device.
- Route: Indicates configuration of static multicast route with an upstream interface and one of more downstream interfaces.
- Bridge: Indicates configuration of static multicast route with only upstream interface so that traffic matching this flow will be bridged only on the ports of upstream interface.

Table 3, VSX Scenarios describes various scenarios and the configuration principle of static multicast route in VSX deployments.

Table 3: *VSX Scenarios*

Upstream	Primary Symmetric Downstream	Asymetric Downstream	Secondary Symmetic Downstream	Asymmetric Downsteam
Symmetric Upstream	Route	Route	Route	Route
Asymmetric Upstream (Primary)	Route	Route	Route	Route
Asymmetric Upstream (Secondary)	Bridge	Route	Route	Route
Asymmetric Upstream (Source S1 on Primary and Source S2 on Secondary)	Route for S1 Bridge for S2	Route	Route for S2 Bridge for S1	Route

Figure 5, Symmetic upstream and symmetric downstream (traffic flow) through Figure 31, ECMP downstream with summary route as backupdepicts various combinations of upstream/downstream

interfaces for multicast traffic on VSX topologies and sample static multicast route configurations for each case.

Figure 4 *VSX scenarios legend*

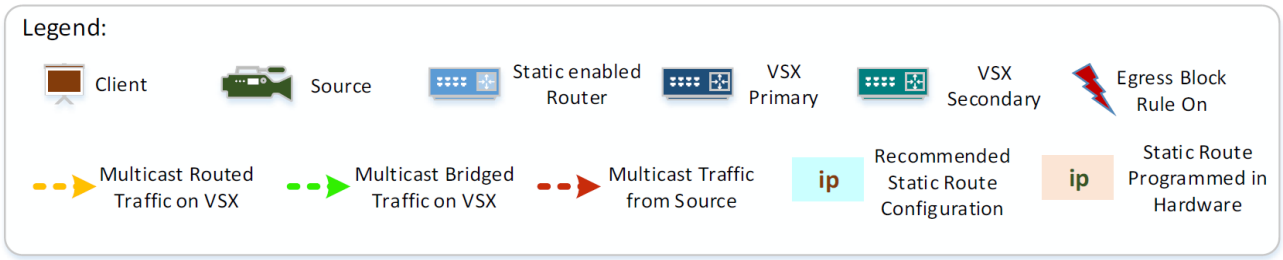


Figure 5 *Symmetic upstream and symmetric downstream (traffic flow)*

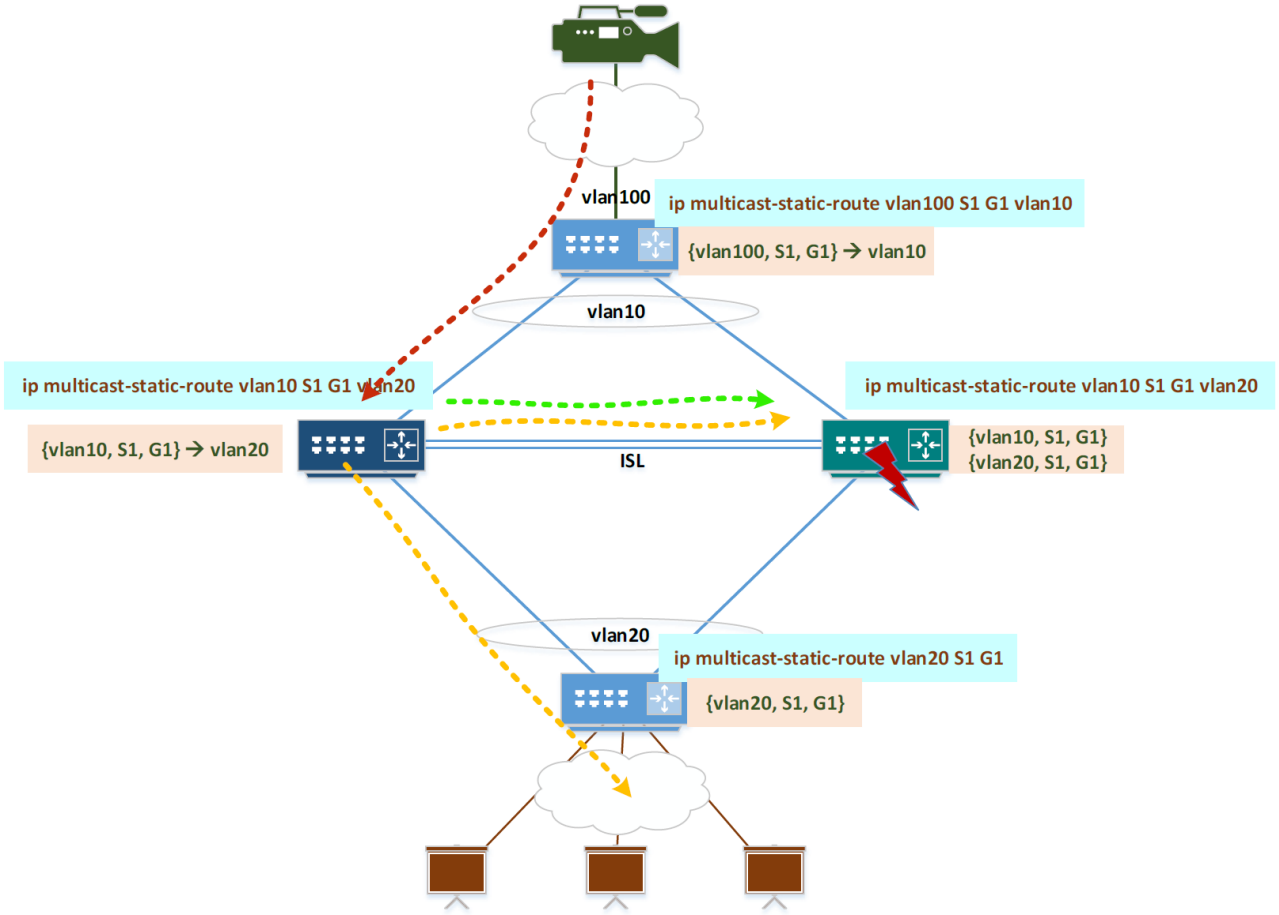


Figure 6 *Symmetic upstream and symmetric downstream (primary uplink down)*

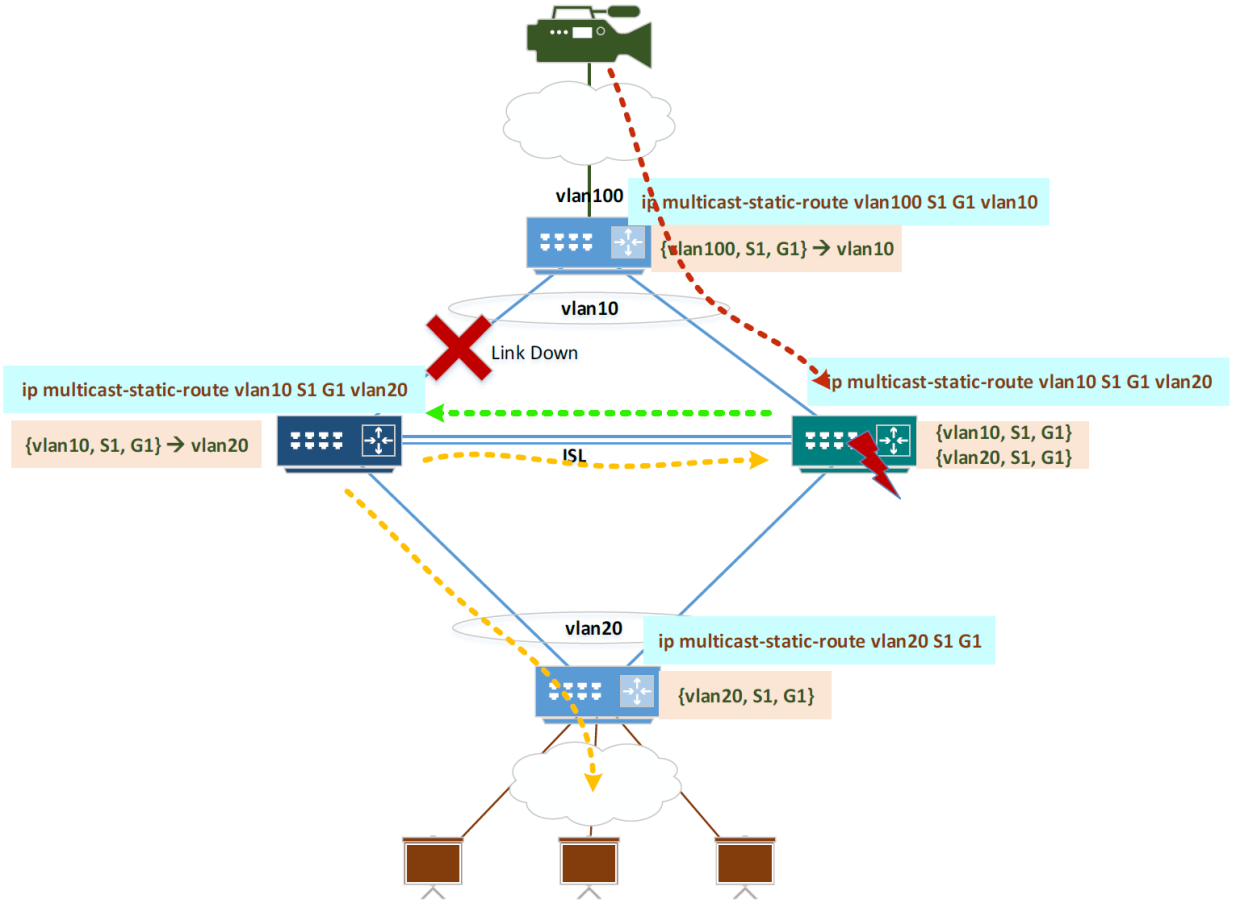


Figure 7 *Symmetric upstream and symmetric downstream (primary mclag down)*

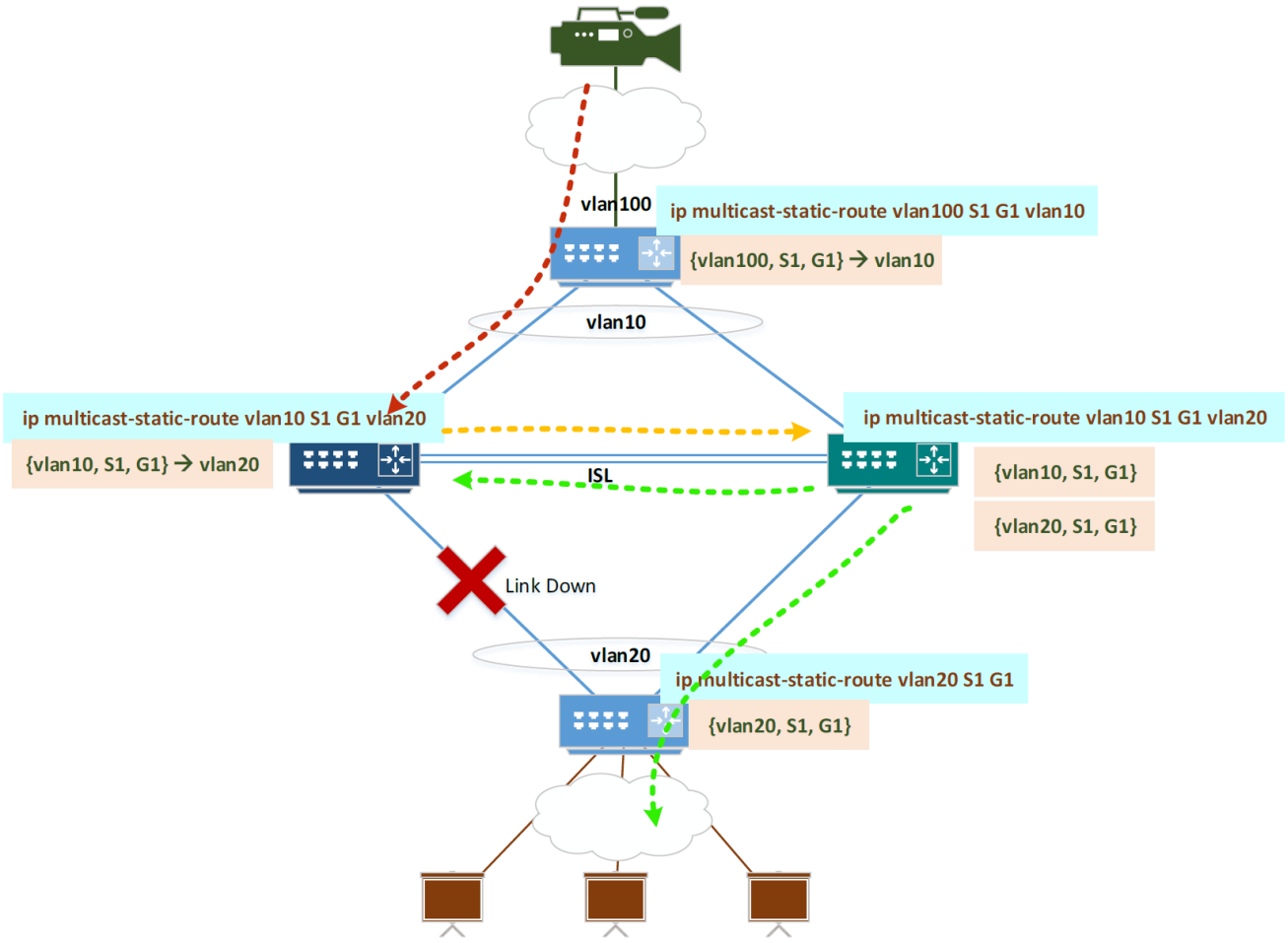


Figure 8 *Symmetric Upstream and symmetric downstream (ISL down)*

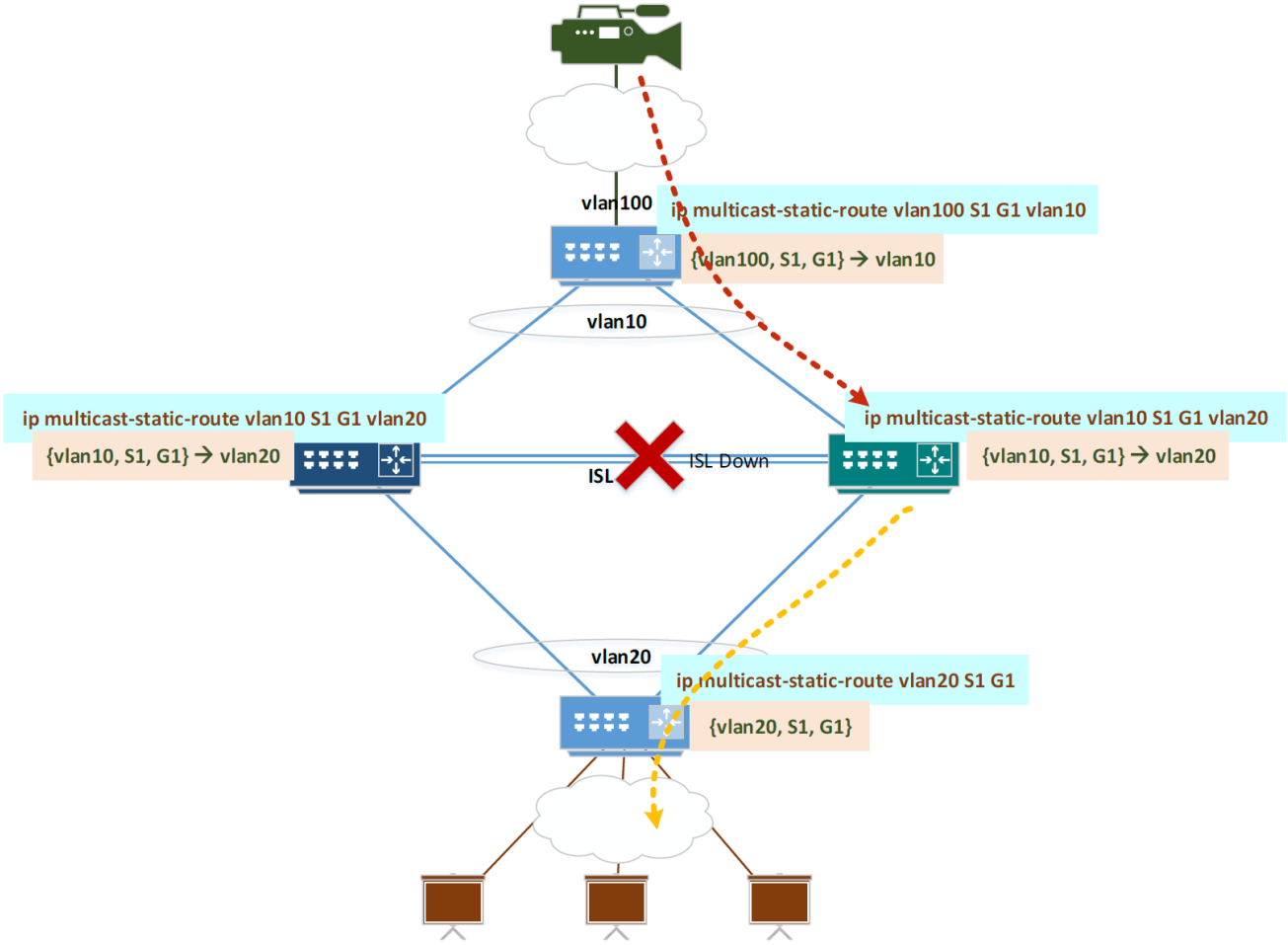


Figure 9 *Symmetric upstream and asymmetric downstream (traffic flow - primary)*

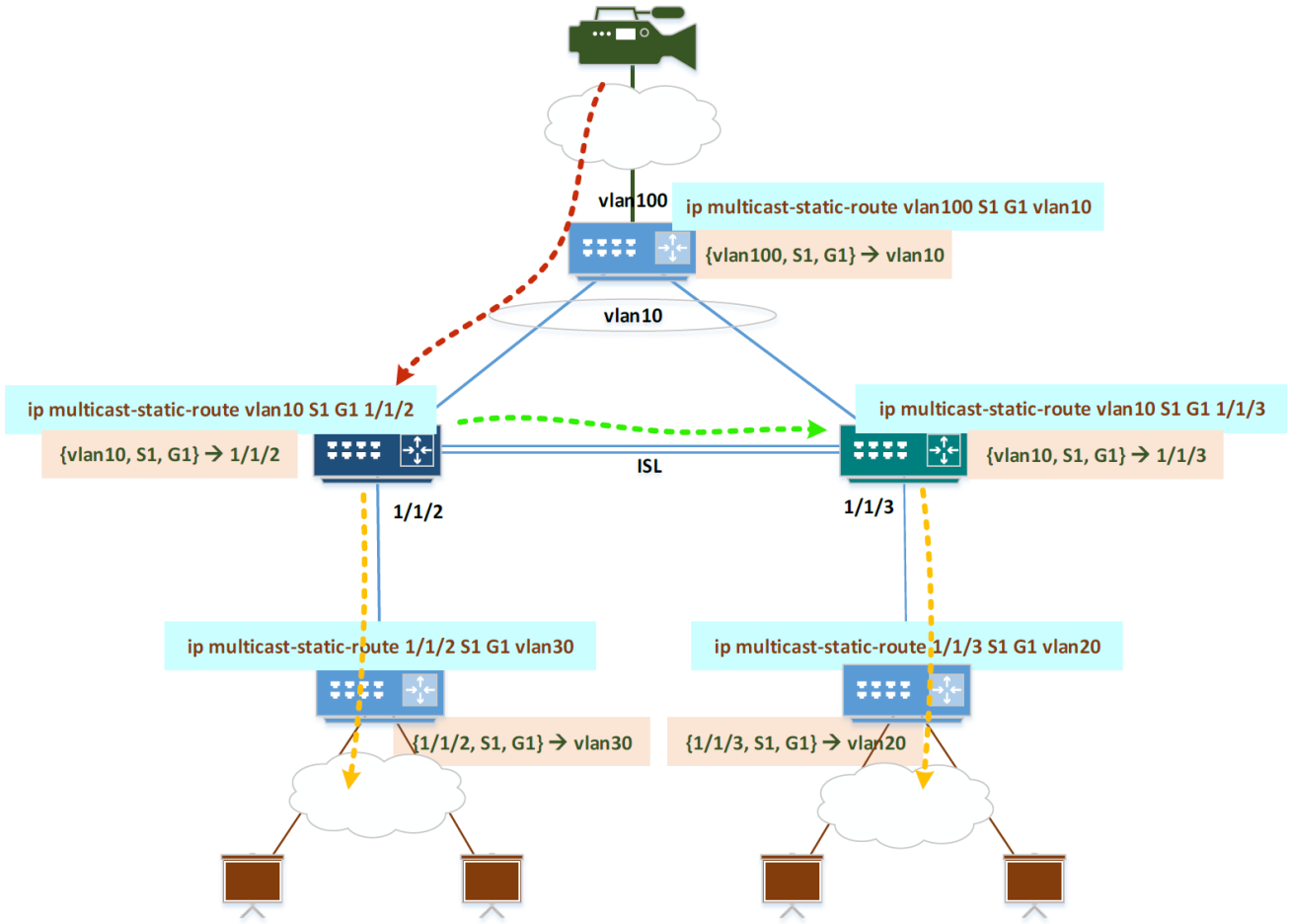


Figure 10 *Symmetric upstream and asymmetric downstream (traffic flow - secondary)*

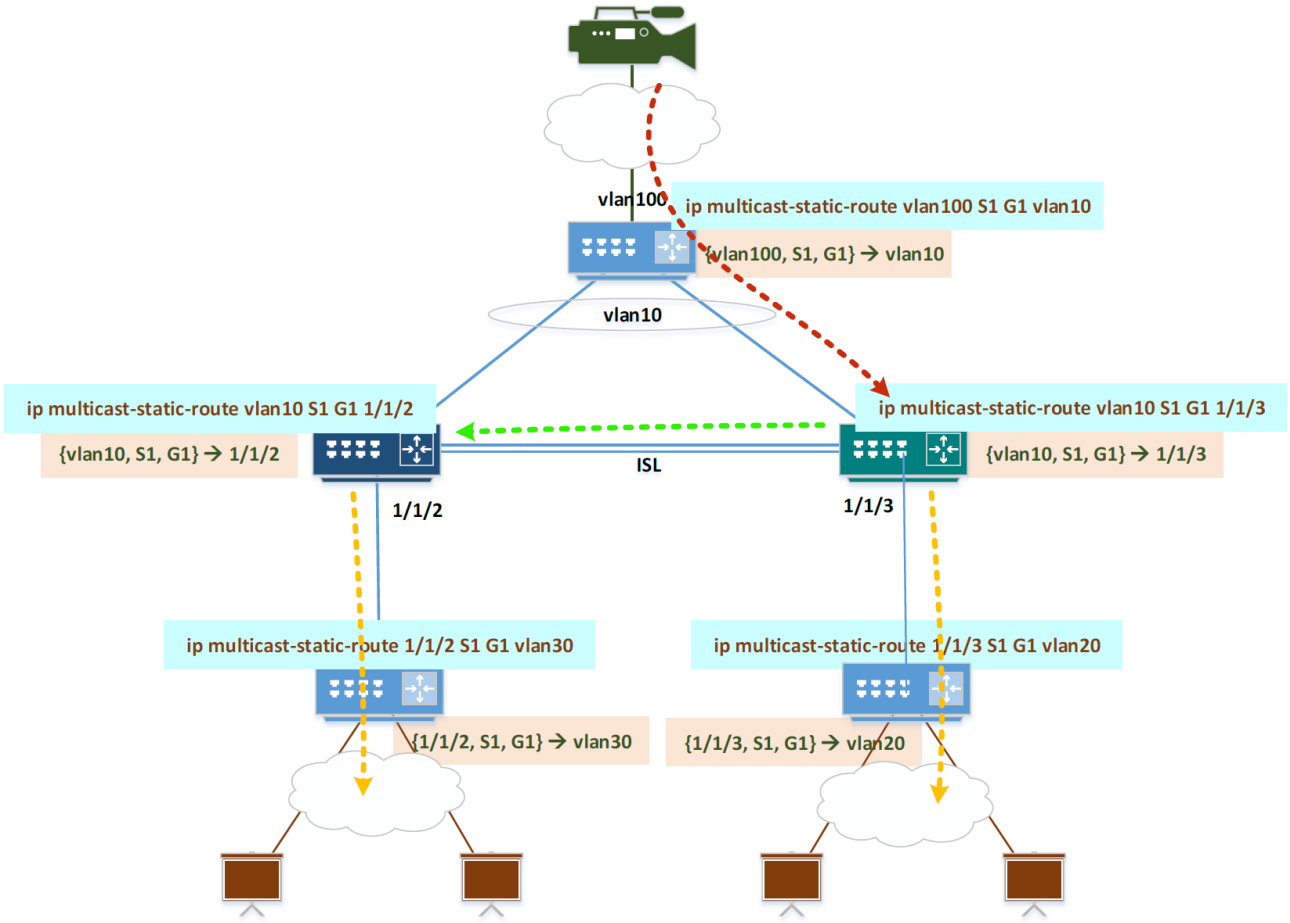


Figure 11 *Symmetric upstream and asymmetric downstream (link down)*

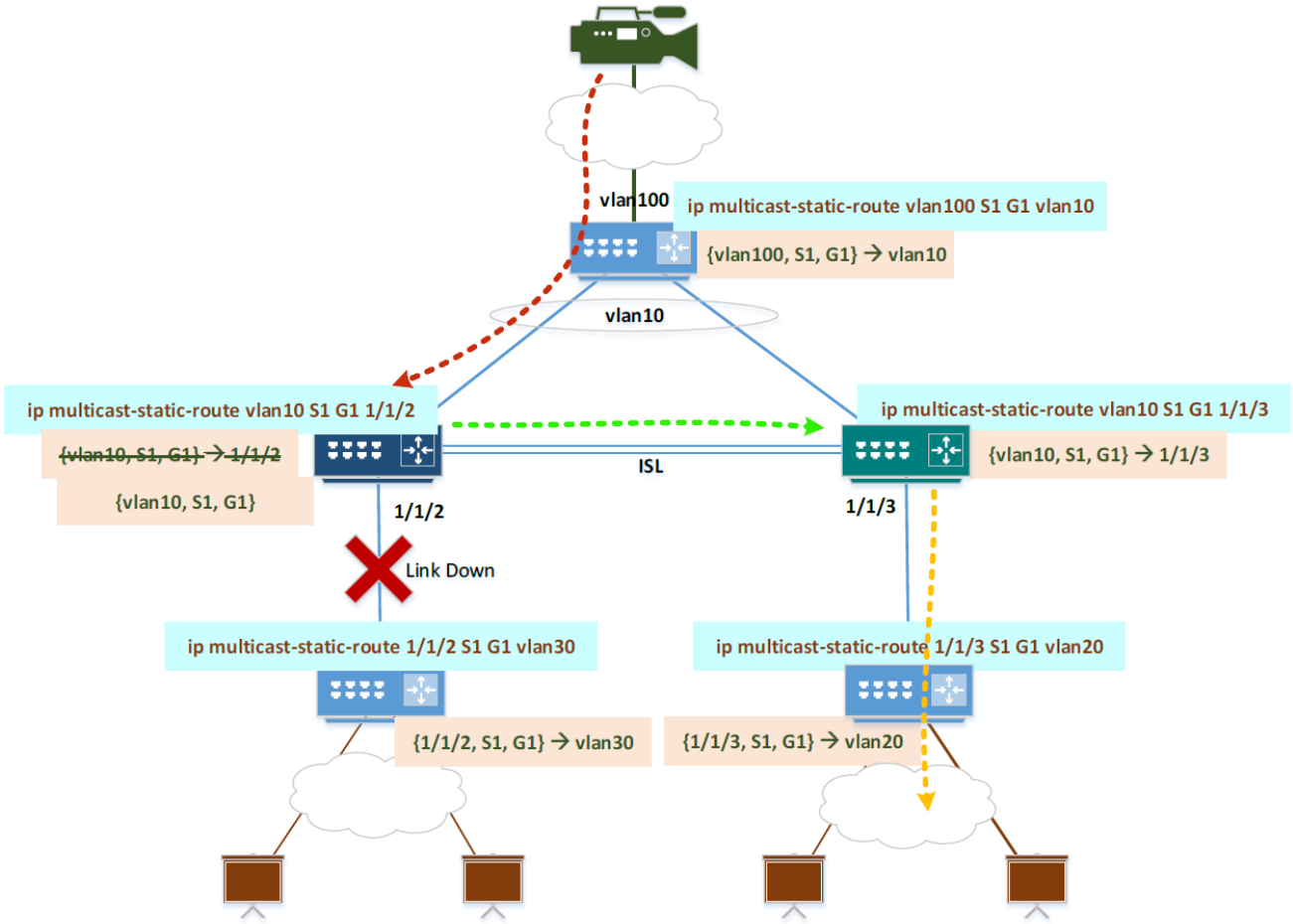


Figure 12 *Symmetric upstream and asymmetric downstream-secondary (traffic flow - primary)*

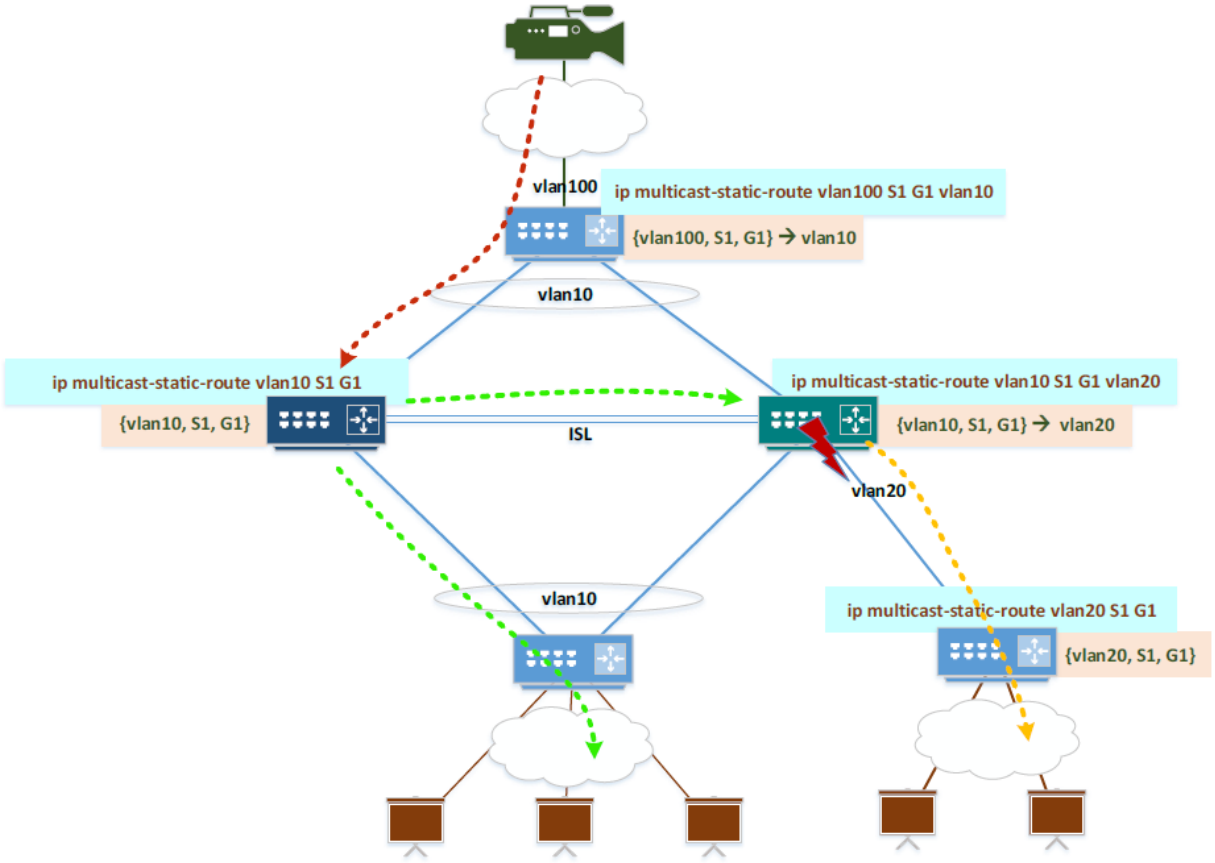


Figure 13 *Symmetric upstream and asymmetric downstream-secondary (traffic flow - secondary)*

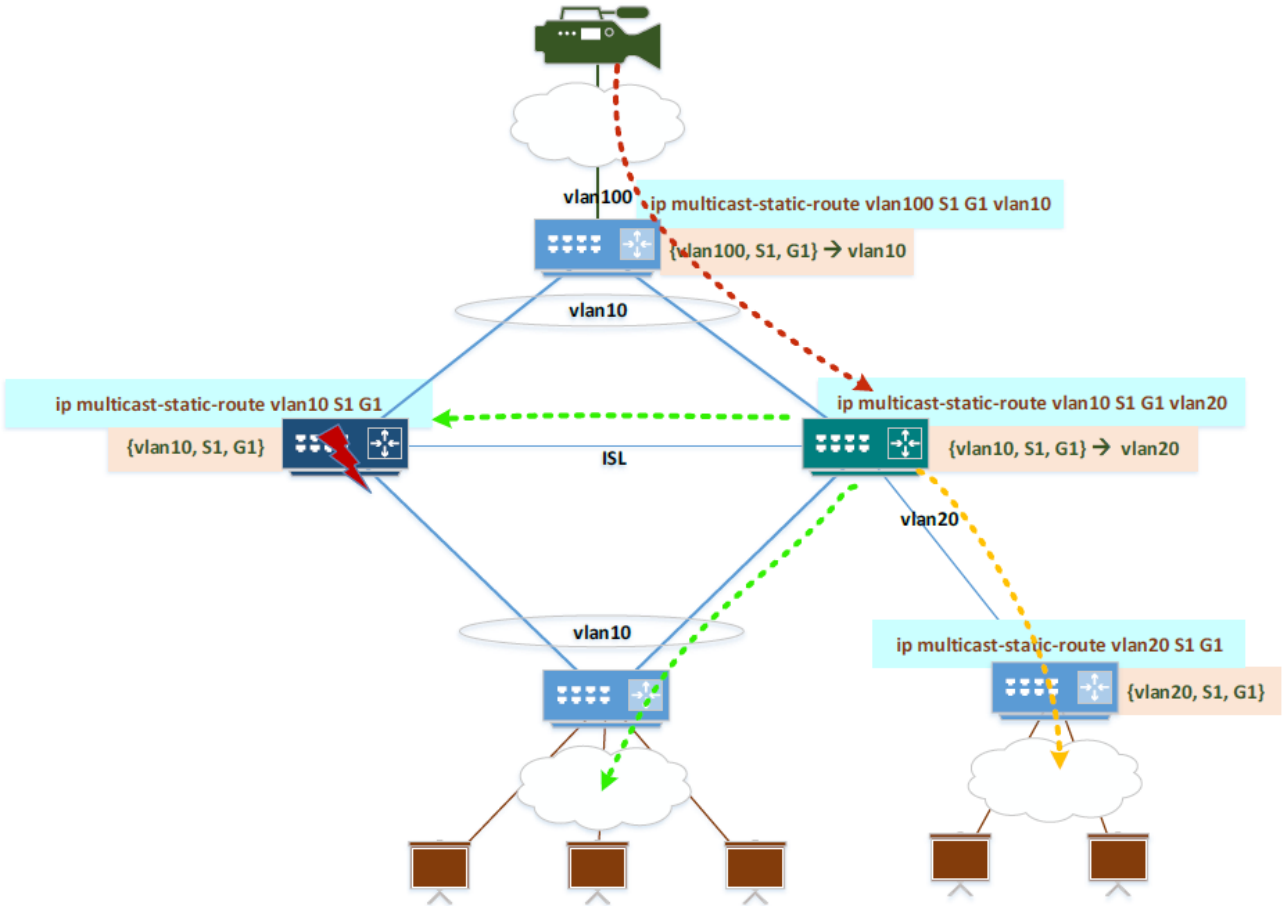


Figure 14 *Symmetric upstream and asymmetric downstream-secondary (mclag down)*

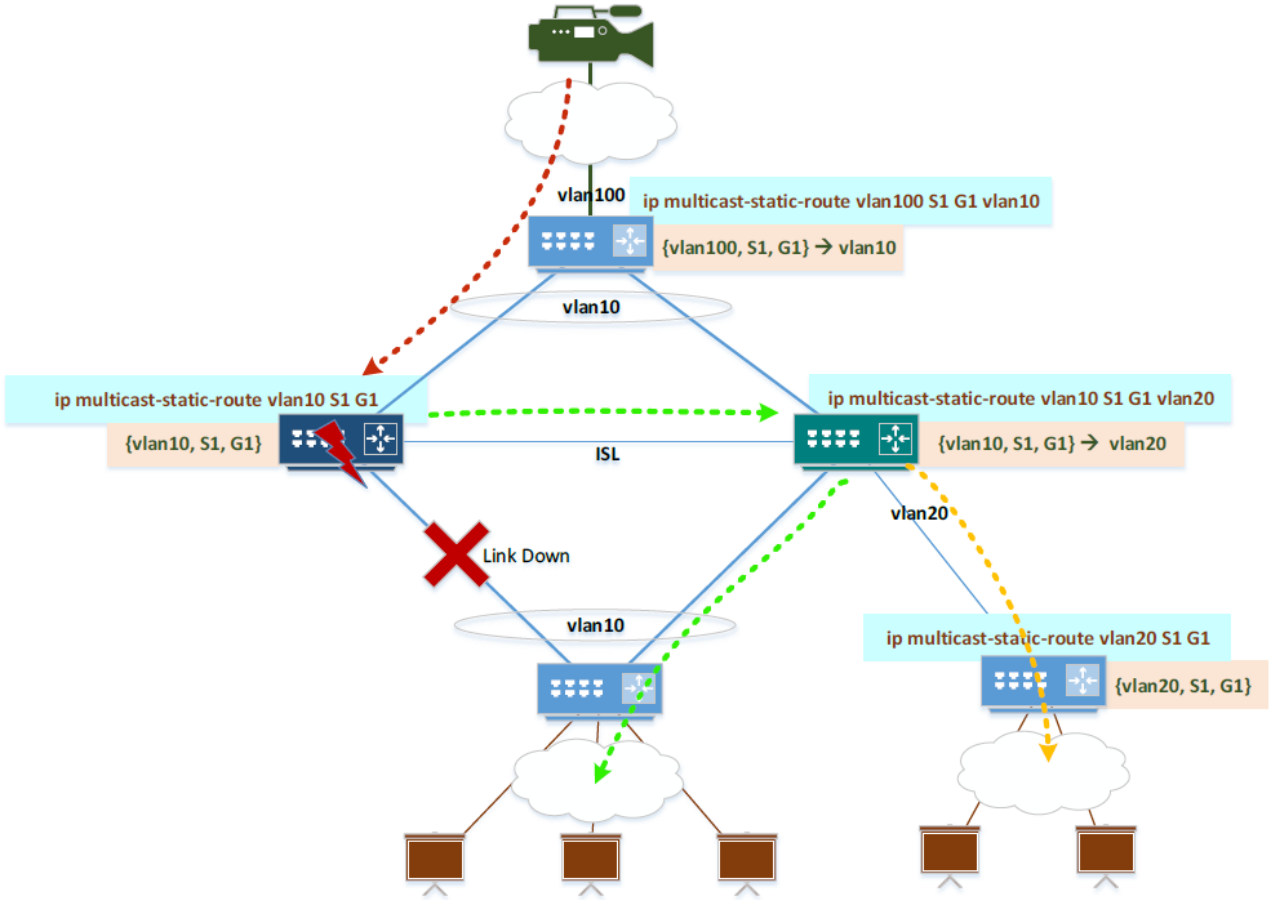


Figure 15 *Asymmetric upstream-primary and symmetric downstream (traffic flow)*

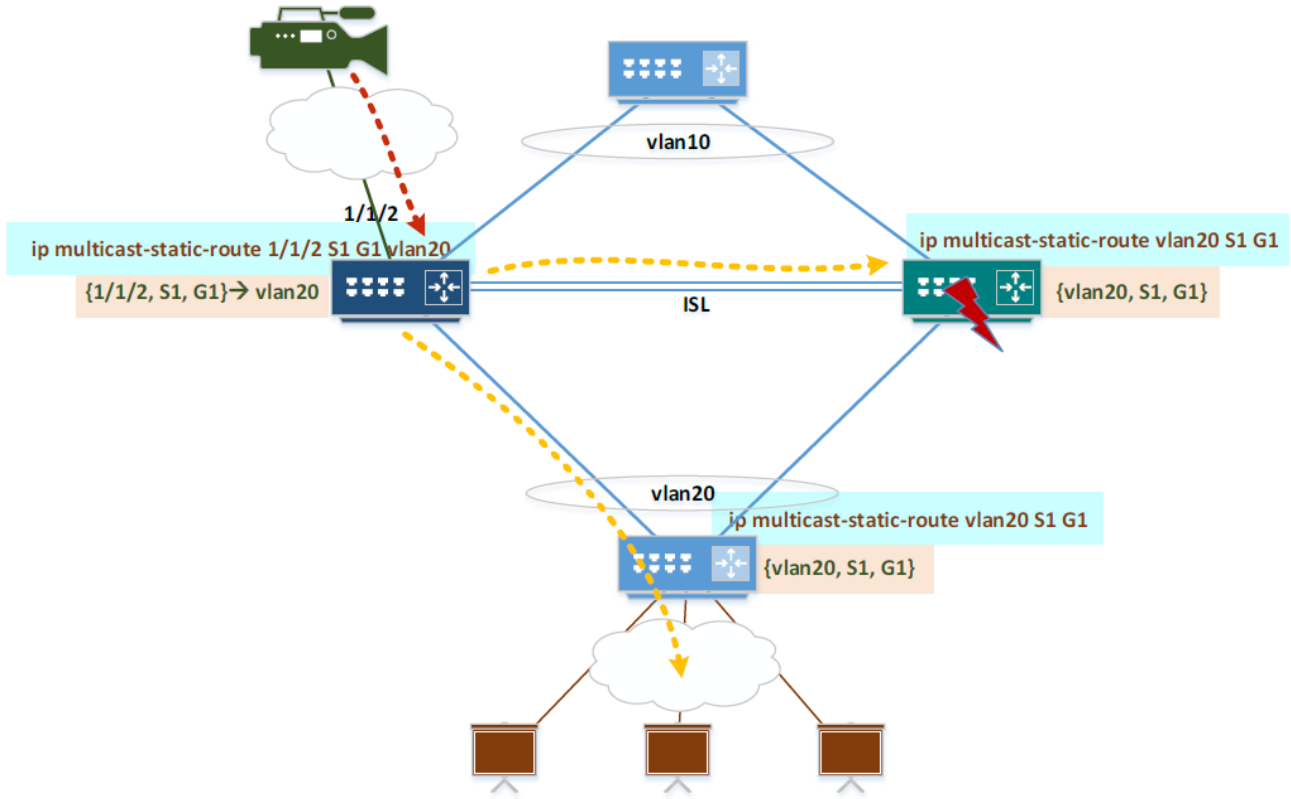


Figure 16 *Asymmetric upstream-primary and symmetric downstream (mclag down)*

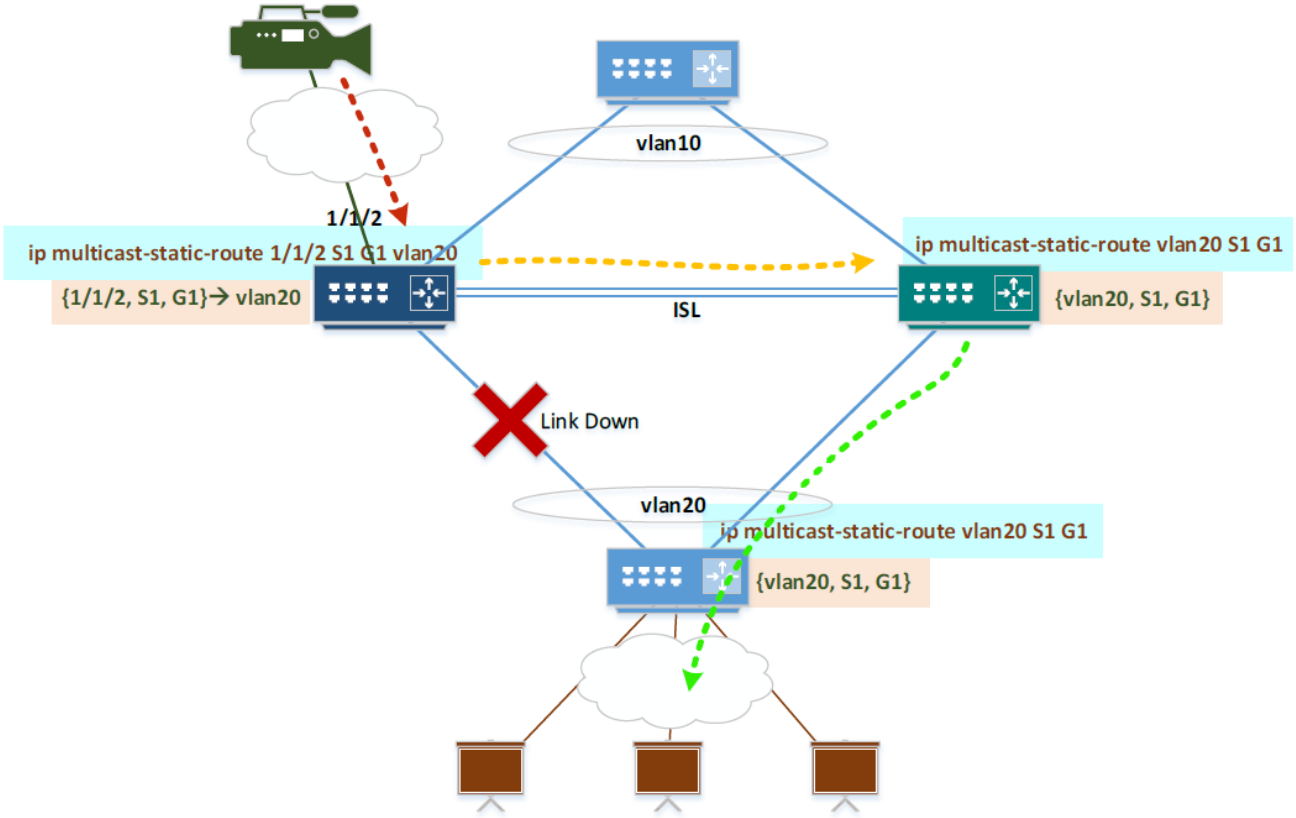


Figure 17 *Asymmetric upstream-secondary and symmetric downstream (traffic flow)*

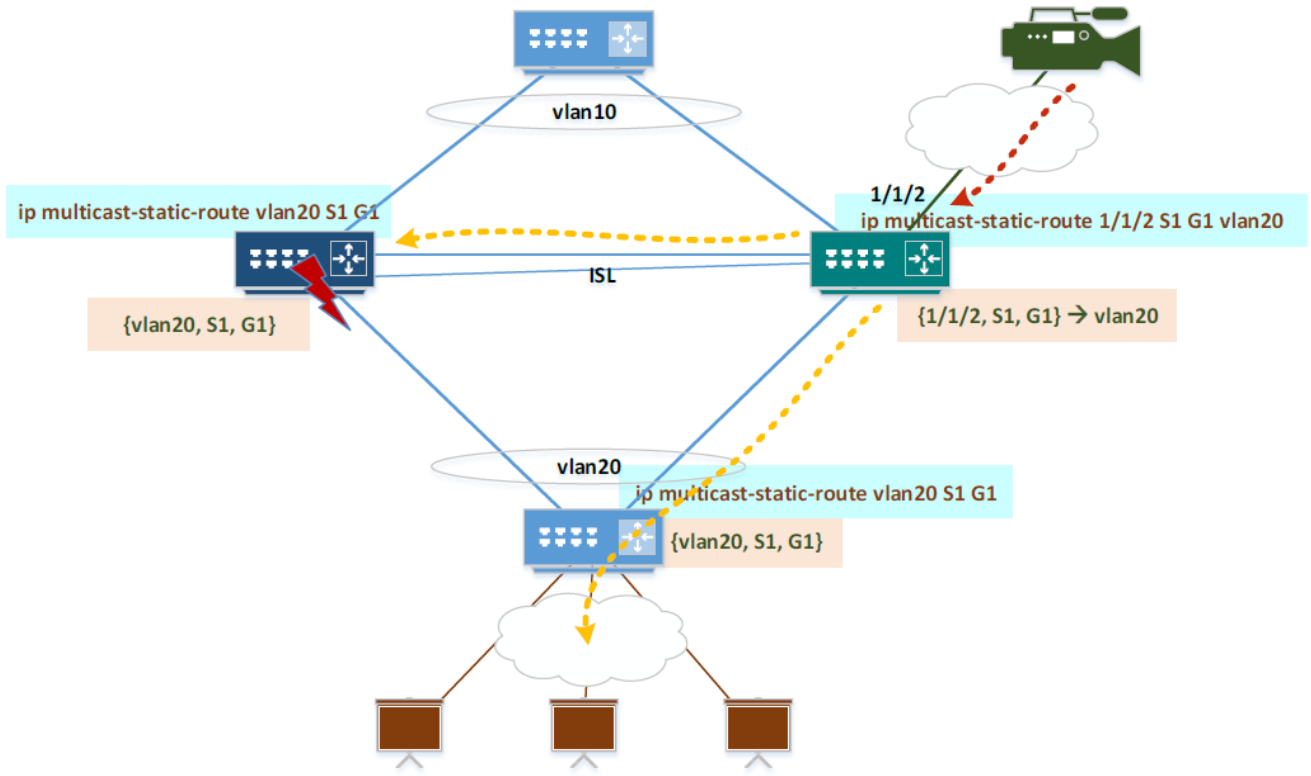


Figure 18 *Asymmetric upstream-secondary and symmetric downstream (mclag down)*

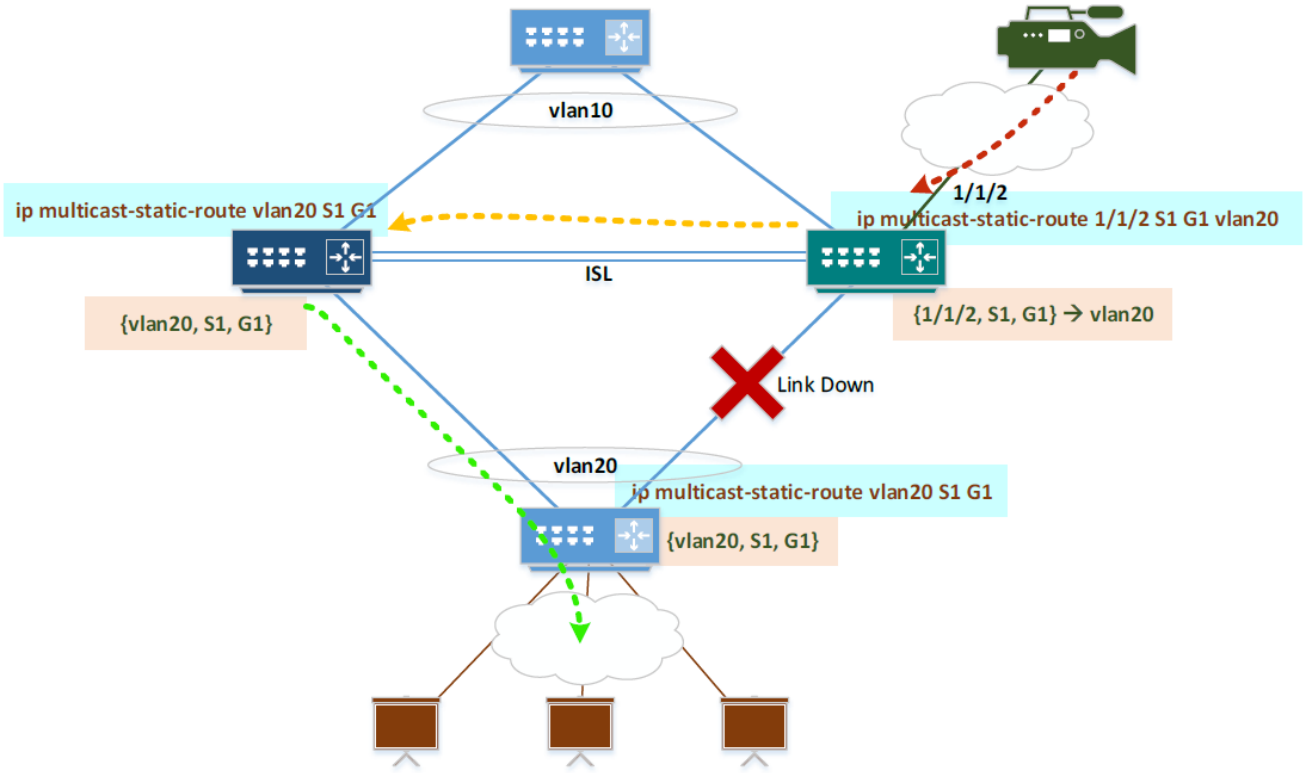


Figure 19 *Asymmetric upstream-primary and asymmetric downstream-secondary (traffic flow)*

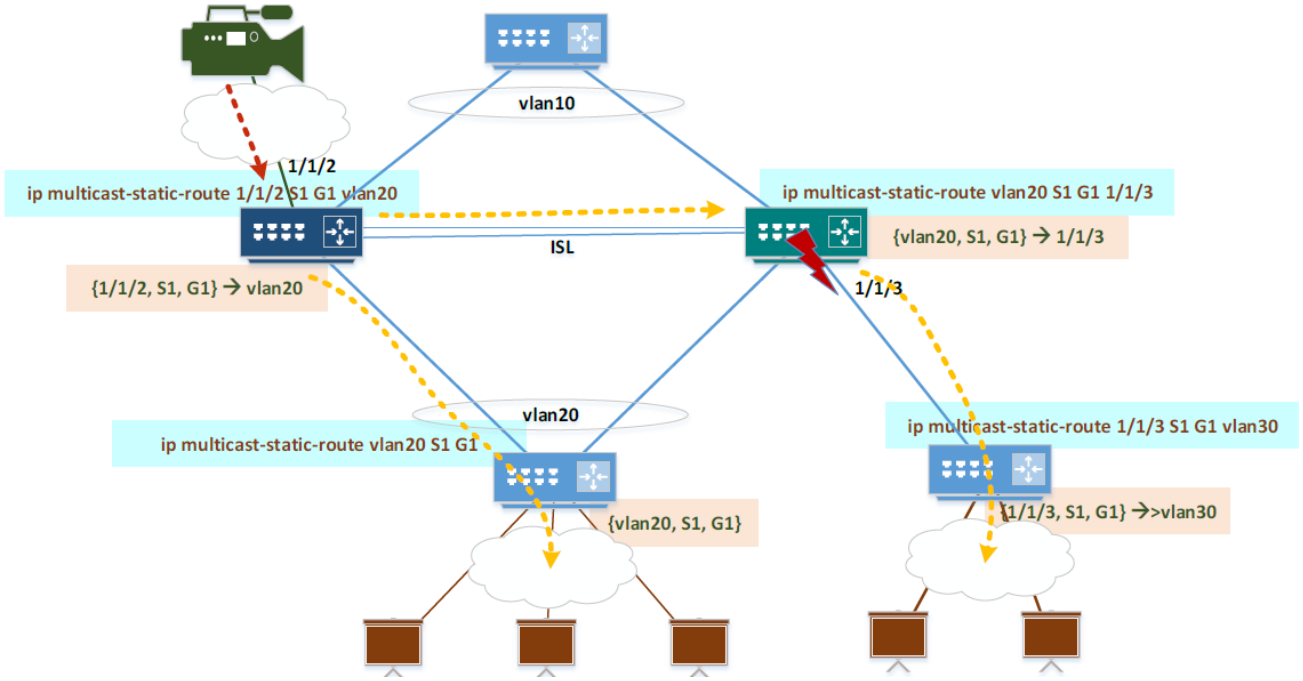


Figure 20 *Asymmetric upstream-primary and asymmetric downstream-secondary (mclag down)*

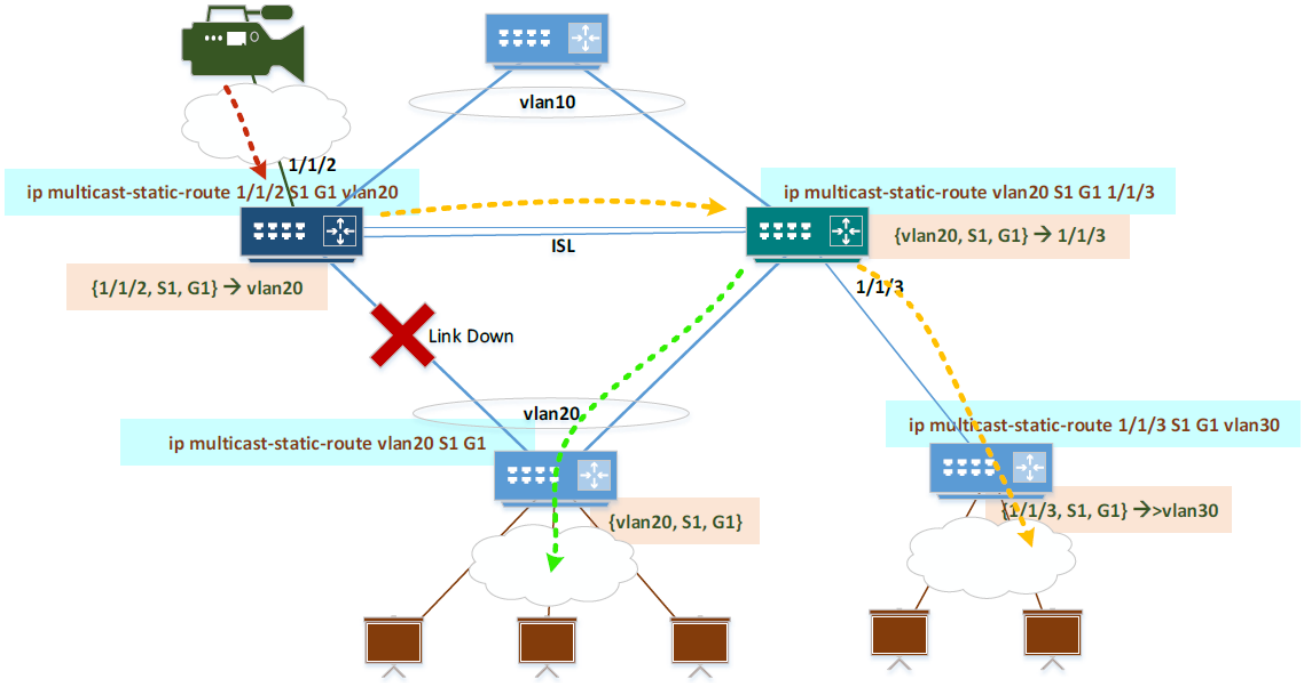


Figure 21 *Asymmetric upstream-secondary and asymmetric downstream-secondary (traffic flow)*

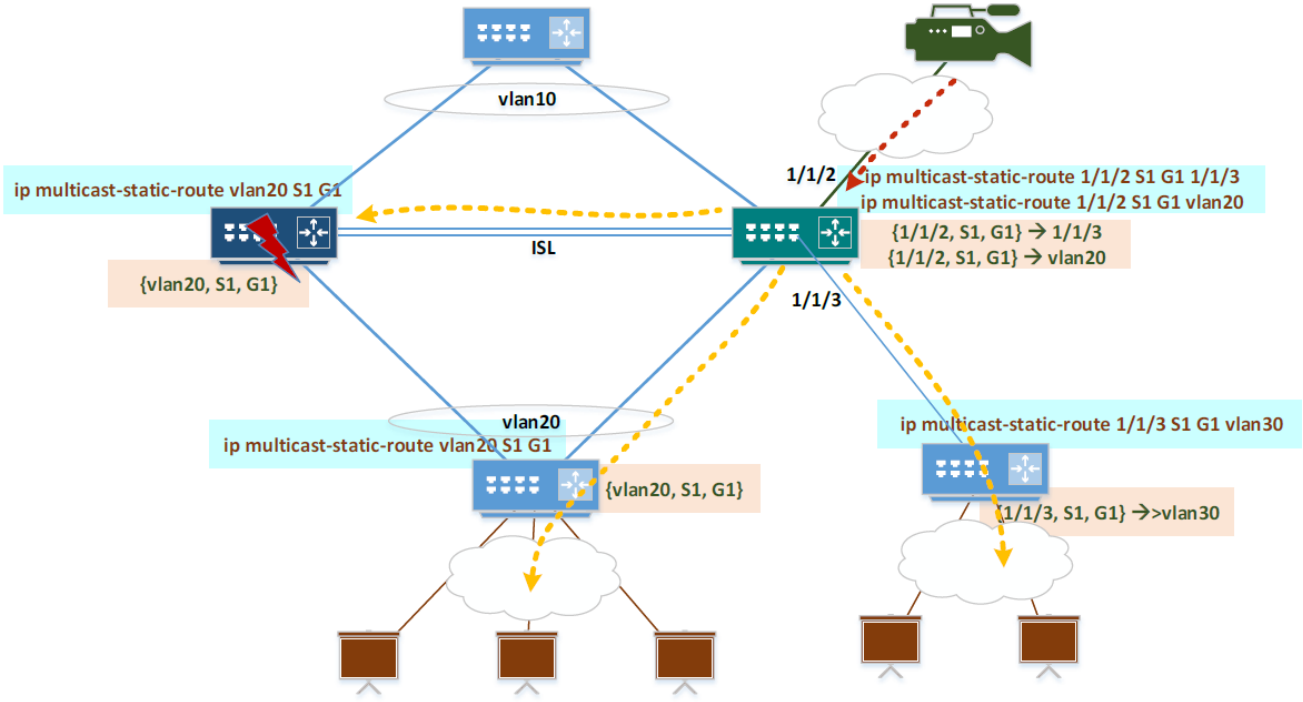


Figure 22 *Asymmetric upstream-secondary and asymmetric downstream-secondary (mclag down)*

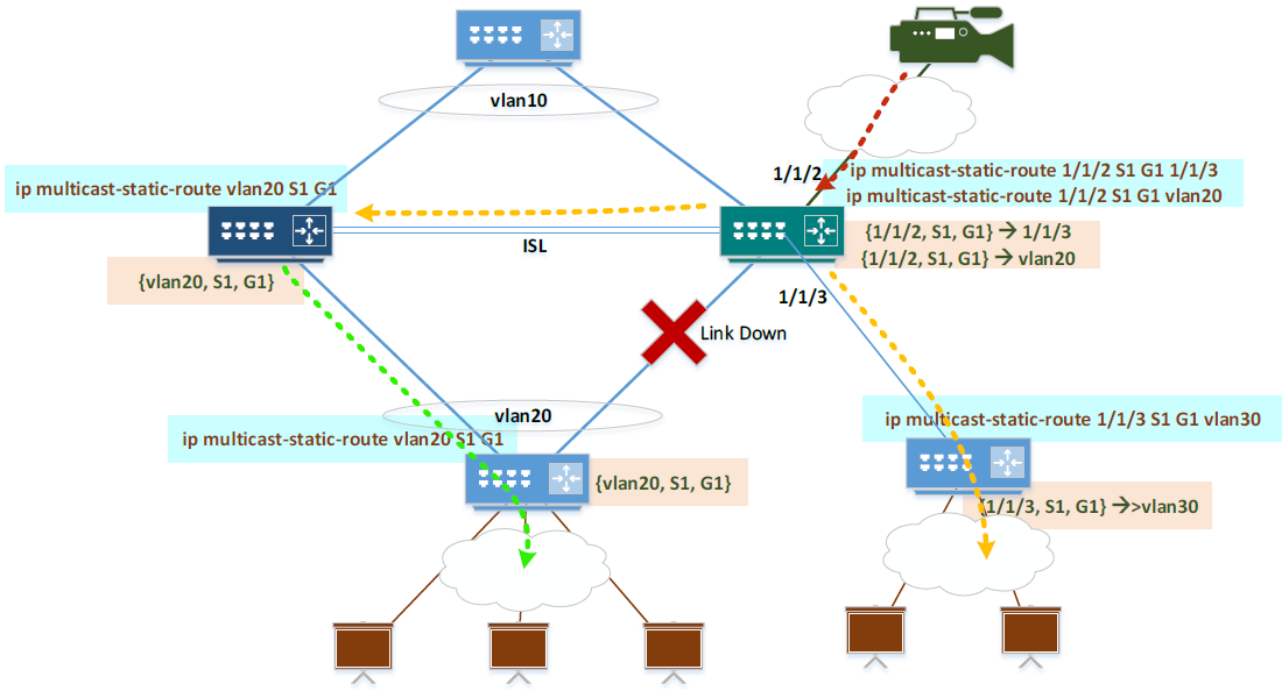


Figure 23 *Asymmetric upstream-both and asymmetric downstream-both (traffic flow)*

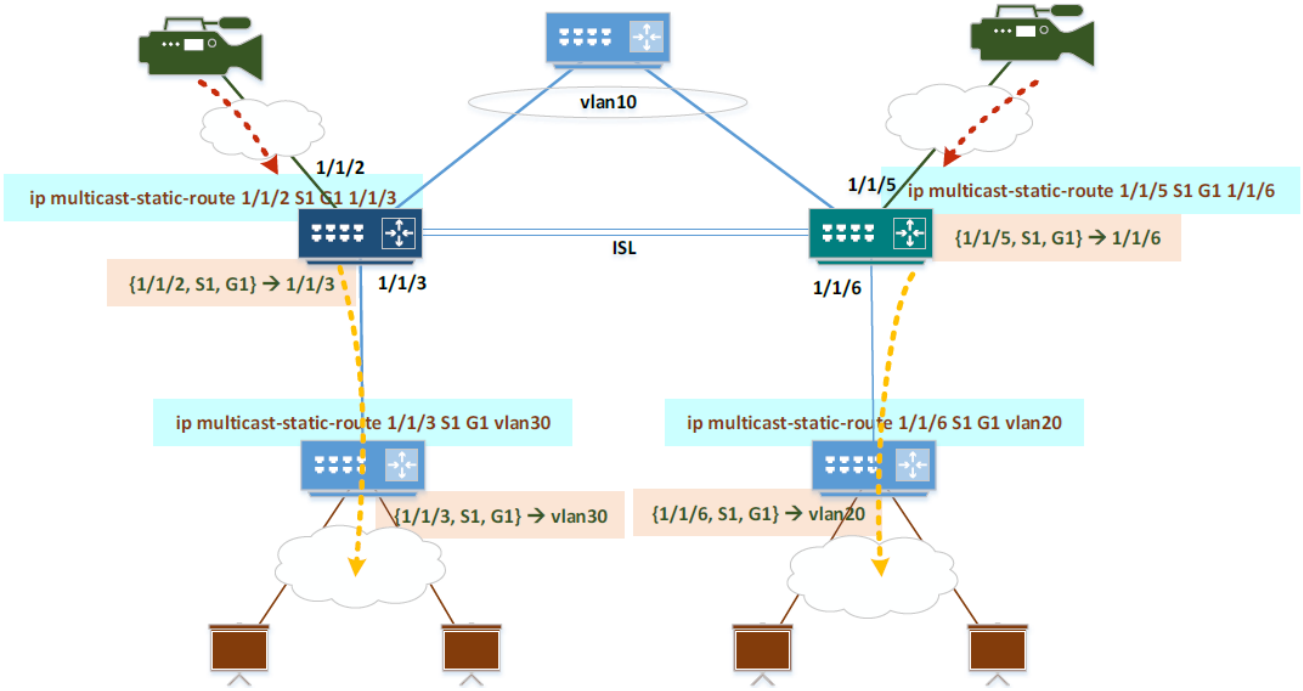


Figure 24 *Asymmetric upstream-both and symmetric downstream (duplicate traffic)*

This configuration is not to be used for IGMPv3 based deployments as it can cause duplicate traffic.

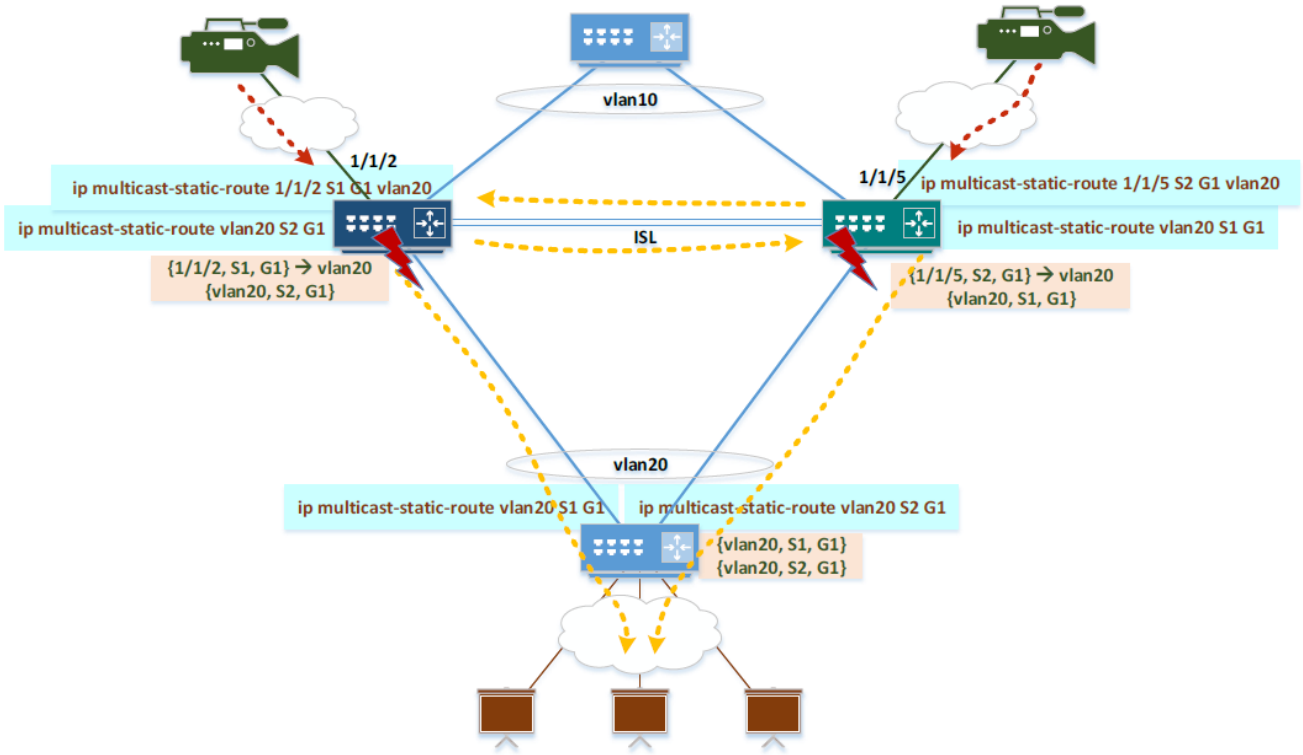


Figure 25 *Asymmetric upstream-both and symmetric downstream (different group)*

This configuration is not to be used for IGMPv3 based deployments as it can cause duplicate traffic.

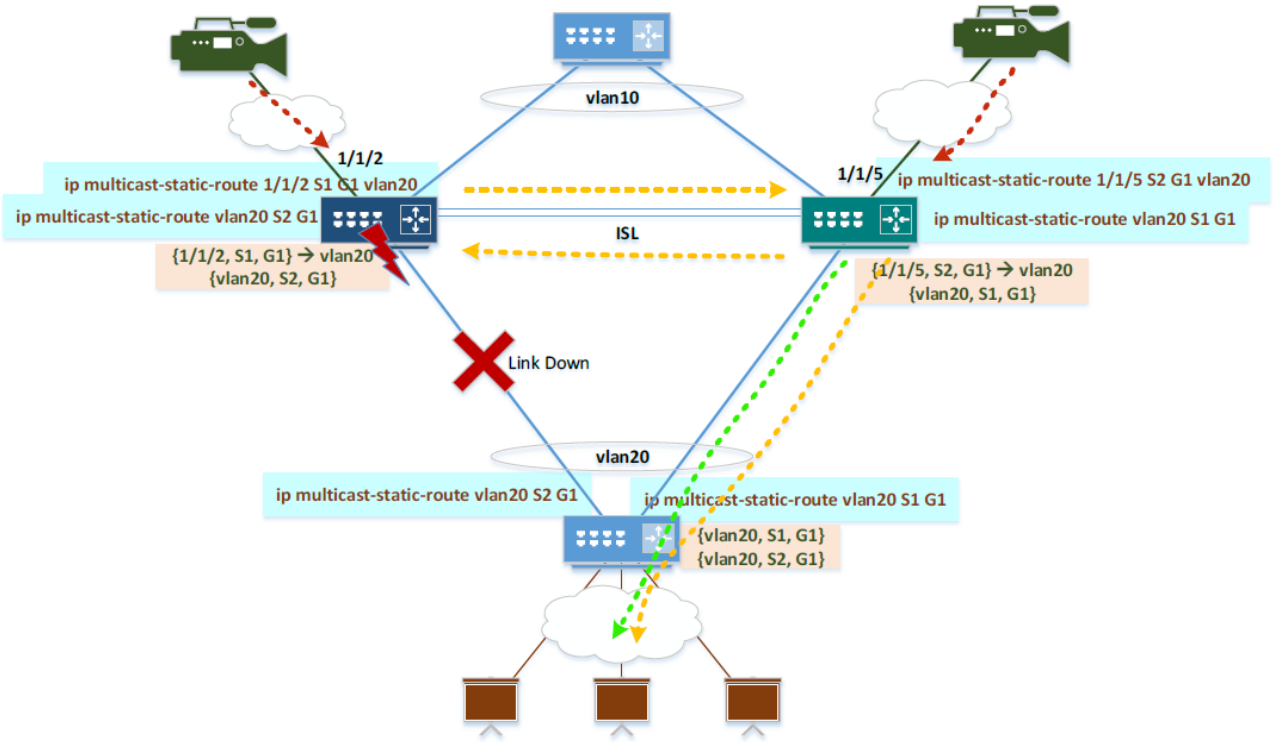


Figure 26 *Asymmetric upstream-both and symmetric downstream (same source, duplicate traffic)*

Static multicast route should not be used for this configuration as it can cause duplicate traffic.

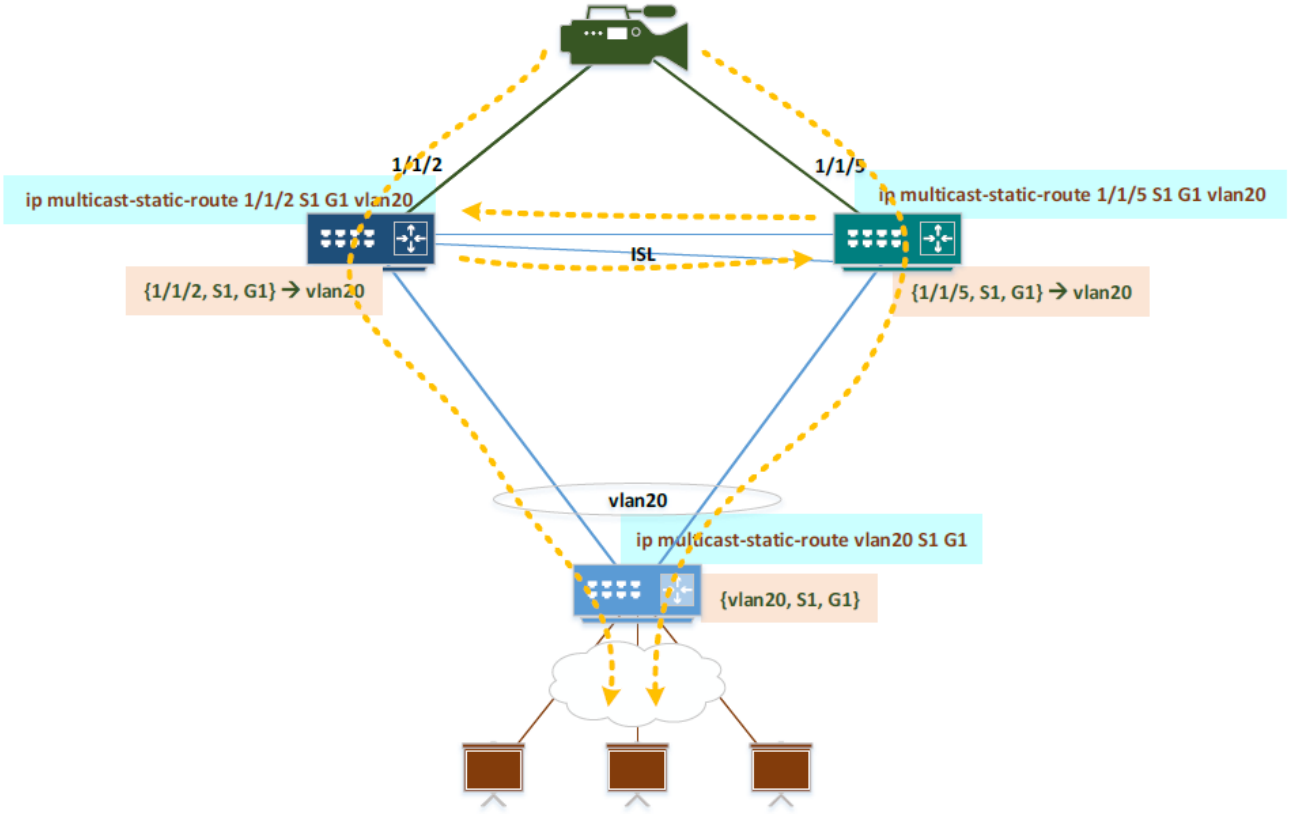
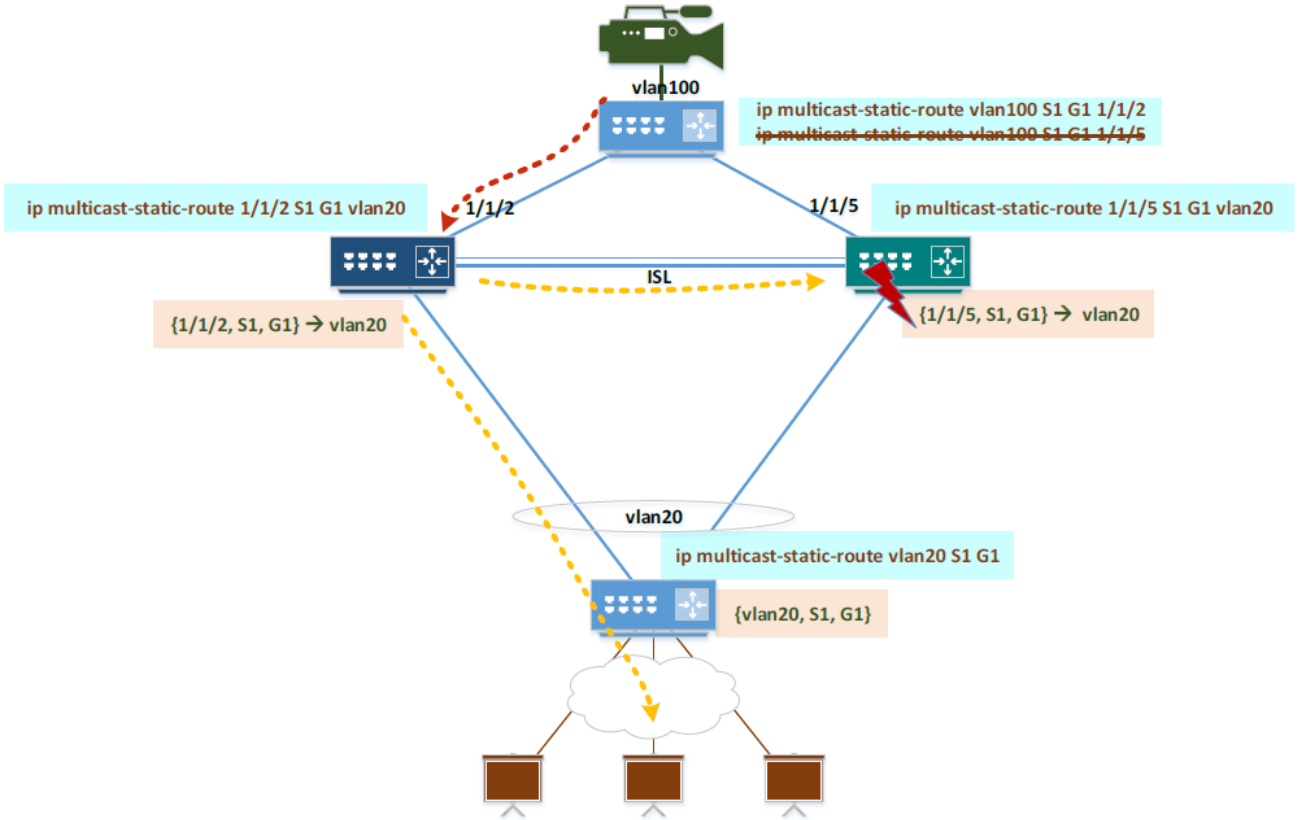


Figure 27 *Asymmetric upstream-both and symmetric downstream (same source)*

Static multicast route cannot be used for redundancy in core router as it can cause duplicates.



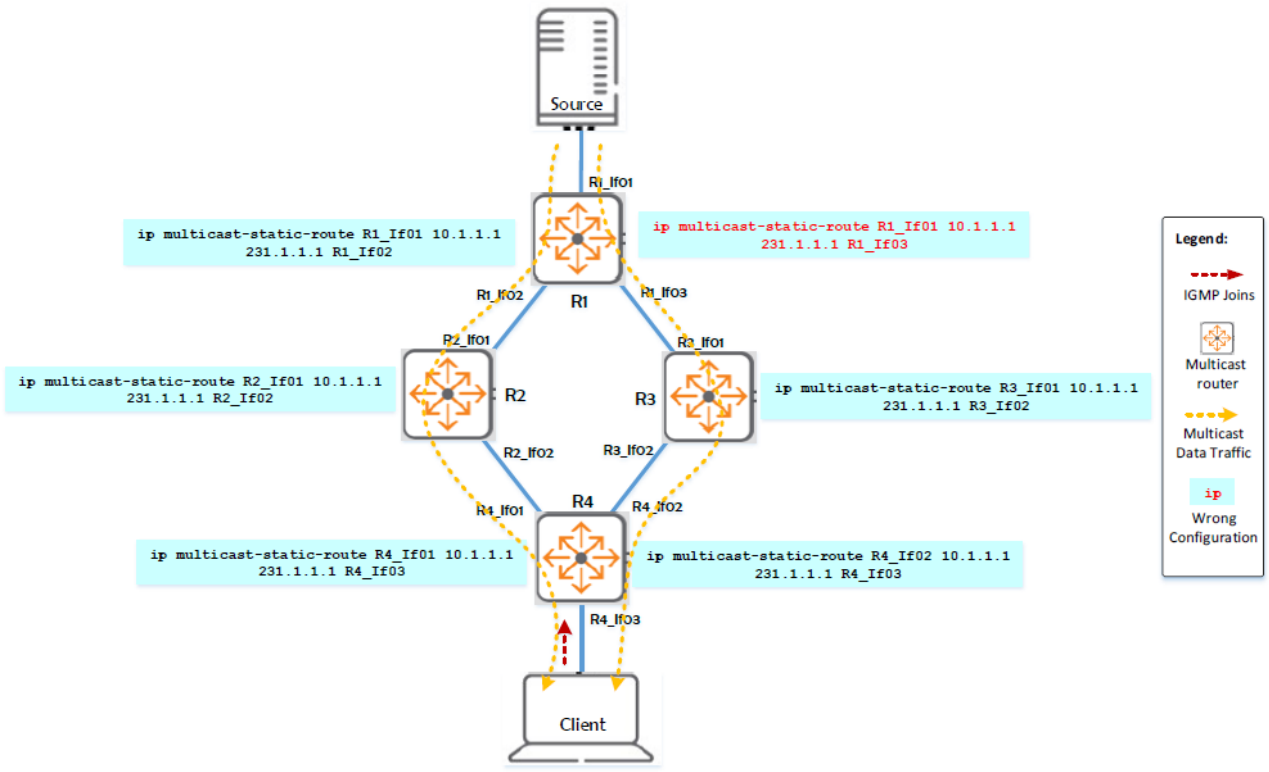
ECMP scenarios

Static multicast routes are not recommended for use in deployments where ECMP towards upstream/downstream is present, as they can cause duplicate traffic. It is not recommended to configure static multicast routes on the networks where PIM solves duplicate packets with solutions such as Designated Forwarder Election.

ECMP downstream

ECMP downstream occurs when the same multicast receivers are reachable from a router over multiple paths. When a static multicast route is configured with multiple downstream interfaces on this device to route traffic through these paths, duplicate packets are seen on the multicast receiver. Such networks with strict requirement of backup paths should not be considered for static multicast routes.

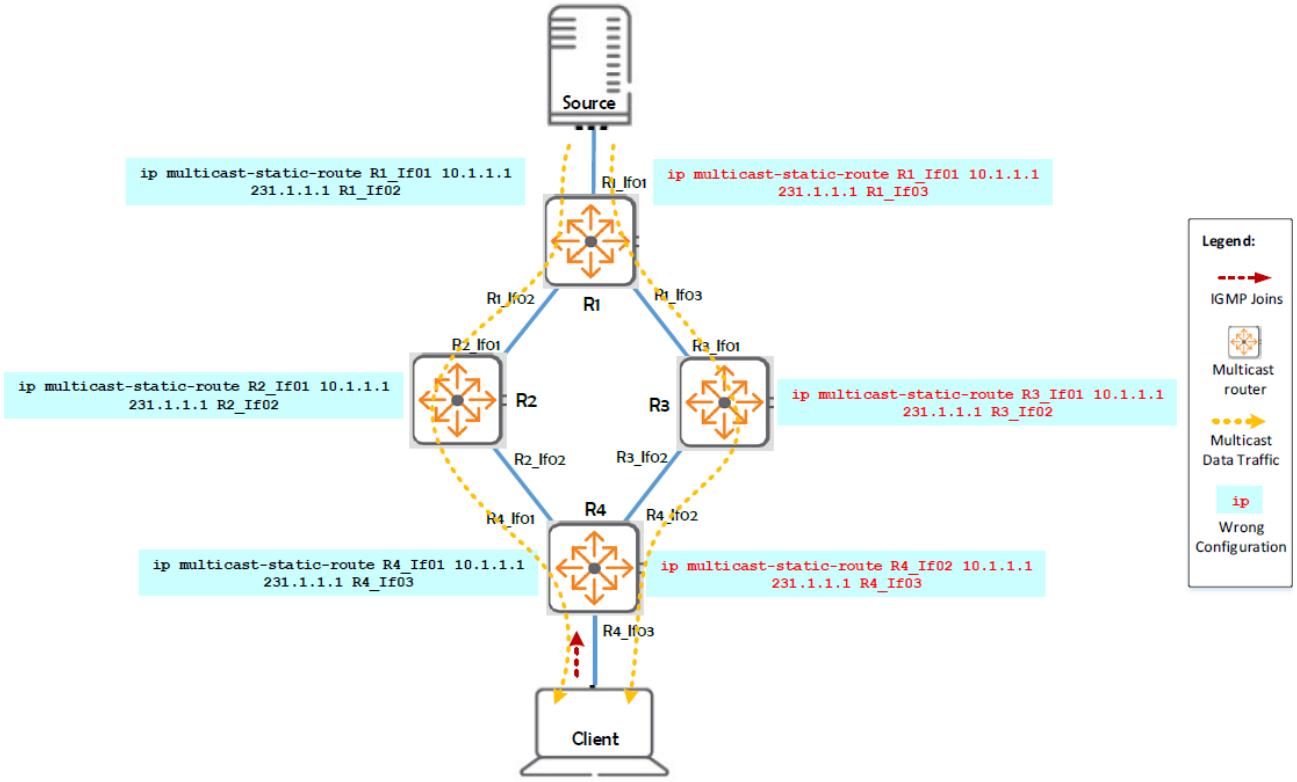
Figure 28 *ECMP downstream on R1 with static multicast routes*



ECMP upstream with static multicast routes

Consider a network with end-to-end static multicast routes configured to forward multicast traffic for a specific flow. If there are multiple equal cost paths to reach the multicast source on a router, configuring multicast routes with both these upstreams can cause traffic to be received from both paths, resulting in duplicate packets.

Figure 29 *ECMP upstream on R4 with static multicast routes*

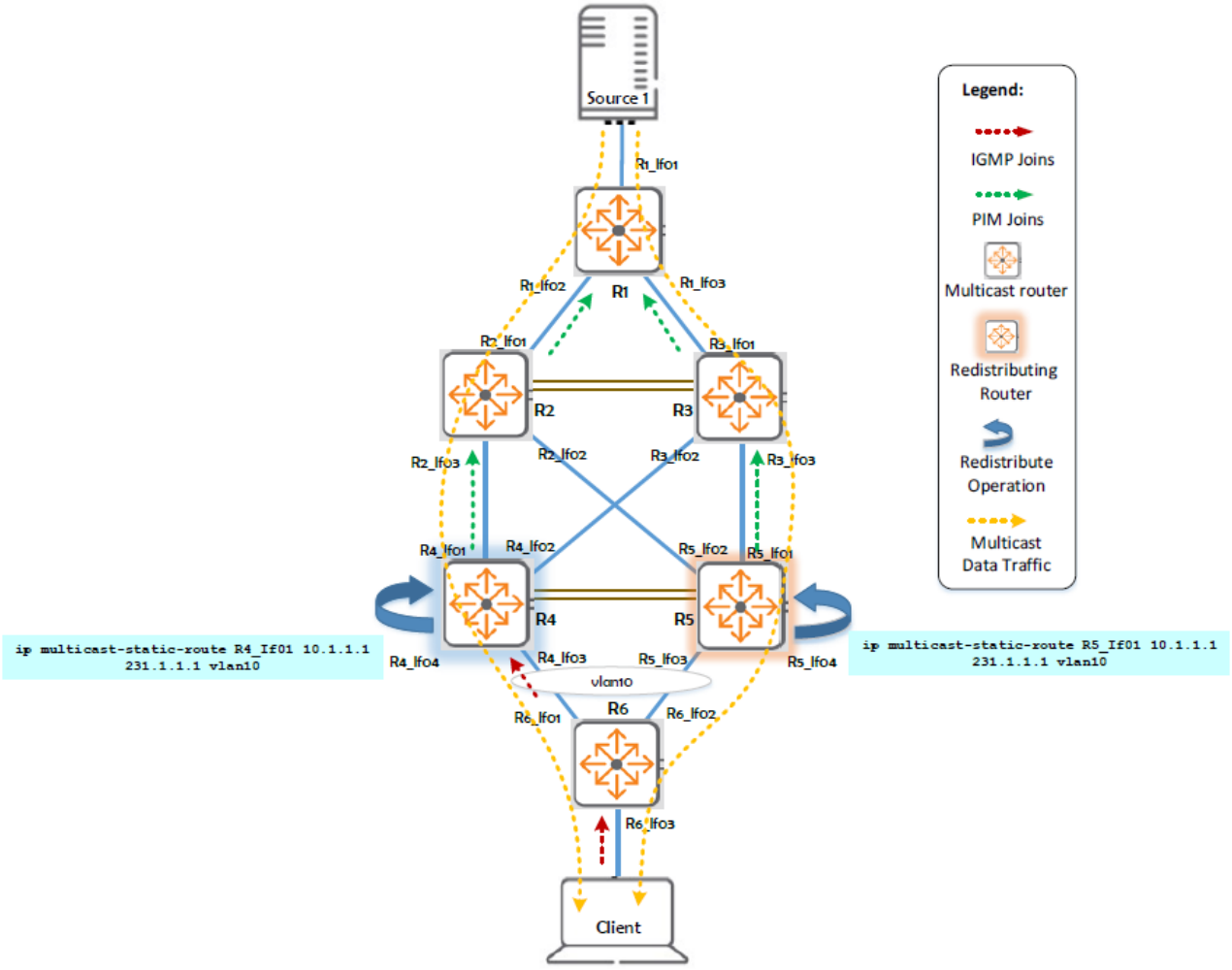


In Figure 29, ECMP upstream on R4 with static multicast routes R4 is the device for which there is ECMP upstream. The multicast static route configuration on routers R1, R3, and R4 are marked as invalid to showcase the duplicate traffic data path. Refer to ECMP downstream with summary route as backup for more information on achieving redundancy.

ECMP upstream with PIM

Duplicate traffic may be seen when static multicast route is redistributed into the upstream PIM domain. If multiple PIM routers in the ECMP path receive joins directly from the redistributing router on the downstream, duplicate traffic is received by the multicast receivers.

Figure 30 *ECMP upstream with redistribute static multicast routes*



ECMP downstream with summary route as backup

For a router with two ECMP paths to reach the multicast receiver(s) and if there is a unique source (and no multiple sources) sending traffic to a specific group address, configuring an {S, G} route and a {*, G} route for the same group proves redundancy in cases of local link failures. When such overlapping static multicast routes are configured on a device, traffic is forwarded using the {S, G} entry based on the longest prefix match on path1. If the interface configured as downstream for {S, G} goes down, {*, G} route is used for traffic forwarding through the alternate path. Since this configuration cannot provide redundancy in case of path failures and selects backup path only on local link failures, the application scenarios are very limited.

Figure 31 *ECMP downstream with summary route as backup*



Inter-operability

Multicast routing protocols like PIM and IGMP are responsible for construction of the multicast delivery tree on overlay networks. These traditional multicast routing protocols achieve this by exchanging mroutes in control packets along with configuring policies across all devices in the network. Static multicast routes interoperate with PIM, IGMP, and other vendors.

Inter-operability with PIM

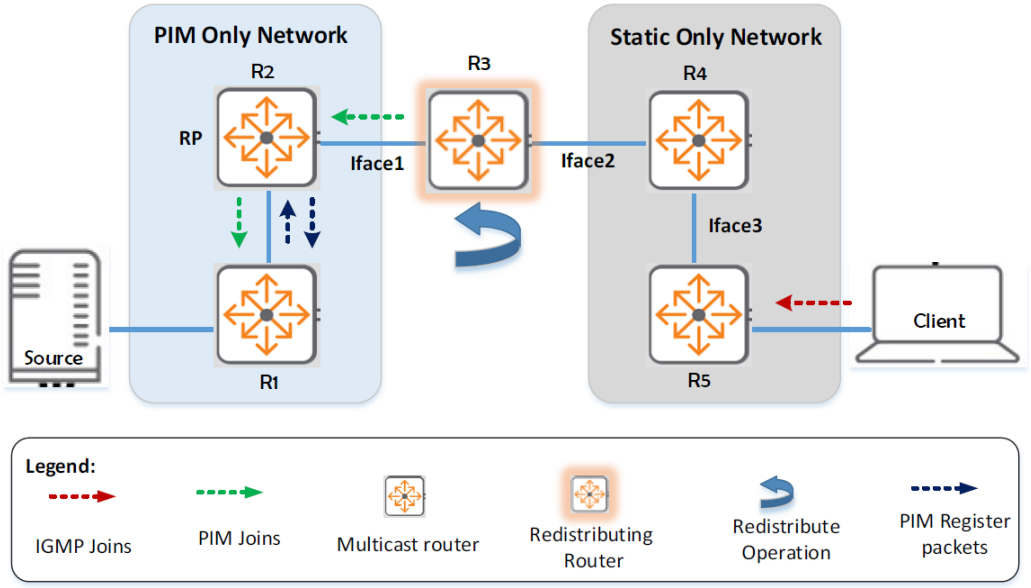
Arbitration with PIM

Arbitration with PIM is needed when a statically configured multicast route is also learnt by PIM. User configured multicast routes take precedence over the PIM learnt routes. If a static multicast route is configured for a flow and is active, PIM does not listen for any updates of this specific flow and does not process the PIM control packets or corresponding data packets corresponding on the incoming configured interface. If a summarized static mroute is configured, the multicast packets from any source or matching PIM control packets for the con figured group address do not be processed by PIM. If PIM has already learned an mroute and a matching static multicast route is configured, the multicast route learned by PIM is removed from the forwarding table and static multicast route is programmed.

Redistribution with PIM

Static multicast routes give the flexibility to the user to program a specific path for multicast traffic from the source to the client without having to rely on the underlying protocols to build a multicast route. They can be configured on all the routers in the path or on a specific section of routers. The remaining section of routers can be configured to run the native PIM protocol. In Figure 1, Redistributing Static Mroutes into PIM domain static multicast routes are configured on routers R4 and R5 whereas PIM protocol builds the multicast routes on routers R1 and R2. R3 acts as a gateway where the static multicast routes terminate and PIM initiates.

Figure 1 *Redistributing Static Mroutes into PIM domain*



In Figure 1, Redistributing Static Mroutes into PIM domain, on R3, a static mroute is programmed as follows:

Flow	Intercoming interface	Outgoing Interface
S,G	Iface 1	Iface 2

In Figure 1, Redistributing Static Mroutes into PIM domain, on R4, a static mroute is programmed as follows:

Flow	Intercoming interface	Outgoing Interface
S,G	Iface 2	Iface 3

In the example in Figure 1, Redistributing Static Mroutes into PIM domain, the PIM protocol is enabled on R3, but not on R4. The source registers to R2 (RP) through the native PIM path. As a result, R1 and R2 contain the multicast routes. On R3, where the static multicast rotues terminate, a redistribute command is configured to inform PIM about the static multicast route. This ensures that PIM creates an Upstream (S,G) state and sends an S, G join to R2 through Iface1. This join reaches R1, which forwards the source traffic to R2. R2 starts routing the (S, G) traffic to Iface1. This traffic is routed on R3, R4, and R5 based on the static multicast routes programmed to reach the clients.

PIM-SM RP Positioning

The rendezvous point (RP) should be located close to the multicast source. The following are recommendations for RP:

If static multicast routes are redistributed into PIM network, the PIM network should be closer to the Source, while Static multicast enabled network should be closer to the Client(s). In this case, RP should be part of the PIM enabled network.

RP should not be chosen as the redistributing router, as this can cause PIM control packet drops and eventually traffic loss.

Inter-operability with IGMP

Static multicast route does not require IGMP to be enabled on routers connected to receivers. Traffic is flooded on the downstream interface configured for the static multicast route. However, with IGMP and IGMP snooping enabled, traffic is sent only to the port on which join is received. Static multicast is inter-operable with both IGMPv2 and IGMPv3.

For an IGMP enabled device, on which IGMPv3 joins are learned (applicable for MLDv2 as well), configuring a summarized static route {any, G} causes the traffic not to be forwarded to the clients sending IGMPv3 joins. In such cases, static multicast routes must be configured with the specific source, such as {S,G}, for the traffic to flow. This also ensures that traffic from unwanted source for the same group is not forwarded to the clients sending IGMPv3 joins.

Inter-operability with other vendors

The AOS-CX multicast static route is a proprietary feature and does not inter-operate with other vendors. However, the router that is redistributing static multicast routes into PIM domain can be connected to another vendor device in the upstream that supports standards-based protocols such as PIM-SM (RFC 4601) or PIM-SSM (RFC 4601). Similarly the AOS-CX Router with static multicast can be connected to a competitor device supporting RFC 3376 and RFC 2236 to learn IGMP joins from the multicast clients.

Considerations and Best Practices

Static multicast routes must be configured with care to avoid causing traffic drop or duplicate packets. The following are considerations and best practices for multicast static routes:

- Static multicast route configuration on network with ECMP on downstream/upstream is not supported. Refer to Static multicast scenarios for more information.
- Static multicast routes should not be used in networks where duplicate traffic issues are resolved by PIM solves using Assert/Designated Forwarder.
- It is recommended to configure static multicast routers on all required routers before sending multicast traffic for configured flows. This is applicable for all modes. Momentary traffic drop or duplicate packets may occur if static multicast routes are configured on the fly on networks where multicast traffic is already flowing.
- Static multicast routes is not a substitute for PIM. It is recommended for configuration on smaller networks as it can cause administrative overhead. It must be configured only when there is a scope of summarization to resolve high resource usage, or in cases where it can solve PIM join/leave latency issues. Refer to Use cases for more information.
  - Refer to Static multicast scenarios for supported scenarios when both PIM and Static multicast routes are configured on the network.
- All downstream interfaces should be explicitly configured for a static multicast route where multicast traffic needs to be forwarded.
- When static multicast routes are configured to redistribute into PIM domain, the device elected as RP on a PIM network should not be configured as the redistributing router.
- With static multicast routes, traffic is not guaranteed to flow in the shortest path tree. Instead, it follows the path configured using the static multicast routes on each device in the network. Refer to Static multicast scenarios for more information.
- When static multicast routes are redistributed into PIM, a PIM Join corresponding to the configured static multicast route is sent on the RPF interface regardless of the configured upstream interface. PIM Joins are sent periodically based on the configured PIM join/prune interval.

- Static multicast routes are not automatically deleted with traffic inactivity and should be explicitly removed if they are no longer in use for optimal resource usage.
- Static multicast routes are not supported with VxLAN and GRE tunnels as upstream/downstream interfaces.
- It is recommended to keep number of static multicast routes on a device limited.
- Some deployments might already be using ACLs or policies to null multicast traffic for specific groups or sources. If a static multicast route is also configured to drop/allow traffic along with these policies, traffic is forwarded/routed only if both static multicast route and policy are configured to allow traffic. If at least one of these configurations is applied to drop the traffic, traffic is dropped.

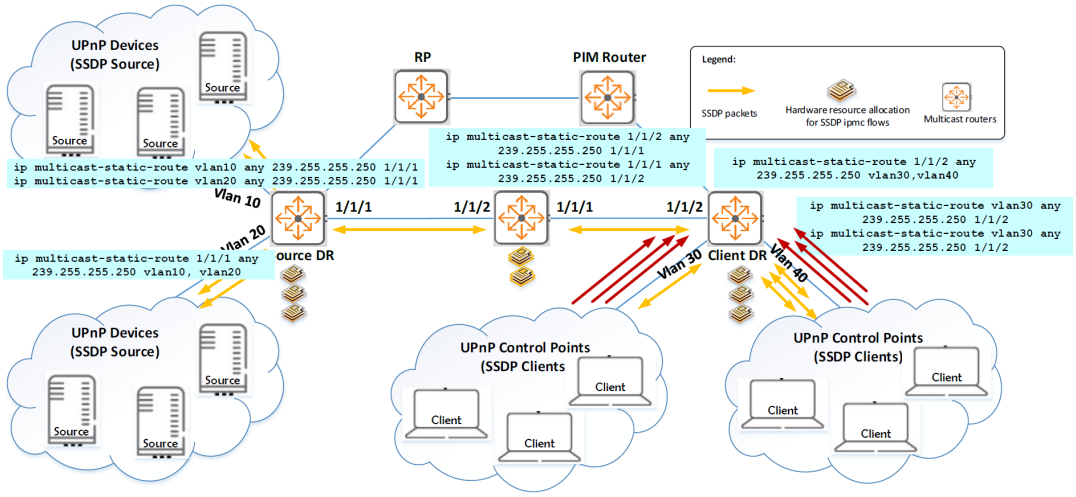
Use cases

The use cases provide examples of networks using multicast static routes.

Use case 1: SSDP enabled networks

The Simple Service Discovery Protocol (SSDP) is an application layer protocol and one of the key protocols that implement Universal Plug and Play (UPnP). SSDP enables network devices to discover and advertise network services by sending multicast discovery and advertisement messages to multicast IPv4 group address 239.255.255.250:1900 or multicast IPv6 group address FF0x::C[1]. With UPnP, each device generates a unique multicast flow (Source IP, SSDP Group IP). In a multicast network with a large number of end user devices, this can bloat up the multicast hardware and software resources as each device creates a unique (S, G) flow and the resources are limited. In networks, where there is a need to control, drop, or minimize SSDP traffic, summarized static multicast routes can be configured to save network resources and to avoid denial of services.

Figure 1 *Sample Static multicast route on an SSDP enabled network*



Use case 2: Fixed channel subscription scenarios

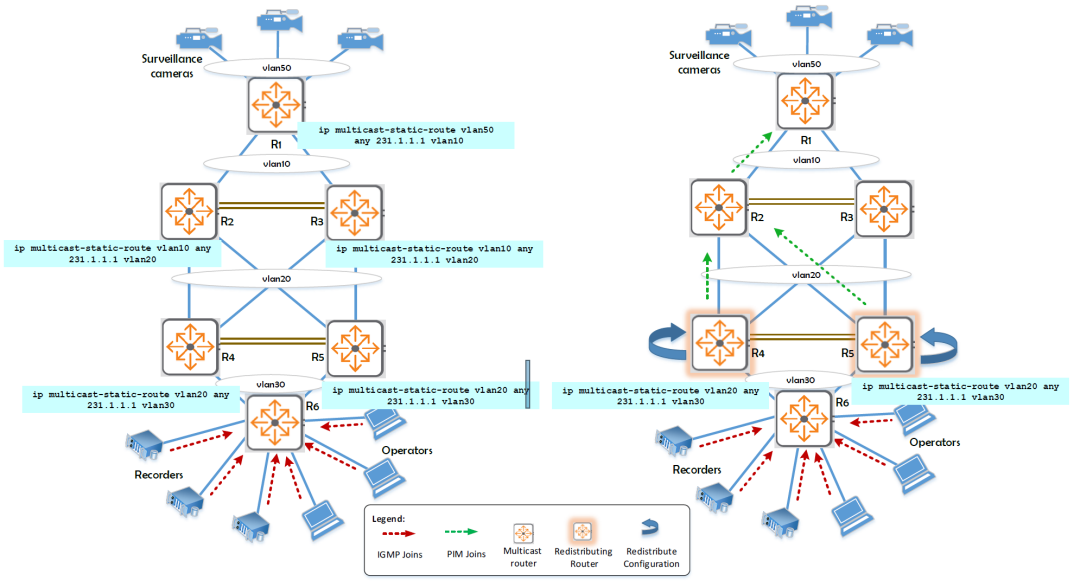
Static multicast routing can be used to avoid interruptions and delay due to mroute updates in cases where there is a fixed source and set of clients, such as video conferencing. Static mroute works for a fixed path through which the route is configured on all the devices or by redistributing static multicast routes into PIM domain. The static multicast route should be promptly removed by the user once the multicast traffic is no longer needed by the clients. In such cases, static multicast routes should be

configured for a smaller-scale network within a single multicast administrative domain for ease of management.

Use case 3: IP video surveillance

IP multicast video surveillance deployments are dictated by requirements such as fast convergence, fault tolerance, and scalability. If the path between the surveillance cameras (multicast source) and the recorders or storage systems (multicast receivers) is fixed, configuring static multicast route provides stability and improved convergence time. Since the topology for IP video surveillance networks seldom changes, end-to-end static multicast routes configuration for the required flows can prevent issues like surveillance blackout caused by higher convergence time or join/leave latency caused by PIM.

Figure 1 *Static multicast route end-to-end and redistribution for IP video surveillance*



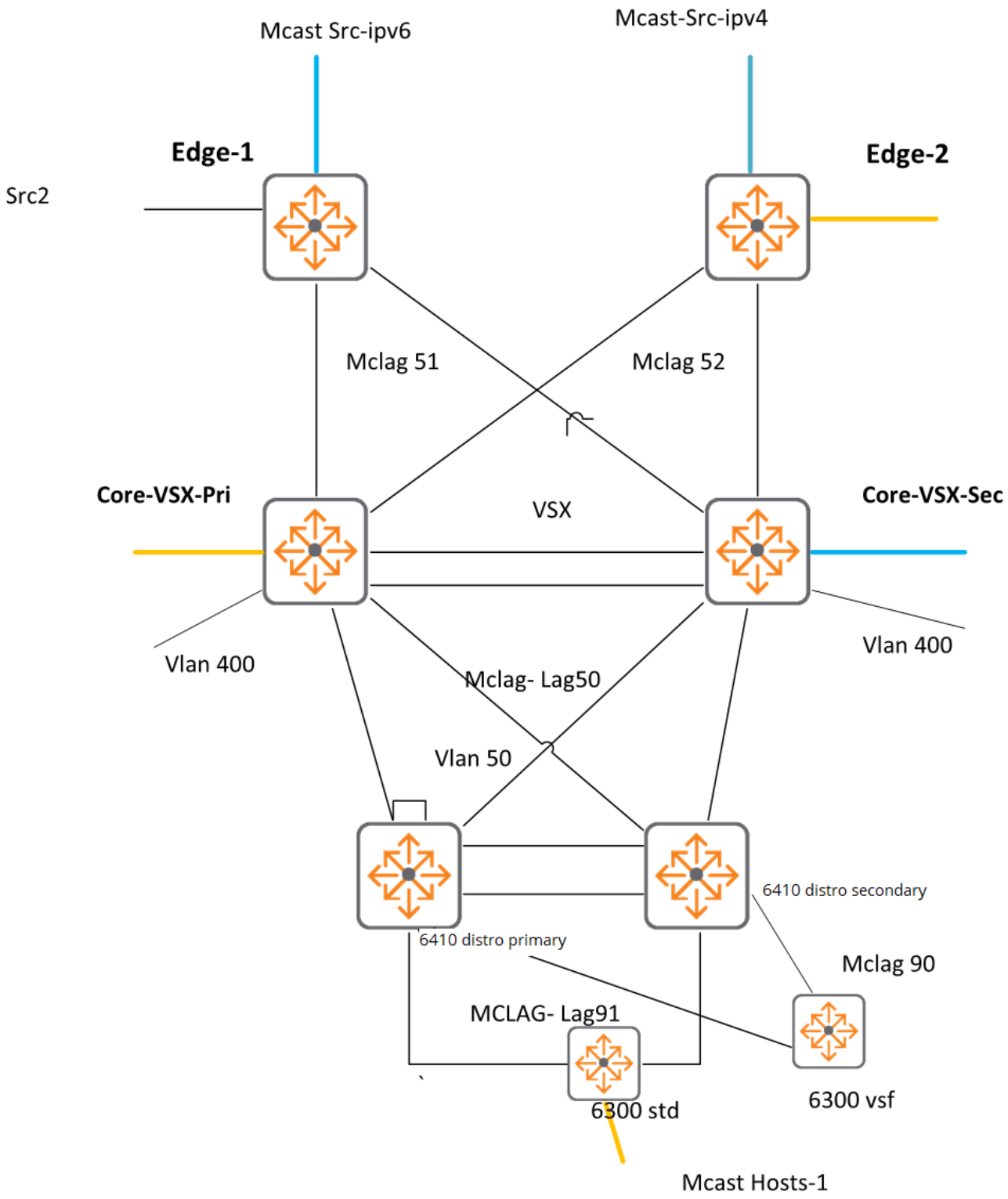
Use case 4: Precision time protocol

In the multicast transport mode, precision time protocol (PTP) uses dedicated multicast destination IP address 224.0.1.129 as per IEEE 1588 standards for communication between devices. The primary clock transmits the clock synchronization messages to the PTP clients as multicast packets. The number of PTP sources and clients can be large, which can cause a large number of hardware resources to be used up in the multicast routers which forward the PTP control packets. In networks where there is a need to optimize the hardware resource usage, summarized static multicast routes can be configured to save network resources and to avoid delay caused by control plane overheads.

Use case configuration

Configuration details for the devices are provided in this section.

Figure 1 *Collapsed core*



PIM and static ANY redistribute distroVSX

- 6410 distro-primary-static ANY configuration
- 6410 distro-secondary static ANY configuration
- Core-primary static configuration
- Core-secondary static configuration

- Edge-core 1 static configuration
- Edge-core 2 static configuration

6410 distro-primary-static ANY configuration

In this use case, PIM active active is enabled. Static multicast route [ANY] is configured for both IPv4 and IPv6, redistribute the static into PIM as CORE and EDGE-CORE are enabled with only PIM, and **no static multicast route** is configured on them. VLAN 3005 and VLAN 3006 are client connected VLANs.

```
vlan 50
vlan 3005
        vsx-sync
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 3006
        vsx-sync
        description uplink-6300-standalone-right
        ip igmp snooping enable
        ipv6 mld snooping enable
interface lag 50 multi-chassis
        description uplink-8400
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 90 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3005
        lacp mode active
interface lag 91 multi-chassis
        description uplink-6300-standalone-right
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3006
        lacp mode active

interface lag 255
        description ISL-1/5/48-To-1/5/48
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.1/24
        ipv6 address 50::/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3005
        description uplink-6300-vsf
        vsx active-forwarding
        ip address 31.1.1.2/24
        ipv6 address 31::2/64
        ip ospf 1 area 0.0.0.0
```

```
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3006
        description uplink-6300-standalone-right
        vsx active-forwarding
        ip address 30.1.1.2/24
        ipv6 address 30::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable

vsx
        inter-switch-link lag 255
        role primary
        keepalive peer 172.19.99.2 source 172.19.99.1 vrf VSX-KA

ip multicast-static-route vlan50 any 227.7.7.7 vlan3005
ipv6 multicast-static-route vlan50 any ff1e::7 vlan3005
ip multicast-static-route vlan50 any 227.7.7.7 vlan3006
ipv6 multicast-static-route vlan50 any ff1e::7 vlan3006

router ospf 1
        router-id 172.19.100.1
        passive-interface default
        area 0.0.0.0
router ospfv3 1
        router-id 23.23.23.3
        area 0.0.0.0
router pim
        enable
        redistribute static
        active-active
router pim6
        enable
        active-active
redistribute static

show outputs
==============

6410-RightAggPri#
6410-RightAggPri# show ip multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 1

Group Address           : 227.7.7.7
Source Address          : any
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
```

```
vlan3005        forwarding
vlan3006        forwarding

6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri# show ipv6 multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 1

Group Address           : ff1e::7
Source Address          : any
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

6410-RightAggPri#
```

6410 distro-secondary static ANY configuration

In this use case, PIM active active is enabled. Static multicast route [ANY] is configured for both IPv4 and IPv6, redistribute the static into PIM as CORE and EDGE-CORE are enabled with only PIM, and **no static multicast route** is configured on them. VLAN 3005 and VLAN 3006 are client connected VLANs.

```
vlan 50
vlan 3005
        name 6300-SA-Rig-Acc-Uplink
        vsx-sync
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 3006
        name 6300-VSF-Rig-Acc-Uplin
        vsx-sync
        description uplink-6300-standalone-right
        ip igmp snooping enable
        ipv6 mld snooping enable
interface lag 50 multi-chassis
        description uplink-8400
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 90 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3005,3007
        lacp mode active
interface lag 91 multi-chassis
        description uplink-6300-standalone-right
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1030,3006
        lacp mode active
```

```
interface lag 255
        description ISL-1/5/48-To-1/5/48
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.2/24
        ipv6 address 50::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable

interface vlan 3005
        description uplink-6300-vsf
        vsx active-forwarding
        ip address 31.1.1.3/24
        ipv6 address 31::3/24
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3006
        description uplink-6300-standalone-right
        vsx active-forwarding
        ip address 30.1.1.3/24
        ipv6 address 30::3/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable

vsx
        inter-switch-link lag 255
        role secondary
        keepalive peer 172.19.99.1 source 172.19.99.2 vrf VSX-KA

ip multicast-static-route vlan50 any 227.7.7.7 vlan3005
ipv6 multicast-static-route vlan50 any ff1e::7 vlan3005
ip multicast-static-route vlan50 any 227.7.7.7 vlan3006
ipv6 multicast-static-route vlan50 any ff1e::7 vlan3006

router ospf 1
        router-id 172.19.100.5
        passive-interface default
        bfd all-interfaces
        trap-enable
        area 0.0.0.0
router ospfv3 1
        router-id 23.23.23.7
        area 0.0.0.0
router pim
```

```
        enable
        redistribute static
        active-active
router pim6
        enable
        redistribute static
        active-active

6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec# show ip multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 3
Group Address           : 227.7.7.7
Source Address          : any
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : any
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : any
Route type              : Static
Incoming interface      : vlan3005
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec# show ipv6 multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 3
Group Address           : ff1e::7
Source Address          : any
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : any
Route type              : Static
Incoming interface      : vlan3006
Group Address           : ff1e::7
Source Address          : any
Route type              : Static
Incoming interface      : vlan3005

6410-RightAggSec#
```

Core-primary static configuration

```
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
```

```
        lacp mode active

interface lag 51 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active
interface lag 52 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.4/24
        ipv6 address 50::4/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.4/24
        ipv6 address 51::4/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.3/24
        ipv6 address 52::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable

router ospf 1
        router-id 6.6.6.1
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.1
        area 0.0.0.0

router pim
        enable
```

Core-secondary static configuration

```
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 51 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
```

```
        lacp mode active
interface lag 52 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.3/24
        ipv6 address 50::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.3/24
        ipv6 address 51::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.2/24
        ipv6 address 52::2/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
router ospf 1
        router-id 6.6.6.2
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.2
        area 0.0.0.0

router pim
        enable
```

Edge-core 1 static configuration

In this use case, PIM is enabled, RP and BSR candidate is configured on this DUT, **no static multicast route** is configured, multicast source is connected VLAN 3600, and downstream is LAG with VSX active forwarding configured.

```
vlan 1,51
vlan 3600,3800
interface mgmt
        no shutdown
        ip dhcp

interface lag 51
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active

interface 1/1/15
        description 8400-Core1-1/1/15-stubpri-1/1/15
```

```
        no shutdown
        mtu 9198
        lag 51
interface 1/1/16
        description 8400core2-1/1/16
        no shutdown
        mtu 9198
        lag 51
interface 1/1/17
        description ixia-15-5-12/7
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3600
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.1/24
        ipv6 address 50::1/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3600
        ip address 36.1.0.1/16
        ipv6 address 2036:136:1::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
!
!
router ospf 1
        router-id 6.6.6.4
        bfd all-interfaces
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.4
        area 0.0.0.0
router pim
        enable
        rp-candidate source-ip-interface vlan3600 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface vlan3600
router pim6
        enable
        rp-candidate source-ip-interface vlan3600 group-prefix ff00::/8
        bsr-candidate source-ip-interface vlan3600

8360-Edge-Core1#
```

Edge-core 2 static configuration

```
no ip icmp redirect
profile aggregation-leaf
ntp server 10.5.6.10 minpoll 4 maxpoll 4 iburst
ntp enable
cli-session
        timeout 0
!
!
!
!
```

```
radius-server host 10.5.9.10 key ciphertext
AQBapVWcNJavUClNBQenFaJwwRrR+nWcJUvsQlHUbuaiOvlDCAAAAMCnYwT2Ful+ tracking enable
radius-server host 10.5.1.11 key ciphertext
AQBapVWcNJavUClNBQenFaJwwRrR+nWcJUvsQlHUbuaiOvlDCAAAAMCnYwT2Ful+ tracking enable
!
!
aaa group server radius CPPM
        server 10.5.1.11
        server 10.5.9.10
!
!
aruba-central
        disable
        location-override device-internal2-d2.central.arubanetworks.com vrf mgmt
ssh server vrf mgmt
ssh key-exchange-algorithms curve25519-sha256 curve25519-sha256@libssh.org ecdh-
sha2-nistp256 ecdh-sha2-nistp384 ecdh-sha2-nistp521 diffie-hellman-group-exchange-
sha256 diffie-hellman-group16-sha512 diffie-hellman-group18-sha512 diffie-hellman-
group14-sha256 diffie-hellman-group14-sha1
vlan 1,51-52,80,90,100,110,648-695,3500-3509,3700,3708
interface mgmt
        no shutdown
        ip dhcp
no dhcp-relay l2vpn-clients
dhcp-relay option 82 replace
interface lag 52
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active
interface 1/1/1
        description 8360-core2-1/1/9
        no shutdown
        mtu 9198
interface 1/1/2
        description 8360-core1-1/1/9
        no shutdown
        mtu 9198
interface 1/1/3
        no shutdown
        no routing
        vlan access 1
interface 1/1/4
        no shutdown
        no routing
        vlan access 1
interface 1/1/5
        description 1/1/5-Cltr-9004-0/0
interface 1/1/6
        description 1/1/6-cltr-9004-0/1
interface 1/1/7
        no shutdown
        no routing
        vlan access 1
interface 1/1/8
        no shutdown
        no routing
        vlan access 1
interface 1/1/9
        no shutdown
        no routing
```

```
        vlan access 1
interface 1/1/10
        no shutdown
        no routing
        vlan access 1
interface 1/1/11
        no shutdown
        no routing
        vlan access 1
interface 1/1/12
        no shutdown
        no routing
        vlan access 1
interface 1/1/13
        no shutdown
        no routing
        vlan access 1
interface 1/1/14
        no shutdown
        no routing
        vlan access 1
interface 1/1/15
        description 8400core1-1/1/16
        no shutdown
        mtu 9198
        lag 52
interface 1/1/16
        description 8400-core2-1/1/15
        no shutdown
        mtu 9198
        lag 52
interface 1/1/17
        description ixia-15-5-12/6
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3500-3509,3700
interface 1/1/18
        no shutdown
        no routing
        vlan access 1
interface 1/1/19
        description 7220-Ctrl1-0/0/5
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
interface 1/1/20
        no shutdown
        no routing
        vlan access 1
interface 1/1/21
        description 7220-Ctrl2-0/0/5
interface 1/1/22
        description IXIA 5/13 - 192.168.15.2
        no shutdown
        no routing
        vlan access 1
interface 1/1/23
        description ISL-1/1/23
interface 1/1/24
        description KA
```

```
        ip address 44.4.4.2/24
interface 1/1/25
        no shutdown
        no routing
        vlan access 1
interface 1/1/26
        no shutdown
        no routing
        vlan access 1
interface loopback 0
        ip address 172.19.105.8/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 172.19.106.7/32
        ip ospf 1 area 0.0.0.0
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.1/24
        ipv6 address 52::1/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3500
        ip address 35.1.0.1/16
        ipv6 address 2035:135:1::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3501
        ip address 35.2.0.1/16
        ipv6 address 2035:135:2::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3502
        ip address 35.3.0.1/16
        ipv6 address 2035:135:3::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3503
        ip address 35.4.0.1/16
        ipv6 address 2035:135:4::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3504
        ip address 35.5.0.1/16
        ipv6 address 2035:135:5::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3505
        ip address 35.6.0.1/16
        ipv6 address 2035:135:6::5/64
        ip ospf 1 area 0.0.0.0
```

```
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3506
        ip address 35.7.0.1/16
        ipv6 address 2035:135:7::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3507
        ip address 35.8.0.1/16
        ipv6 address 2035:135:8::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3508
        ip address 35.9.0.1/16
        ipv6 address 2035:135:9::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3509
        ip address 35.10.0.1/16
        ipv6 address 2035:135:a::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable

!
router ospf 1
        router-id 6.6.6.3
        bfd all-interfaces
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.3
        area 0.0.0.0
router pim
        enable
        rp-candidate source-ip-interface vlan3500 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface vlan3500
router pim6
        enable
        rp-candidate source-ip-interface vlan3500 group-prefix ff00::/8
        bsr-candidate source-ip-interface vlan3500

https-server vrf mgmt
8360-Edge-Core2#
```

End-to-end static, no PIM

- 6410 distro-primary-static configuration
- 6410 distro-secondary-static configuration
- Core-primary static configuration
- Core-secondary static configuration
- Edge-core1 static configuration
- Edge-core2 static configuration

6410 distro-primary-static configuration

In this use case, PIM active active is enabled, static multicast route [S,G] is configured for both ipv4 and ipv6, and **no redistribute** is configured on Distro as Redistribute is configured on CORE. VLAN 3005 and VLAN 3006 are client connected VLANs.

```
vlan 50
vlan 3005
        vsx-sync
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 3006
        vsx-sync
        description uplink-6300-standalone-right
        ip igmp snooping enable
        ipv6 mld snooping enable
interface lag 50 multi-chassis
        description uplink-8400
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 90 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3005
        lacp mode active
interface lag 91 multi-chassis
        description uplink-6300-standalone-right
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3006
        lacp mode active

interface lag 255
        description ISL-1/5/48-To-1/5/48
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.1/24
        ipv6 address 50::/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 3005
        description uplink-6300-vsf
        vsx active-forwarding
        ip address 31.1.1.2/24
        ipv6 address 31::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
```

```
interface vlan 3006
        description uplink-6300-standalone-right
        vsx active-forwarding
        ip address 30.1.1.2/24
        ipv6 address 30::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable

vsx
        inter-switch-link lag 255
        role primary
        keepalive peer 172.19.99.2 source 172.19.99.1 vrf VSX-KA

ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3005

ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3006
router ospf 1
        router-id 172.19.100.1
        passive-interface default
        area 0.0.0.0
router ospfv3 1
```

```
        router-id 23.23.23.3
        area 0.0.0.0
```

6410 distro-secondary-static configuration

In this use case, PIM active active is enabled. Static multicast route [S,G] is configured for both ipv4 and ipv6,`no redistribute` is configured on Distro as redistribute is configured on CORE. VLAN 3005 and VLAN 3006 are client connected VLANs.

```
vlan 50
vlan 3005
        name 6300-SA-Rig-Acc-Uplink
        vsx-sync
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 3006
        name 6300-VSF-Rig-Acc-Uplin
        vsx-sync
        description uplink-6300-standalone-right
        ip igmp snooping enable
        ipv6 mld snooping enable
interface lag 50 multi-chassis
        description uplink-8400
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 90 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3005,3007
        lacp mode active
interface lag 91 multi-chassis
        description uplink-6300-standalone-right
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1030,3006
        lacp mode active
interface lag 255
        description ISL-1/5/48-To-1/5/48
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.2/24
        ipv6 address 50::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 3005
        description uplink-6300-vsf
        vsx active-forwarding
        ip address 31.1.1.3/24
        ipv6 address 31::3/24
```

```
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable

interface vlan 3006
        description uplink-6300-standalone-right
        vsx active-forwarding
        ip address 30.1.1.3/24
        ipv6 address 30::3/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable

vsx
        inter-switch-link lag 255
        role secondary
        keepalive peer 172.19.99.1 source 172.19.99.2 vrf VSX-KA
ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3005

ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3006
```

```
router ospf 1
        router-id 172.19.100.5
        passive-interface default
        bfd all-interfaces
        trap-enable
        area 0.0.0.0
router ospfv3 1
        router-id 23.23.23.7
        area 0.0.0.0
```

Core-primary static configuration

```
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active

interface lag 51 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active
interface lag 52 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active

interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.4/24
        ipv6 address 50::4/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.4/24
        ipv6 address 51::4/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.3/24
        ipv6 address 52::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

ip multicast-static-route vlan51 36.1.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.1.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.2.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.2.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.3.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.3.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.4.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.4.0.2 227.7.7.7 vlan400
```

```
ip multicast-static-route vlan51 36.5.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.5.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.6.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.6.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.7.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.7.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.8.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.8.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.9.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.9.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.10.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.10.0.2 227.7.7.7 vlan400
ipv6 multicast-static-route vlan52 2035:135:1::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:1::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:2::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:2::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:3::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:3::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:4::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:4::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:5::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:5::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:6::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:6::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:7::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:7::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:8::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:8::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:9::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:9::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:a::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:a::1 ff1e::7 vlan50

router ospf 1
        router-id 6.6.6.1
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.1
        area 0.0.0.0
```

Core-secondary static configuration

```
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 51 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active
interface lag 52 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active
interface vlan 50
```

```
        vsx active-forwarding
        ip address 50.1.1.3/24
        ipv6 address 50::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.3/24
        ipv6 address 51::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.2/24
        ipv6 address 52::2/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
ip multicast-static-route vlan51 36.1.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.1.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.2.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.2.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.3.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.3.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.4.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.4.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.5.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.5.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.6.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.6.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.7.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.7.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.8.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.8.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.9.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.9.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.10.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.10.0.2 227.7.7.7 vlan400
ipv6 multicast-static-route vlan52 2035:135:1::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:1::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:2::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:2::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:3::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:3::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:4::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:4::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:5::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:5::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:6::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:6::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:7::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:7::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:8::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:8::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:9::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:9::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:a::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:a::1 ff1e::7 vlan50
router ospf 1
```

```
        router-id 6.6.6.2
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.2
        area 0.0.0.0
```

Edge-core1 static configuration

In this use case, PIM is enabled, RP and BSR candidate is configured on this DUT, **no static multicast route** is configured, multicast source is connected to VLAN 3600, and downstream is LAG with VSX active forwarding configured.

```
vlan 1,51
vlan 3600,3800
interface mgmt
        no shutdown
        ip dhcp

interface lag 51
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active

interface 1/1/15
        description 8400-Core1-1/1/15-stubpri-1/1/15
        no shutdown
        mtu 9198
        lag 51
interface 1/1/16
        description 8400core2-1/1/16
        no shutdown
        mtu 9198
        lag 51
interface 1/1/17
        description ixia-15-5-12/7
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3600
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.1/24
        ipv6 address 50::1/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 3600
        ip address 36.1.0.1/16
        ipv6 address 2036:136:1::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

!
!
ip multicast-static-route vlan3600 any 227.7.7.7 vlan51
ip multicast-static-route vlan3601 any 227.7.7.7 vlan51
ip multicast-static-route vlan3602 any 227.7.7.7 vlan51
ip multicast-static-route vlan3603 any 227.7.7.7 vlan51
ip multicast-static-route vlan3604 any 227.7.7.7 vlan51
```

```
ip multicast-static-route vlan3605 any 227.7.7.7 vlan51
ip multicast-static-route vlan3606 any 227.7.7.7 vlan51
ip multicast-static-route vlan3607 any 227.7.7.7 vlan51
ip multicast-static-route vlan3608 any 227.7.7.7 vlan51
ip multicast-static-route vlan3609 any 227.7.7.7 vlan51
ip multicast-static-route vlan3610 any 227.7.7.7 vlan51
!

router ospf 1
        router-id 6.6.6.4
        bfd all-interfaces
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.4
        area 0.0.0.0
```

Edge-core2 static configuration

```
vlan 1,51-52,80,90,100,110,648-695,3500-3509,3700,3708
interface mgmt
        no shutdown
        ip dhcp
no dhcp-relay l2vpn-clients
dhcp-relay option 82 replace
interface lag 52
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active
interface 1/1/1
        description 8360-core2-1/1/9
        no shutdown
        mtu 9198
interface 1/1/2
        description 8360-core1-1/1/9
        no shutdown
        mtu 9198
interface 1/1/3
        no shutdown
        no routing
        vlan access 1
interface 1/1/4
        no shutdown
        no routing
        vlan access 1
interface 1/1/5
        description 1/1/5-Cltr-9004-0/0
interface 1/1/6
        description 1/1/6-cltr-9004-0/1
interface 1/1/7
        no shutdown
        no routing
        vlan access 1
interface 1/1/8
        no shutdown
        no routing
        vlan access 1
interface 1/1/9
        no shutdown
        no routing
```

```
        vlan access 1
interface 1/1/10
        no shutdown
        no routing
        vlan access 1
interface 1/1/11
        no shutdown
        no routing
        vlan access 1
interface 1/1/12
        no shutdown
        no routing
        vlan access 1
interface 1/1/13
        no shutdown
        no routing
        vlan access 1
interface 1/1/14
        no shutdown
        no routing
        vlan access 1
interface 1/1/15
        description 8400core1-1/1/16
        no shutdown
        mtu 9198
        lag 52
interface 1/1/16
        description 8400-core2-1/1/15
        no shutdown
        mtu 9198
        lag 52
interface 1/1/17
        description ixia-15-5-12/6
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3500-3509,3700
interface 1/1/18
        no shutdown
        no routing
        vlan access 1
interface 1/1/19
        description 7220-Ctrl1-0/0/5
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
interface 1/1/20
        no shutdown
        no routing
        vlan access 1
interface 1/1/21
        description 7220-Ctrl2-0/0/5
interface 1/1/22
        description IXIA 5/13 - 192.168.15.2
        no shutdown
        no routing
        vlan access 1
interface 1/1/23
        description ISL-1/1/23
interface 1/1/24
        description KA
```

```
        ip address 44.4.4.2/24
interface 1/1/25
        no shutdown
        no routing
        vlan access 1
interface 1/1/26
        no shutdown
        no routing
        vlan access 1
interface loopback 0
        ip address 172.19.105.8/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 172.19.106.7/32
        ip ospf 1 area 0.0.0.0
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.1/24
        ipv6 address 52::1/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 3500
        ip address 35.1.0.1/16
        ipv6 address 2035:135:1::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 3501
        ip address 35.2.0.1/16
        ipv6 address 2035:135:2::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 3502
        ip address 35.3.0.1/16
        ipv6 address 2035:135:3::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 3503
        ip address 35.4.0.1/16
        ipv6 address 2035:135:4::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 3504
        ip address 35.5.0.1/16
        ipv6 address 2035:135:5::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 3505
        ip address 35.6.0.1/16
        ipv6 address 2035:135:6::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3506
        ip address 35.7.0.1/16
        ipv6 address 2035:135:7::5/64
```

```
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 3507
        ip address 35.8.0.1/16
        ipv6 address 2035:135:8::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 3508
        ip address 35.9.0.1/16
        ipv6 address 2035:135:9::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

interface vlan 3509
        ip address 35.10.0.1/16
        ipv6 address 2035:135:a::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0

ipv6 multicast-static-route vlan3500 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3501 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3502 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3503 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3504 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3505 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3506 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3507 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3508 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3509 any ff1e::7 vlan52
8360-Edge-Core2#

!
router ospf 1
        router-id 6.6.6.3
        bfd all-interfaces
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.3
        area 0.0.0.0

https-server vrf mgmt
8360-Edge-Core2#
```

Hybrid mode with PIM

- 6410 distro-primary-static configuration
- 6410 distro-secondary static configuration
- Core-primary static configuration
- Core-secondary static configuration
- Edge-core 1 static configuration
- Edge-core 2 static configuration

6410 distro-primary-static configuration

In this use case, PIM active active is enabled, static multicast route [S,G] is configured for both ipv4 and ipv6, and **no redistribute** is configured on Distro as Redistribute is configured on CORE. VLAN 3005 and VLAN 3006 are client connected VLANs.

```
vlan 50
vlan 3005
        vsx-sync
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 3006
        vsx-sync
        description uplink-6300-standalone-right
        ip igmp snooping enable
        ipv6 mld snooping enable
interface lag 50 multi-chassis
        description uplink-8400
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 90 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3005
        lacp mode active
interface lag 91 multi-chassis
        description uplink-6300-standalone-right
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3006
        lacp mode active

interface lag 255
        description ISL-1/5/48-To-1/5/48
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.1/24
        ipv6 address 50::/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3005
        description uplink-6300-vsf
        vsx active-forwarding
        ip address 31.1.1.2/24
        ipv6 address 31::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3006
        description uplink-6300-standalone-right
        vsx active-forwarding
```

```
        ip address 30.1.1.2/24
        ipv6 address 30::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable

vsx
        inter-switch-link lag 255
        role primary
        keepalive peer 172.19.99.2 source 172.19.99.1 vrf VSX-KA

ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3005

ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3006
router ospf 1
        router-id 172.19.100.1
        passive-interface default
        area 0.0.0.0
router ospfv3 1
        router-id 23.23.23.3
```

```
        area 0.0.0.0
router pim
        enable
        active-active
router pim6
        enable
        active-active
```

6410 distro-secondary static configuration

In this use case, PIM active active is enabled, static multicast route [S,G] is configured for both ipv4 and ipv6, and **no redistribute** is configured on Distro as Redistribute is configured on CORE. VLAN 3005 and VLAN 3006 are client connected VLANs.

```
vlan 50
vlan 3005
        name 6300-SA-Rig-Acc-Uplink
        vsx-sync
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 3006
        name 6300-VSF-Rig-Acc-Uplin
        vsx-sync
        description uplink-6300-standalone-right
        ip igmp snooping enable
        ipv6 mld snooping enable
interface lag 50 multi-chassis
        description uplink-8400
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 90 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3005,3007
        lacp mode active
interface lag 91 multi-chassis
        description uplink-6300-standalone-right
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1030,3006
        lacp mode active
interface lag 255
        description ISL-1/5/48-To-1/5/48
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.2/24
        ipv6 address 50::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
```

```
        ipv6 pim6-sparse enable

interface vlan 3005
        description uplink-6300-vsf
        vsx active-forwarding
        ip address 31.1.1.3/24
        ipv6 address 31::3/24
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3006
        description uplink-6300-standalone-right
        vsx active-forwarding
        ip address 30.1.1.3/24
        ipv6 address 30::3/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable

vsx
        inter-switch-link lag 255
        role secondary
        keepalive peer 172.19.99.1 source 172.19.99.2 vrf VSX-KA
ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3005

ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3006
```

```
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3006
router ospf 1
        router-id 172.19.100.5
        passive-interface default
        bfd all-interfaces
        trap-enable
        area 0.0.0.0
router ospfv3 1
        router-id 23.23.23.7
        area 0.0.0.0
router pim
        enable
        active-active
router pim6
        enable
        active-active
```

Core-primary static configuration

```
Edg
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active

interface lag 51 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active
interface lag 52 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active

interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.4/24
        ipv6 address 50::4/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.4/24
        ipv6 address 51::4/64
```

```
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.3/24
        ipv6 address 52::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable

ip multicast-static-route vlan51 36.1.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.1.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.2.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.2.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.3.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.3.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.4.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.4.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.5.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.5.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.6.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.6.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.7.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.7.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.8.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.8.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.9.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.9.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.10.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.10.0.2 227.7.7.7 vlan400
ipv6 multicast-static-route vlan52 2035:135:1::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:1::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:2::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:2::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:3::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:3::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:4::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:4::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:5::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:5::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:6::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:6::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:7::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:7::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:8::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:8::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:9::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:9::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:a::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:a::1 ff1e::7 vlan50

router ospf 1
        router-id 6.6.6.1
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.1
        area 0.0.0.0

router pim
        enable
```

```
router pim6
        enable
```

Core-secondary static configuration

```
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 51 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active
interface lag 52 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.3/24
        ipv6 address 50::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.3/24
        ipv6 address 51::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.2/24
        ipv6 address 52::2/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
ip multicast-static-route vlan51 36.1.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.1.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.2.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.2.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.3.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.3.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.4.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.4.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.5.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.5.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.6.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.6.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.7.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.7.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.8.0.2 227.7.7.7 vlan50
```

```
ip multicast-static-route vlan51 36.8.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.9.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.9.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.10.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.10.0.2 227.7.7.7 vlan400
ipv6 multicast-static-route vlan52 2035:135:1::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:1::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:2::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:2::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:3::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:3::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:4::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:4::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:5::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:5::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:6::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:6::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:7::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:7::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:8::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:8::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:9::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:9::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:a::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:a::1 ff1e::7 vlan50
router ospf 1
        router-id 6.6.6.2
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.2
        area 0.0.0.0
```

Edge-core 1 static configuration

In this use case, PIM is enabled, RP and BSR candidate is configured on this DUT, **no static multicast route** is configured, Multicast source is connected to VLAN 3600, and sownstream is LAG with VSX active forwarding configured.

```
vlan 1,51
vlan 3600,3800
interface mgmt
        no shutdown
        ip dhcp

interface lag 51
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active

interface 1/1/15
        description 8400-Core1-1/1/15-stubpri-1/1/15
        no shutdown
        mtu 9198
        lag 51
interface 1/1/16
        description 8400core2-1/1/16
        no shutdown
        mtu 9198
        lag 51
```

```
interface 1/1/17
        description ixia-15-5-12/7
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3600
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.1/24
        ipv6 address 50::1/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3600
        ip address 36.1.0.1/16
        ipv6 address 2036:136:1::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
!
!
ip multicast-static-route vlan3600 any 227.7.7.7 vlan51
ip multicast-static-route vlan3601 any 227.7.7.7 vlan51
ip multicast-static-route vlan3602 any 227.7.7.7 vlan51
ip multicast-static-route vlan3603 any 227.7.7.7 vlan51
ip multicast-static-route vlan3604 any 227.7.7.7 vlan51
ip multicast-static-route vlan3605 any 227.7.7.7 vlan51
ip multicast-static-route vlan3606 any 227.7.7.7 vlan51
ip multicast-static-route vlan3607 any 227.7.7.7 vlan51
ip multicast-static-route vlan3608 any 227.7.7.7 vlan51
ip multicast-static-route vlan3609 any 227.7.7.7 vlan51
ip multicast-static-route vlan3610 any 227.7.7.7 vlan51
!

router ospf 1
        router-id 6.6.6.4
        bfd all-interfaces
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.4
        area 0.0.0.0
router pim
        enable
        rp-candidate source-ip-interface vlan3600 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface vlan3600
router pim6
        enable
        rp-candidate source-ip-interface vlan3600 group-prefix ff00::/8
        bsr-candidate source-ip-interface vlan3600

8360-Edge-Core1#
```

Edge-core 2 static configuration

```
no ip icmp redirect
profile aggregation-leaf
ntp server 10.5.6.10 minpoll 4 maxpoll 4 iburst
ntp enable
cli-session
```

```
        timeout 0
!
!
!
!
radius-server host 10.5.9.10 key ciphertext
AQBapVWcNJavUClNBQenFaJwwRrR+nWcJUvsQlHUbuaiOvlDCAAAAMCnYwT2Ful+ tracking enable
radius-server host 10.5.1.11 key ciphertext
AQBapVWcNJavUClNBQenFaJwwRrR+nWcJUvsQlHUbuaiOvlDCAAAAMCnYwT2Ful+ tracking enable
!
!
aaa group server radius CPPM
        server 10.5.1.11
        server 10.5.9.10
!
!
aruba-central
        disable
        location-override device-internal2-d2.central.arubanetworks.com vrf mgmt
ssh server vrf mgmt
ssh key-exchange-algorithms curve25519-sha256 curve25519-sha256@libssh.org ecdh-
sha2-nistp256 ecdh-sha2-nistp384 ecdh-sha2-nistp521 diffie-hellman-group-exchange-
sha256 diffie-hellman-group16-sha512 diffie-hellman-group18-sha512 diffie-hellman-
group14-sha256 diffie-hellman-group14-sha1
vlan 1,51-52,80,90,100,110,648-695,3500-3509,3700,3708
interface mgmt
        no shutdown
        ip dhcp
no dhcp-relay l2vpn-clients
dhcp-relay option 82 replace
interface lag 52
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active
interface 1/1/1
        description 8360-core2-1/1/9
        no shutdown
        mtu 9198
interface 1/1/2
        description 8360-core1-1/1/9
        no shutdown
        mtu 9198
interface 1/1/3
        no shutdown
        no routing
        vlan access 1
interface 1/1/4
        no shutdown
        no routing
        vlan access 1
interface 1/1/5
        description 1/1/5-Cltr-9004-0/0
interface 1/1/6
        description 1/1/6-cltr-9004-0/1
interface 1/1/7
        no shutdown
        no routing
        vlan access 1
interface 1/1/8
        no shutdown
```

```
        no routing
        vlan access 1
interface 1/1/9
        no shutdown
        no routing
        vlan access 1
interface 1/1/10
        no shutdown
        no routing
        vlan access 1
interface 1/1/11
        no shutdown
        no routing
        vlan access 1
interface 1/1/12
        no shutdown
        no routing
        vlan access 1
interface 1/1/13
        no shutdown
        no routing
        vlan access 1
interface 1/1/14
        no shutdown
        no routing
        vlan access 1
interface 1/1/15
        description 8400core1-1/1/16
        no shutdown
        mtu 9198
        lag 52
interface 1/1/16
        description 8400-core2-1/1/15
        no shutdown
        mtu 9198
        lag 52
interface 1/1/17
        description ixia-15-5-12/6
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3500-3509,3700
interface 1/1/18
        no shutdown
        no routing
        vlan access 1
interface 1/1/19
        description 7220-Ctrl1-0/0/5
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
interface 1/1/20
        no shutdown
        no routing
        vlan access 1
interface 1/1/21
        description 7220-Ctrl2-0/0/5
interface 1/1/22
        description IXIA 5/13 - 192.168.15.2
        no shutdown
        no routing
```

```
        vlan access 1
interface 1/1/23
        description ISL-1/1/23
interface 1/1/24
        description KA
        ip address 44.4.4.2/24
interface 1/1/25
        no shutdown
        no routing
        vlan access 1
interface 1/1/26
        no shutdown
        no routing
        vlan access 1
interface loopback 0
        ip address 172.19.105.8/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 172.19.106.7/32
        ip ospf 1 area 0.0.0.0
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.1/24
        ipv6 address 52::1/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3500
        ip address 35.1.0.1/16
        ipv6 address 2035:135:1::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3501
        ip address 35.2.0.1/16
        ipv6 address 2035:135:2::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3502
        ip address 35.3.0.1/16
        ipv6 address 2035:135:3::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3503
        ip address 35.4.0.1/16
        ipv6 address 2035:135:4::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3504
        ip address 35.5.0.1/16
        ipv6 address 2035:135:5::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
```

```
        ipv6 pim6-sparse enable
interface vlan 3505
        ip address 35.6.0.1/16
        ipv6 address 2035:135:6::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3506
        ip address 35.7.0.1/16
        ipv6 address 2035:135:7::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3507
        ip address 35.8.0.1/16
        ipv6 address 2035:135:8::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3508
        ip address 35.9.0.1/16
        ipv6 address 2035:135:9::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3509
        ip address 35.10.0.1/16
        ipv6 address 2035:135:a::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable

ipv6 pim6-sparse enable
ipv6 multicast-static-route vlan3500 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3501 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3502 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3503 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3504 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3505 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3506 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3507 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3508 any ff1e::7 vlan52
ipv6 multicast-static-route vlan3509 any ff1e::7 vlan52
8360-Edge-Core2#

!
router ospf 1
        router-id 6.6.6.3
        bfd all-interfaces
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.3
        area 0.0.0.0
router pim
        enable
        rp-candidate source-ip-interface vlan3500 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface vlan3500
router pim6
```

```
        enable
        rp-candidate source-ip-interface vlan3500 group-prefix ff00::/8
        bsr-candidate source-ip-interface vlan3500

https-server vrf mgmt
8360-Edge-Core2#
```

PIM and static ANY redistribute distroVSX

- 6410 distro-primary-static ANY configuration
- 6410 distro-secondary static ANY configuration
- Core-primary static configuration
- Core-secondary static configuration
- Edge-core 1 static configuration
- Edge-core 2 static configuration

6410 distro-primary-static ANY configuration

In this use case, PIM active active is enabled. Static multicast route [ANY] is configured for both IPv4 and IPv6, redistribute the static into PIM as CORE and EDGE-CORE are enabled with only PIM, and **no static multicast route** is configured on them. VLAN 3005 and VLAN 3006 are client connected VLANs.

```
vlan 50
vlan 3005
        vsx-sync
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 3006
        vsx-sync
        description uplink-6300-standalone-right
        ip igmp snooping enable
        ipv6 mld snooping enable
interface lag 50 multi-chassis
        description uplink-8400
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 90 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3005
        lacp mode active
interface lag 91 multi-chassis
        description uplink-6300-standalone-right
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3006
        lacp mode active

interface lag 255
        description ISL-1/5/48-To-1/5/48
        no shutdown
        no routing
        vlan trunk native 1
```

```
        vlan trunk allowed all
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.1/24
        ipv6 address 50::/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3005
        description uplink-6300-vsf
        vsx active-forwarding
        ip address 31.1.1.2/24
        ipv6 address 31::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3006
        description uplink-6300-standalone-right
        vsx active-forwarding
        ip address 30.1.1.2/24
        ipv6 address 30::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable

vsx
        inter-switch-link lag 255
        role primary
        keepalive peer 172.19.99.2 source 172.19.99.1 vrf VSX-KA

ip multicast-static-route vlan50 any 227.7.7.7 vlan3005
ipv6 multicast-static-route vlan50 any ff1e::7 vlan3005
ip multicast-static-route vlan50 any 227.7.7.7 vlan3006
ipv6 multicast-static-route vlan50 any ff1e::7 vlan3006

router ospf 1
        router-id 172.19.100.1
        passive-interface default
        area 0.0.0.0
router ospfv3 1
        router-id 23.23.23.3
        area 0.0.0.0
router pim
        enable
        redistribute static
        active-active
router pim6
        enable
        active-active
redistribute static
```

```
show outputs
==============

6410-RightAggPri#
6410-RightAggPri# show ip multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 1

Group Address           : 227.7.7.7
Source Address          : any
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri# show ipv6 multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 1

Group Address           : ff1e::7
Source Address          : any
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

6410-RightAggPri#
```

6410 distro-secondary static ANY configuration

In this use case, PIM active active is enabled. Static multicast route [ANY] is configured for both IPv4 and IPv6, redistribute the static into PIM as CORE and EDGE-CORE are enabled with only PIM, and **no static multicast route** is configured on them. VLAN 3005 and VLAN 3006 are client connected VLANs.

```
vlan 50
vlan 3005
        name 6300-SA-Rig-Acc-Uplink
        vsx-sync
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 3006
        name 6300-VSF-Rig-Acc-Uplin
        vsx-sync
        description uplink-6300-standalone-right
        ip igmp snooping enable
        ipv6 mld snooping enable
interface lag 50 multi-chassis
        description uplink-8400
        no shutdown
```

```
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 90 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3005,3007
        lacp mode active
interface lag 91 multi-chassis
        description uplink-6300-standalone-right
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1030,3006
        lacp mode active
interface lag 255
        description ISL-1/5/48-To-1/5/48
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.2/24
        ipv6 address 50::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable

interface vlan 3005
        description uplink-6300-vsf
        vsx active-forwarding
        ip address 31.1.1.3/24
        ipv6 address 31::3/24
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3006
        description uplink-6300-standalone-right
        vsx active-forwarding
        ip address 30.1.1.3/24
        ipv6 address 30::3/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable

vsx
        inter-switch-link lag 255
        role secondary
```

```
        keepalive peer 172.19.99.1 source 172.19.99.2 vrf VSX-KA

ip multicast-static-route vlan50 any 227.7.7.7 vlan3005
ipv6 multicast-static-route vlan50 any ff1e::7 vlan3005
ip multicast-static-route vlan50 any 227.7.7.7 vlan3006
ipv6 multicast-static-route vlan50 any ff1e::7 vlan3006

router ospf 1
        router-id 172.19.100.5
        passive-interface default
        bfd all-interfaces
        trap-enable
        area 0.0.0.0
router ospfv3 1
        router-id 23.23.23.7
        area 0.0.0.0
router pim
        enable
        redistribute static
        active-active
router pim6
        enable
        redistribute static
        active-active

6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec# show ip multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 3
Group Address           : 227.7.7.7
Source Address          : any
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : any
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : any
Route type              : Static
Incoming interface      : vlan3005
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec# show ipv6 multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 3
Group Address           : ff1e::7
Source Address          : any
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : any
```

```
Route type              : Static
Incoming interface      : vlan3006
Group Address           : ff1e::7
Source Address          : any
Route type              : Static
Incoming interface      : vlan3005

6410-RightAggSec#
```

Core-primary static configuration

```
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active

interface lag 51 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active
interface lag 52 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.4/24
        ipv6 address 50::4/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.4/24
        ipv6 address 51::4/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.3/24
        ipv6 address 52::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable

router ospf 1
        router-id 6.6.6.1
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.1
        area 0.0.0.0
```

```
router pim
        enable
```

Core-secondary static configuration

```
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 51 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active
interface lag 52 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.3/24
        ipv6 address 50::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.3/24
        ipv6 address 51::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.2/24
        ipv6 address 52::2/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
router ospf 1
        router-id 6.6.6.2
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.2
        area 0.0.0.0

router pim
        enable
```

Edge-core 1 static configuration

In this use case, PIM is enabled, RP and BSR candidate is configured on this DUT, **no static multicast route** is configured, multicast source is connected VLAN 3600, and downstream is LAG with VSX active forwarding configured.

```
vlan 1,51
vlan 3600,3800
interface mgmt
        no shutdown
        ip dhcp

interface lag 51
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active

interface 1/1/15
        description 8400-Core1-1/1/15-stubpri-1/1/15
        no shutdown
        mtu 9198
        lag 51
interface 1/1/16
        description 8400core2-1/1/16
        no shutdown
        mtu 9198
        lag 51
interface 1/1/17
        description ixia-15-5-12/7
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3600
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.1/24
        ipv6 address 50::1/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3600
        ip address 36.1.0.1/16
        ipv6 address 2036:136:1::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
!
!
router ospf 1
        router-id 6.6.6.4
        bfd all-interfaces
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.4
        area 0.0.0.0
router pim
        enable
        rp-candidate source-ip-interface vlan3600 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface vlan3600
router pim6
        enable
        rp-candidate source-ip-interface vlan3600 group-prefix ff00::/8
        bsr-candidate source-ip-interface vlan3600
```

```
8360-Edge-Core1#
```

Edge-core 2 static configuration

```
no ip icmp redirect
profile aggregation-leaf
ntp server 10.5.6.10 minpoll 4 maxpoll 4 iburst
ntp enable
cli-session
        timeout 0
!
!
!
!
radius-server host 10.5.9.10 key ciphertext
AQBapVWcNJavUClNBQenFaJwwRrR+nWcJUvsQlHUbuaiOvlDCAAAAMCnYwT2Ful+ tracking enable
radius-server host 10.5.1.11 key ciphertext
AQBapVWcNJavUClNBQenFaJwwRrR+nWcJUvsQlHUbuaiOvlDCAAAAMCnYwT2Ful+ tracking enable
!
!
aaa group server radius CPPM
        server 10.5.1.11
        server 10.5.9.10
!
!
aruba-central
        disable
        location-override device-internal2-d2.central.arubanetworks.com vrf mgmt
ssh server vrf mgmt
ssh key-exchange-algorithms curve25519-sha256 curve25519-sha256@libssh.org ecdh-
sha2-nistp256 ecdh-sha2-nistp384 ecdh-sha2-nistp521 diffie-hellman-group-exchange-
sha256 diffie-hellman-group16-sha512 diffie-hellman-group18-sha512 diffie-hellman-
group14-sha256 diffie-hellman-group14-sha1
vlan 1,51-52,80,90,100,110,648-695,3500-3509,3700,3708
interface mgmt
        no shutdown
        ip dhcp
no dhcp-relay l2vpn-clients
dhcp-relay option 82 replace
interface lag 52
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active
interface 1/1/1
        description 8360-core2-1/1/9
        no shutdown
        mtu 9198
interface 1/1/2
        description 8360-core1-1/1/9
        no shutdown
        mtu 9198
interface 1/1/3
        no shutdown
        no routing
        vlan access 1
interface 1/1/4
        no shutdown
        no routing
        vlan access 1
```

```
interface 1/1/5
        description 1/1/5-Cltr-9004-0/0
interface 1/1/6
        description 1/1/6-cltr-9004-0/1
interface 1/1/7
        no shutdown
        no routing
        vlan access 1
interface 1/1/8
        no shutdown
        no routing
        vlan access 1
interface 1/1/9
        no shutdown
        no routing
        vlan access 1
interface 1/1/10
        no shutdown
        no routing
        vlan access 1
interface 1/1/11
        no shutdown
        no routing
        vlan access 1
interface 1/1/12
        no shutdown
        no routing
        vlan access 1
interface 1/1/13
        no shutdown
        no routing
        vlan access 1
interface 1/1/14
        no shutdown
        no routing
        vlan access 1
interface 1/1/15
        description 8400core1-1/1/16
        no shutdown
        mtu 9198
        lag 52
interface 1/1/16
        description 8400-core2-1/1/15
        no shutdown
        mtu 9198
        lag 52
interface 1/1/17
        description ixia-15-5-12/6
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3500-3509,3700
interface 1/1/18
        no shutdown
        no routing
        vlan access 1
interface 1/1/19
        description 7220-Ctrl1-0/0/5
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
```

```
interface 1/1/20
        no shutdown
        no routing
        vlan access 1
interface 1/1/21
        description 7220-Ctrl2-0/0/5
interface 1/1/22
        description IXIA 5/13 - 192.168.15.2
        no shutdown
        no routing
        vlan access 1
interface 1/1/23
        description ISL-1/1/23
interface 1/1/24
        description KA
        ip address 44.4.4.2/24
interface 1/1/25
        no shutdown
        no routing
        vlan access 1
interface 1/1/26
        no shutdown
        no routing
        vlan access 1
interface loopback 0
        ip address 172.19.105.8/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 172.19.106.7/32
        ip ospf 1 area 0.0.0.0
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.1/24
        ipv6 address 52::1/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3500
        ip address 35.1.0.1/16
        ipv6 address 2035:135:1::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3501
        ip address 35.2.0.1/16
        ipv6 address 2035:135:2::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3502
        ip address 35.3.0.1/16
        ipv6 address 2035:135:3::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3503
        ip address 35.4.0.1/16
        ipv6 address 2035:135:4::5/64
```

```
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3504
        ip address 35.5.0.1/16
        ipv6 address 2035:135:5::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3505
        ip address 35.6.0.1/16
        ipv6 address 2035:135:6::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3506
        ip address 35.7.0.1/16
        ipv6 address 2035:135:7::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3507
        ip address 35.8.0.1/16
        ipv6 address 2035:135:8::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3508
        ip address 35.9.0.1/16
        ipv6 address 2035:135:9::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3509
        ip address 35.10.0.1/16
        ipv6 address 2035:135:a::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable

!
router ospf 1
        router-id 6.6.6.3
        bfd all-interfaces
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.3
        area 0.0.0.0
router pim
        enable
        rp-candidate source-ip-interface vlan3500 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface vlan3500
router pim6
        enable
        rp-candidate source-ip-interface vlan3500 group-prefix ff00::/8
```

```
        bsr-candidate source-ip-interface vlan3500

https-server vrf mgmt
8360-Edge-Core2#
```

PIM and static SG redistribute coreVSX

- 6410 distro-primary only static no redistribute configuration
- 6410 distro-secondary only static no redistribute configuration
- Core-primary static redistribute configuration
- Core-secondary static redistribute configuration
- Edge-core 1 PIM static configuration
- Edge-core 2 PIM static configuration

6410 distro-primary only static no redistribute configuration

In this use case, PIM active active is enabled, static multicast route [S,G] is configured for both IPv4 and IPv6, **no redistribute** is configured on Distro as REdistribute is configured on CORE, and VLAN 3005 and VLAN 3006 are client connected VLANs.

```
vlan 50
vlan 3005
        vsx-sync
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 3006
        vsx-sync
        description uplink-6300-standalone-right
        ip igmp snooping enable
        ipv6 mld snooping enable
interface lag 50 multi-chassis
        description uplink-8400
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 90 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3005
        lacp mode active
interface lag 91 multi-chassis
        description uplink-6300-standalone-right
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3006
        lacp mode active

interface lag 255
        description ISL-1/5/48-To-1/5/48
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
```

```
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.1/24
        ipv6 address 50::/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3005
        description uplink-6300-vsf
        vsx active-forwarding
        ip address 31.1.1.2/24
        ipv6 address 31::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3006
        description uplink-6300-standalone-right
        vsx active-forwarding
        ip address 30.1.1.2/24
        ipv6 address 30::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable

vsx
        inter-switch-link lag 255
        role primary
        keepalive peer 172.19.99.2 source 172.19.99.1 vrf VSX-KA

ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3005

ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3006
```

```
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3006
router ospf 1
        router-id 172.19.100.1
        passive-interface default
        area 0.0.0.0
router ospfv3 1
        router-id 23.23.23.3
        area 0.0.0.0
router pim
        enable
        active-active
router pim6
        enable
        active-active

show output
=============
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri# show ip multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 10

Group Address           : 227.7.7.7
Source Address          : 36.1.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.10.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding
Group Address           : 227.7.7.7
```

```
Source Address          : 36.2.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.3.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.4.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.5.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.6.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.7.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.8.0.2
Route type              : Static
```

```
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.9.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri# show ipv6 multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 10

Group Address           : ff1e::7
Source Address          : 2035:135:1::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:2::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:3::1
```

```
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:4::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:5::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:6::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding
Group Address           : ff1e::7
Source Address          : 2035:135:7::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:8::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:9::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
```

```
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:a::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
```

6410 distro-secondary only static no redistribute configuration

In this use case, PIM active active is enabled, static multicast route [S,G] is configured for both IPv4 and IPv6, **no redistribute** is configured on Distro as REdistribute is configured on CORE, and VLAN 3005 and VLAN 3006 are client connected VLANs.

```
vlan 50
vlan 3005
        name 6300-SA-Rig-Acc-Uplink
        vsx-sync
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 3006
        name 6300-VSF-Rig-Acc-Uplin
        vsx-sync
        description uplink-6300-standalone-right
        ip igmp snooping enable
        ipv6 mld snooping enable
interface lag 50 multi-chassis
        description uplink-8400
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 90 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3005,3007
        lacp mode active
interface lag 91 multi-chassis
        description uplink-6300-standalone-right
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1030,3006
        lacp mode active
interface lag 255
        description ISL-1/5/48-To-1/5/48
        no shutdown
        no routing
```

```
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.2/24
        ipv6 address 50::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable

interface vlan 3005
        description uplink-6300-vsf
        vsx active-forwarding
        ip address 31.1.1.3/24
        ipv6 address 31::3/24
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3006
        description uplink-6300-standalone-right
        vsx active-forwarding
        ip address 30.1.1.3/24
        ipv6 address 30::3/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable

vsx
        inter-switch-link lag 255
        role secondary
        keepalive peer 172.19.99.1 source 172.19.99.2 vrf VSX-KA
ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3005
```

```
ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3006
router ospf 1
        router-id 172.19.100.5
        passive-interface default
        bfd all-interfaces
        trap-enable
        area 0.0.0.0
        router ospfv3 1
        router-id 23.23.23.7
        area 0.0.0.0
router pim
        enable
        active-active
router pim6
        enable
        active-active

show output
============

6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec# show ip multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 30

Group Address           : 227.7.7.7
Source Address          : 36.1.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.1.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.1.0.2
Route type              : Static
Incoming interface      : vlan3005
```

```
Group Address           : 227.7.7.7
Source Address          : 36.10.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.10.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.10.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.2.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.2.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.2.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.3.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.3.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.3.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.4.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.4.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.4.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
```

```
Source Address          : 36.5.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.5.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.5.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.6.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.6.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.6.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.7.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.7.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.7.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.8.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.8.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.8.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.9.0.2
Route type              : Static
```

```
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.9.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.9.0.2
Route type              : Static
Incoming interface      : vlan3005

6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec# show ipv6 multicast-static-route
IP Multicast Static Route Entries
VRF : default
Total number of entries : 30

Group Address           : ff1e::7
Source Address          : 2035:135:1::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:1::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:1::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:2::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:2::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:2::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:3::1
```

```
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:3::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:3::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:4::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:4::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:4::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:5::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:5::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:5::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:6::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:6::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:6::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:7::1
Route type              : Static
Incoming interface      : vlan50
```

```
Group Address           : ff1e::7
Source Address          : 2035:135:7::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:7::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:8::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:8::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:8::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:9::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:9::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:9::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:a::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:a::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:a::1
Route type              : Static
Incoming interface      : vlan3005

6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
```

Core-primary static redistribute configuration

```
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active

interface lag 51 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active
interface lag 52 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active

interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.4/24
        ipv6 address 50::4/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.4/24
        ipv6 address 51::4/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.3/24
        ipv6 address 52::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable

ip multicast-static-route vlan51 36.1.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.1.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.2.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.2.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.3.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.3.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.4.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.4.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.5.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.5.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.6.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.6.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.7.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.7.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.8.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.8.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.9.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.9.0.2 227.7.7.7 vlan400
```

```
ip multicast-static-route vlan51 36.10.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.10.0.2 227.7.7.7 vlan400
ipv6 multicast-static-route vlan52 2035:135:1::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:1::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:2::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:2::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:3::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:3::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:4::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:4::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:5::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:5::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:6::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:6::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:7::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:7::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:8::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:8::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:9::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:9::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:a::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:a::1 ff1e::7 vlan50

router ospf 1
        router-id 6.6.6.1
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.1
        area 0.0.0.0

router pim
        redistribute static
        enable
router pim6
redistribute static
        enable

Show outputs
=============

8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1# show ip multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 10

Group Address           : 227.7.7.7
Source Address          : 36.1.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan50          forwarding
vlan400         forwarding

Group Address           : 227.7.7.7
Source Address          : 36.10.0.2
```

```
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : 227.7.7.7
Source Address          : 36.2.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : 227.7.7.7
Source Address          : 36.3.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan50          forwarding
vlan400         forwarding

Group Address           : 227.7.7.7
Source Address          : 36.4.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : 227.7.7.7
Source Address          : 36.5.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : 227.7.7.7
Source Address          : 36.6.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : 227.7.7.7
Source Address          : 36.7.0.2
Route type              : Static
Incoming interface      : vlan51
```

```
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : 227.7.7.7
Source Address          : 36.8.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : 227.7.7.7
Source Address          : 36.9.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1# show ipv6 multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 10

Group Address           : ff1e::7
Source Address          : 2035:135:1::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan50          forwarding
vlan400         forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:2::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
```

```
vlan50          forwarding
vlan400         forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:3::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:4::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:5::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan50          forwarding
vlan400         forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:6::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:7::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan50          forwarding
vlan400         forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:8::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding
```

```
Group Address           : ff1e::7
Source Address          : 2035:135:9::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:a::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

8400-Core1#
```

Core-secondary static redistribute configuration

```
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 51 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active
interface lag 52 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.4/24
        ipv6 address 50::4/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.4/24
        ipv6 address 51::4/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.3/24
```

```
        ipv6 address 52::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
ip multicast-static-route vlan51 36.1.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.1.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.2.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.2.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.3.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.3.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.4.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.4.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.5.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.5.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.6.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.6.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.7.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.7.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.8.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.8.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.9.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.9.0.2 227.7.7.7 vlan400
ip multicast-static-route vlan51 36.10.0.2 227.7.7.7 vlan50
ip multicast-static-route vlan51 36.10.0.2 227.7.7.7 vlan400
ipv6 multicast-static-route vlan52 2035:135:1::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:1::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:2::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:2::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:3::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:3::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:4::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:4::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:5::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:5::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:6::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:6::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:7::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:7::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:8::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:8::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:9::1 ff1e::7 vlan50
ipv6 multicast-static-route vlan52 2035:135:9::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:a::1 ff1e::7 vlan400
ipv6 multicast-static-route vlan52 2035:135:a::1 ff1e::7 vlan50
router ospf 1
        router-id 6.6.6.1
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.1
        area 0.0.0.0

router pim
redistribute static
        enable
router pim6
redistribute static
        enable

Show outputs
=============
```

```
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1# show ip multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 10

Group Address           : 227.7.7.7
Source Address          : 36.1.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan50          forwarding
vlan400         forwarding

Group Address           : 227.7.7.7
Source Address          : 36.10.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : 227.7.7.7
Source Address          : 36.2.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : 227.7.7.7
Source Address          : 36.3.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan50          forwarding
vlan400         forwarding

Group Address           : 227.7.7.7
Source Address          : 36.4.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : 227.7.7.7
Source Address          : 36.5.0.2
```

```
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : 227.7.7.7
Source Address          : 36.6.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : 227.7.7.7
Source Address          : 36.7.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : 227.7.7.7
Source Address          : 36.8.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : 227.7.7.7
Source Address          : 36.9.0.2
Route type              : Static
Incoming interface      : vlan51
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1#
8400-Core1# show ipv6 multicast-static-route
```

```
IP Multicast Static Route Entries

VRF : default
Total number of entries : 10

Group Address           : ff1e::7
Source Address          : 2035:135:1::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan50          forwarding
vlan400         forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:2::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan50          forwarding
vlan400         forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:3::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:4::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:5::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan50          forwarding
vlan400         forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:6::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
```

```
vlan400         forwarding
vlan50          forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:7::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan50          forwarding
vlan400         forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:8::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:9::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:a::1
Route type              : Static
Incoming interface      : vlan52
Outgoing Interface List :
Interface       State
-----------     ----------
vlan400         forwarding
vlan50          forwarding

8400-Core1#
```

Edge-core 1 PIM static configuration

In this use case, PIM is enabled, RP and BSR candidate is configured on this DUT, **no static multicast route** is configured, multicast source is connected to VLAN 3600, and downstream is LAG with VSX active forwarding is configured.

```
vlan 1,51
vlan 3600,3800
interface mgmt
        no shutdown
        ip dhcp

interface lag 51
        no shutdown
        no routing
        vlan trunk native 1
```

```
        vlan trunk allowed 51
        lacp mode active

interface 1/1/15
        description 8400-Core1-1/1/15-stubpri-1/1/15
        no shutdown
        mtu 9198
        lag 51
interface 1/1/16
        description 8400core2-1/1/16
        no shutdown
        mtu 9198
        lag 51
interface 1/1/17
        description ixia-15-5-12/7
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3600
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.1/24
        ipv6 address 50::1/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3600
        ip address 36.1.0.1/16
        ipv6 address 2036:136:1::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
!
!
router ospf 1
        router-id 6.6.6.4
        bfd all-interfaces
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.4
        area 0.0.0.0
router pim
        enable
        rp-candidate source-ip-interface vlan3600 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface vlan3600
router pim6
        enable
        rp-candidate source-ip-interface vlan3600 group-prefix ff00::/8
        bsr-candidate source-ip-interface vlan3600
8360-Edge-Core1#
```

Edge-core 2 PIM static configuration

```
no ip icmp redirect
profile aggregation-leaf
ntp server 10.5.6.10 minpoll 4 maxpoll 4 iburst
ntp enable
cli-session
        timeout 0
```

```
!
!
!
!
radius-server host 10.5.9.10 key ciphertext
AQBapVWcNJavUClNBQenFaJwwRrR+nWcJUvsQlHUbuaiOvlDCAAAAMCnYwT2Ful+ tracking enable
radius-server host 10.5.1.11 key ciphertext
AQBapVWcNJavUClNBQenFaJwwRrR+nWcJUvsQlHUbuaiOvlDCAAAAMCnYwT2Ful+ tracking enable
!
!
aaa group server radius CPPM
        server 10.5.1.11
        server 10.5.9.10
!
!
aruba-central
        disable
        location-override device-internal2-d2.central.arubanetworks.com vrf mgmt
ssh server vrf mgmt
ssh key-exchange-algorithms curve25519-sha256 curve25519-sha256@libssh.org ecdh-
sha2-nistp256 ecdh-sha2-nistp384 ecdh-sha2-nistp521 diffie-hellman-group-exchange-
sha256 diffie-hellman-group16-sha512 diffie-hellman-group18-sha512 diffie-hellman-
group14-sha256 diffie-hellman-group14-sha1
vlan 1,51-52,80,90,100,110,648-695,3500-3509,3700,3708
interface mgmt
        no shutdown
        ip dhcp
no dhcp-relay l2vpn-clients
dhcp-relay option 82 replace
interface lag 52
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active
interface 1/1/1
        description 8360-core2-1/1/9
        no shutdown
        mtu 9198
interface 1/1/2
        description 8360-core1-1/1/9
        no shutdown
        mtu 9198
interface 1/1/3
        no shutdown
        no routing
        vlan access 1
interface 1/1/4
        no shutdown
        no routing
        vlan access 1
interface 1/1/5
        description 1/1/5-Cltr-9004-0/0
interface 1/1/6
        description 1/1/6-cltr-9004-0/1
interface 1/1/7
        no shutdown
        no routing
        vlan access 1
interface 1/1/8
        no shutdown
        no routing
```

```
        vlan access 1
interface 1/1/9
        no shutdown
        no routing
        vlan access 1
interface 1/1/10
        no shutdown
        no routing
        vlan access 1
interface 1/1/11
        no shutdown
        no routing
        vlan access 1
interface 1/1/12
        no shutdown
        no routing
        vlan access 1
interface 1/1/13
        no shutdown
        no routing
        vlan access 1
interface 1/1/14
        no shutdown
        no routing
        vlan access 1
interface 1/1/15
        description 8400core1-1/1/16
        no shutdown
        mtu 9198
        lag 52
interface 1/1/16
        description 8400-core2-1/1/15
        no shutdown
        mtu 9198
        lag 52
interface 1/1/17
        description ixia-15-5-12/6
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3500-3509,3700
interface 1/1/18
        no shutdown
        no routing
        vlan access 1
interface 1/1/19
        description 7220-Ctrl1-0/0/5
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
interface 1/1/20
        no shutdown
        no routing
        vlan access 1
interface 1/1/21
        description 7220-Ctrl2-0/0/5
interface 1/1/22
        description IXIA 5/13 - 192.168.15.2
        no shutdown
        no routing
        vlan access 1
```

```
interface 1/1/23
        description ISL-1/1/23
interface 1/1/24
        description KA
        ip address 44.4.4.2/24
interface 1/1/25
        no shutdown
        no routing
        vlan access 1
interface 1/1/26
        no shutdown
        no routing
        vlan access 1
interface loopback 0
        ip address 172.19.105.8/32
        ip ospf 1 area 0.0.0.0
        interface loopback 1
        ip address 172.19.106.7/32
        ip ospf 1 area 0.0.0.0
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.1/24
        ipv6 address 52::1/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3500
        ip address 35.1.0.1/16
        ipv6 address 2035:135:1::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3501
        ip address 35.2.0.1/16
        ipv6 address 2035:135:2::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3502
        ip address 35.3.0.1/16
        ipv6 address 2035:135:3::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3503
        ip address 35.4.0.1/16
        ipv6 address 2035:135:4::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3504
        ip address 35.5.0.1/16
        ipv6 address 2035:135:5::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
```

```
interface vlan 3505
        ip address 35.6.0.1/16
        ipv6 address 2035:135:6::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3506
        ip address 35.7.0.1/16
        ipv6 address 2035:135:7::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3507
        ip address 35.8.0.1/16
        ipv6 address 2035:135:8::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3508
        ip address 35.9.0.1/16
        ipv6 address 2035:135:9::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3509
        ip address 35.10.0.1/16
        ipv6 address 2035:135:a::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
!
router ospf 1
        router-id 6.6.6.3
        bfd all-interfaces
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.3
        area 0.0.0.0
router pim
        enable
        rp-candidate source-ip-interface vlan3500 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface vlan3500
router pim6
        enable
        rp-candidate source-ip-interface vlan3500 group-prefix ff00::/8
        bsr-candidate source-ip-interface vlan3500

https-server vrf mgmt
8360-Edge-Core2#
```

PIM and static SG redistribute DistroVSX

- 6410 distro-primary configuration
- 6410 distro-secondary configuration
- Core-primary static configuration
- Core-secondary static configuration

- Edge-core 1 PIM static configuration
- Edge-core 2 PIM static configuration

6410 distro-primary configuration

In this use case, PIM active active is enabled, static multicast route [S,G] is configured for both IPv4 and IPv6, redistribute the static into PIM as CORE and EDGE-CORE are enabled with only PIM and **no static multicast route** is configured on them. VLAN 3005 and VLAN 3006 are client connected VLANs.

```
vlan 50
vlan 3005
        vsx-sync
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 3006
        vsx-sync
        description uplink-6300-standalone-right
        ip igmp snooping enable
        ipv6 mld snooping enable
interface lag 50 multi-chassis
        description uplink-8400
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 90 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3005
        lacp mode active
interface lag 91 multi-chassis
        description uplink-6300-standalone-right
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3006
        lacp mode active

interface lag 255
        description ISL-1/5/48-To-1/5/48
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.1/24
        ipv6 address 50::/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3005
        description uplink-6300-vsf
        vsx active-forwarding
        ip address 31.1.1.2/24
        ipv6 address 31::2/64
        ip ospf 1 area 0.0.0.0
```

```
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3006
        description uplink-6300-standalone-right
        vsx active-forwarding
        ip address 30.1.1.2/24
        ipv6 address 30::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable

vsx
        inter-switch-link lag 255
        role primary
        keepalive peer 172.19.99.2 source 172.19.99.1 vrf VSX-KA

ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3005

ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3006
```

```
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3006
router ospf 1
        router-id 172.19.100.1
        passive-interface default
        area 0.0.0.0
router ospfv3 1
        router-id 23.23.23.3
        area 0.0.0.0
router pim
        enable
        redistribute static
        active-active
router pim6
        enable
        active-active
redistribute static

show outputs
==============

6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri# show ip multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 10

Group Address           : 227.7.7.7
Source Address          : 36.1.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.10.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.2.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding
```

```
Group Address           : 227.7.7.7
Source Address          : 36.3.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.4.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.5.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.6.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.7.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : 227.7.7.7
Source Address          : 36.8.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

Group Address           : 227.7.7.7
```

```
Source Address          : 36.9.0.2
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri# show ipv6 multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 10

Group Address           : ff1e::7
Source Address          : 2035:135:1::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:2::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:3::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding
```

```
Group Address           : ff1e::7
Source Address          : 2035:135:4::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:5::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:6::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:7::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:8::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:9::1
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3006        forwarding
vlan3005        forwarding

Group Address           : ff1e::7
Source Address          : 2035:135:a::1
```

```
Route type              : Static
Incoming interface      : vlan50
Outgoing Interface List :
Interface       State
-----------     ----------
vlan3005        forwarding
vlan3006        forwarding

6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
6410-RightAggPri#
```

6410 distro-secondary configuration

In this use case, PIM active active is enabled, static multicast route [S,G] is configured for both IPv4 and IPv6, redistribute the static into PIM as CORE and EDGE-CORE are enabled with only PIM and **no static multicast route** is configured on them. VLAN 3005 and VLAN 3006 are client connected VLANs.

```
vlan 50
vlan 3005
        name 6300-SA-Rig-Acc-Uplink
        vsx-sync
        ip igmp snooping enable
        ipv6 mld snooping enable
vlan 3006
        name 6300-VSF-Rig-Acc-Uplin
        vsx-sync
        description uplink-6300-standalone-right
        ip igmp snooping enable
        ipv6 mld snooping enable
interface lag 50 multi-chassis
        description uplink-8400
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 90 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3005,3007
        lacp mode active
interface lag 91 multi-chassis
        description uplink-6300-standalone-right
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 1030,3006
        lacp mode active
interface lag 255
        description ISL-1/5/48-To-1/5/48
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.2/24
```

```
        ipv6 address 50::2/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable

interface vlan 3005
        description uplink-6300-vsf
        vsx active-forwarding
        ip address 31.1.1.3/24
        ipv6 address 31::3/24
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3006
        description uplink-6300-standalone-right
        vsx active-forwarding
        ip address 30.1.1.3/24
        ipv6 address 30::3/64
        ip ospf 1 area 0.0.0.0
        no ip ospf passive
        ipv6 ospfv3 1 area 0.0.0.0
        ip igmp enable
        ipv6 mld enable
        ip pim-sparse enable
        ipv6 pim6-sparse enable

vsx
        inter-switch-link lag 255
        role secondary
        keepalive peer 172.19.99.1 source 172.19.99.2 vrf VSX-KA
ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3005
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3005
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3005

ip multicast-static-route vlan50 36.1.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.2.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.3.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.4.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.5.0.2 227.7.7.7 vlan3006
```

```
ip multicast-static-route vlan50 36.6.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.7.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.8.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.9.0.2 227.7.7.7 vlan3006
ip multicast-static-route vlan50 36.10.0.2 227.7.7.7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:1::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:2::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:3::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:4::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:5::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:6::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:7::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:8::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:9::1 ff1e::7 vlan3006
ipv6 multicast-static-route vlan50 2035:135:a::1 ff1e::7 vlan3006
router ospf 1
        router-id 172.19.100.5
        passive-interface default
        bfd all-interfaces
        trap-enable
        area 0.0.0.0
router ospfv3 1
        router-id 23.23.23.7
        area 0.0.0.0
router pim
        enable
        redistribute static
        active-active
router pim6
        enable
        redistribute static
        active-active

show output
============

6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec# show ip multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 30

Group Address           : 227.7.7.7
Source Address          : 36.1.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.1.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.1.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.10.0.2
Route type              : Static
```

```
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.10.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.10.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.2.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.2.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.2.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.3.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.3.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.3.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.4.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.4.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.4.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.5.0.2
Route type              : Static
Incoming interface      : vlan50
```

```
Group Address           : 227.7.7.7
Source Address          : 36.5.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.5.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.6.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.6.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.6.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.7.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.7.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.7.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.8.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.8.0.2
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.8.0.2
Route type              : Static
Incoming interface      : vlan3005

Group Address           : 227.7.7.7
Source Address          : 36.9.0.2
Route type              : Static
Incoming interface      : vlan50

Group Address           : 227.7.7.7
Source Address          : 36.9.0.2
```

```
Route type              : Static
Incoming interface      : vlan3006

Group Address           : 227.7.7.7
Source Address          : 36.9.0.2
Route type              : Static
Incoming interface      : vlan3005

6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec# show ipv6 multicast-static-route
IP Multicast Static Route Entries

VRF : default
Total number of entries : 30

Group Address           : ff1e::7
Source Address          : 2035:135:1::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:1::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:1::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:2::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:2::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:2::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:3::1
Route type              : Static
Incoming interface      : vlan50
```

```
Group Address           : ff1e::7
Source Address          : 2035:135:3::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:3::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:4::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:4::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:4::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:5::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:5::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:5::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:6::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:6::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:6::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:7::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:7::1
```

```
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:7::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:8::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:8::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:8::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:9::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:9::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:9::1
Route type              : Static
Incoming interface      : vlan3005

Group Address           : ff1e::7
Source Address          : 2035:135:a::1
Route type              : Static
Incoming interface      : vlan50

Group Address           : ff1e::7
Source Address          : 2035:135:a::1
Route type              : Static
Incoming interface      : vlan3006

Group Address           : ff1e::7
Source Address          : 2035:135:a::1
Route type              : Static
Incoming interface      : vlan3005

6410-RightAggSec#
6410-RightAggSec#
6410-RightAggSec#
```

Core-primary static configuration

```
interface lag 50 multi-chassis
        no shutdown
```

```
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 51 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active
interface lag 52 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active

interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.4/24
        ipv6 address 50::4/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.4/24
        ipv6 address 51::4/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.3/24
        ipv6 address 52::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable

router ospf 1
        router-id 6.6.6.1
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.1
        area 0.0.0.0

router pim
        enable
```

Core-secondary static configuration

```
interface lag 50 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 50
        lacp mode active
interface lag 51 multi-chassis
        no shutdown
```

```
        no routing
        vlan trunk native 1
        vlan trunk allowed 51
        lacp mode active
interface lag 52 multi-chassis
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active
interface vlan 50
        vsx active-forwarding
        ip address 50.1.1.3/24
        ipv6 address 50::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.3/24
        ipv6 address 51::3/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.2/24
        ipv6 address 52::2/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
router ospf 1
        router-id 6.6.6.2
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.2
        area 0.0.0.0

router pim
        enable
```

Edge-core 1 PIM static configuration

In this use case, PIM enabled, RP and BSR candidate is configured on this DUT, `no static multicast route` is configured, multicast source is connected to VLAN 3600, and downstream is LAG with VSX active forwarding configured.

```
no ip icmp redirect
!

vlan 1,51
vlan 3600,3800
interface mgmt
        no shutdown
        ip dhcp
interface lag 51
        no shutdown
        no routing
        vlan trunk native 1
```

```
        vlan trunk allowed 51
        lacp mode active

interface 1/1/15
        description 8400-Core1-1/1/15-stubpri-1/1/15
        no shutdown
        mtu 9198
        lag 51
interface 1/1/16
        description 8400core2-1/1/16
        no shutdown
        mtu 9198
        lag 51
interface 1/1/17
        description ixia-15-5-12/7
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3600
interface vlan 51
        vsx active-forwarding
        ip address 51.1.1.1/24
        ipv6 address 50::1/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3600
        ip address 36.1.0.1/16
        ipv6 address 2036:136:1::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
!
!
router ospf 1
        router-id 6.6.6.4
        bfd all-interfaces
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.4
        area 0.0.0.0
router pim
        enable
        rp-candidate source-ip-interface vlan3600 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface vlan3600
router pim6
        enable
        rp-candidate source-ip-interface vlan3600 group-prefix ff00::/8
        bsr-candidate source-ip-interface vlan3600
8360-Edge-Core1#
```

Edge-core 2 PIM static configuration

```
no ip icmp redirect
profile aggregation-leaf
ntp server 10.5.6.10 minpoll 4 maxpoll 4 iburst
ntp enable
cli-session
        timeout 0
```

```
!
!
!
!
radius-server host 10.5.9.10 key ciphertext
AQBapVWcNJavUClNBQenFaJwwRrR+nWcJUvsQlHUbuaiOvlDCAAAAMCnYwT2Ful+ tracking enable
radius-server host 10.5.1.11 key ciphertext
AQBapVWcNJavUClNBQenFaJwwRrR+nWcJUvsQlHUbuaiOvlDCAAAAMCnYwT2Ful+ tracking enable
!
!
aaa group server radius CPPM
        server 10.5.1.11
        server 10.5.9.10
!
!
aruba-central
        disable
        location-override device-internal2-d2.central.arubanetworks.com vrf mgmt
ssh server vrf mgmt
ssh key-exchange-algorithms curve25519-sha256 curve25519-sha256@libssh.org ecdh-
sha2-nistp256 ecdh-sha2-nistp384 ecdh-sha2-nistp521 diffie-hellman-group-exchange-
sha256 diffie-hellman-group16-sha512 diffie-hellman-group18-sha512 diffie-hellman-
group14-sha256 diffie-hellman-group14-sha1
vlan 1,51-52,80,90,100,110,648-695,3500-3509,3700,3708
interface mgmt
        no shutdown
        ip dhcp
no dhcp-relay l2vpn-clients
dhcp-relay option 82 replace
interface lag 52
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 52
        lacp mode active
interface 1/1/1
        description 8360-core2-1/1/9
        no shutdown
        mtu 9198
interface 1/1/2
        description 8360-core1-1/1/9
        no shutdown
        mtu 9198
interface 1/1/3
        no shutdown
        no routing
        vlan access 1
interface 1/1/4
        no shutdown
        no routing
        vlan access 1
interface 1/1/5
        description 1/1/5-Cltr-9004-0/0
interface 1/1/6
        description 1/1/6-cltr-9004-0/1
interface 1/1/7
        no shutdown
        no routing
        vlan access 1
interface 1/1/8
        no shutdown
        no routing
```

```
        vlan access 1
interface 1/1/9
        no shutdown
        no routing
        vlan access 1
interface 1/1/10
        no shutdown
        no routing
        vlan access 1
interface 1/1/11
        no shutdown
        no routing
        vlan access 1
interface 1/1/12
        no shutdown
        no routing
        vlan access 1
interface 1/1/13
        no shutdown
        no routing
        vlan access 1
interface 1/1/14
        no shutdown
        no routing
        vlan access 1
interface 1/1/15
        description 8400core1-1/1/16
        no shutdown
        mtu 9198
        lag 52
interface 1/1/16
        description 8400-core2-1/1/15
        no shutdown
        mtu 9198
        lag 52
interface 1/1/17
        description ixia-15-5-12/6
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed 3500-3509,3700
interface 1/1/18
        no shutdown
        no routing
        vlan access 1
interface 1/1/19
        description 7220-Ctrl1-0/0/5
        no shutdown
        no routing
        vlan trunk native 1
        vlan trunk allowed all
interface 1/1/20
        no shutdown
        no routing
        vlan access 1
interface 1/1/21
        description 7220-Ctrl2-0/0/5
interface 1/1/22
        description IXIA 5/13 - 192.168.15.2
        no shutdown
        no routing
        vlan access 1
```

```
interface 1/1/23
        description ISL-1/1/23
interface 1/1/24
        description KA
        ip address 44.4.4.2/24
interface 1/1/25
        no shutdown
        no routing
        vlan access 1
interface 1/1/26
        no shutdown
        no routing
        vlan access 1
interface loopback 0
        ip address 172.19.105.8/32
        ip ospf 1 area 0.0.0.0
interface loopback 1
        ip address 172.19.106.7/32
        ip ospf 1 area 0.0.0.0
interface vlan 52
        vsx active-forwarding
        ip address 52.1.1.1/24
        ipv6 address 52::1/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3500
        ip address 35.1.0.1/16
        ipv6 address 2035:135:1::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3501
        ip address 35.2.0.1/16
        ipv6 address 2035:135:2::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3502
        ip address 35.3.0.1/16
        ipv6 address 2035:135:3::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3503
        ip address 35.4.0.1/16
        ipv6 address 2035:135:4::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3504
        ip address 35.5.0.1/16
        ipv6 address 2035:135:5::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
```

```
interface vlan 3505
        ip address 35.6.0.1/16
        ipv6 address 2035:135:6::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3506
        ip address 35.7.0.1/16
        ipv6 address 2035:135:7::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3507
        ip address 35.8.0.1/16
        ipv6 address 2035:135:8::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3508
        ip address 35.9.0.1/16
        ipv6 address 2035:135:9::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable
interface vlan 3509
        ip address 35.10.0.1/16
        ipv6 address 2035:135:a::5/64
        ip ospf 1 area 0.0.0.0
        ipv6 ospfv3 1 area 0.0.0.0
        ip pim-sparse enable
        ipv6 pim6-sparse enable

!
router ospf 1
        router-id 6.6.6.3
        bfd all-interfaces
        area 0.0.0.0
router ospfv3 1
        router-id 6.6.6.3
        area 0.0.0.0
router pim
        enable
        rp-candidate source-ip-interface vlan3500 group-prefix 224.0.0.0/4
        bsr-candidate source-ip-interface vlan3500
router pim6
        enable
        rp-candidate source-ip-interface vlan3500 group-prefix ff00::/8
        bsr-candidate source-ip-interface vlan3500

https-server vrf mgmt
8360-Edge-Core2#
```

Static Route commands

ip multicast-static-route

`ip multicast-static-route <INCOMING-INTERFACE-NAME> {<SOURCE-ADDRESS | ANY>} <GROUP-ADDRESS> [<OUTGOING-INTERFACE-NAME>] vrf <VRF-NAME>`

```
no ip multicast-static-route <INCOMING-INTERFACE-NAME> {<SOURCE-ADDRESS | ANY>} <GROUP-ADDRESS> [<OUTGOING-INTERFACE-NAME>] vrf <VRF-NAME>
```

Description

Configures a multicast static route for (source, group) on an incoming interface with outgoing interface (s) not involving L3VNI. If a vrf is not specified, default vrf is used.

The **no** form of this command removes the configuration.

Parameter	Description
<INCOMING-INTERFACE-NAME>	Specifies the multicast stream incoming interface name.
<SOURCE-ADDRESS>	Selects the IPv4 source address.
<ANY>	Selects any source address.
<GROUP-ADDRESS>	Specifies the IPv4 multicast group address.
<OUTGOING-INTERFACE-NAME>	Specifies the outgoing interface name.
vrf *<VRF-NAME>*	Configures the specified VRF. The default is default vrf.

Usage

If the incoming interface is attached to different vrf than the vrf spcified in the multicast static route command, route will be made inactive. If the vrf mismatch occurs for the outgoing interface, that particular outgoing interface will be made inactive. If no outgoing interface is specified, the multicast traffic is not routed and is bridged on the interface (SVI) on which the traffic is received.

Examples

Configuring Multicast Static Route with a outgoing interface:

```
switch(config)# ip multicast-static-route vlan10 10.10.1.2 239.255.255.250 vlan20
```

Removing the configured Multicast Static Route with a outgoing interface:

```
switch(config)# no ip multicast-static-route vlan10 10.10.1.2 239.255.255.250
vlan20
```

Configuring Multicast Static Route without an outgoing interface to bridge traffic only in incoming interface in default vrf:

```
switch(config)# ip multicast-static-route vlan30 30.30.1.2 239.255.255.250
```

Removing the configured Multicast Static Route without an outgoing interface to bridge traffic only in incoming interface in default vrf:

```
switch(config)# no ip multicast-static-route vlan30 30.30.1.2 239.255.255.250
```

Configuring Multicast Static Route without an outgoing interface to bridge traffic only in incoming interface in non-default vrf:

```
switch(config)# ipv6 multicast-static-route vlan30 30.30.1.2 239.255.255.250 vrf
red
```

Removing the configured Multicast Static Route without an outgoing interface to bridge traffic only in incoming interface in non-default vrf:

```
switch(config)# ipv6 multicast-static-route vlan30 30.30.1.2 239.255.255.250 vrf
red
```

Configuring Multicast Static Route with multiple outgoing interfaces:

```
switch(config)# ip multicast-static-route vlan40 40.40.1.2 239.255.255.250 vlan50
vrf red
switch(config)# ip multicast-static-route vlan40 40.40.1.2 239.255.255.250 vlan60
vrf red
switch(config)# ip multicast-static-route vlan40 40.40.1.2 239.255.255.250 1/1/1
vrf red
```

Removing configured Multicast Static Route with multiple outgoing interfaces:

```
switch(config)# no ip multicast-static-route vlan40 40.40.1.2 239.255.255.250
vlan60 vrf red
switch(config)# no ip multicast-static-route vlan40 40.40.1.2 239.255.255.250 vrf
red
```

Configuring Static (*, Group) Multicast Route with multiple outgoing interfaces:

```
switch(config)# ip multicast-static-route vlan50 any 239.255.255.250 vlan70 vrf
red
switch(config)# ip multicast-static-route vlan50 any 239.255.255.250 vlan80 vrf
red
```

Removing configured Static (*, Group) Multicast Route with multiple outgoing interfaces:

```
switch(config)# no ip multicast-static-route vlan50 any 239.255.255.250 vlan70 vrf
red
switch(config)# no ip multicast-static-route vlan50 any 239.255.255.250 vlan80 vrf
red
```

Command History

Release	Modification
10.11	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

ip multicast-static-route (l3vni)

```
ip multicast-static-route <INCOMING-INTERFACE-NAME> {<SOURCE-ADDRESS | ANY>} <GROUP-ADDRESS>  vrf <VRF-NAME>
ip multicast-static-route <VXLAN1> {<SOURCE-ADDRESS | ANY>} <GROUP-ADDRESS> [<OUTGOING-INTERFACE-NAME>]vrf <VRF-NAME>
no ip multicast-static-route <INCOMING-INTERFACE-NAME> {<SOURCE-ADDRESS | ANY>} <GROUP-ADDRESS>  vrf <VRF-NAME>
no ip multicast-static-route {<SOURCE-ADDRESS | ANY>} <GROUP-ADDRESS> [<OUTGOING-INTERFACE-NAME>]vrf <VRF-NAME>
```

Description

Configures a multicast static route for (source, group) involving L3VNI tunnels. If a vrf is not specified, default vrf is used.

The **no** form of this command removes the configuration.

Parameter	Description
<INCOMING-INTERFACE-NAME>	Specifies the multicast stream incoming interface name.
<SOURCE-ADDRESS>	Selects the IPv4 source address.
<ANY>	Selects any source address.
<GROUP-ADDRESS>	Specifies the IPv4 multicast group address.
<OUTGOING-INTERFACE-NAME>	Specifies the outgoing interface name.
vrf *<VRF-NAME>*	Configures the specified VRF. The default is default vrf.

Usage

If the incoming interface is attached to different vrf than the vrf spcified in the multicast static route command, route will be made inactive. If the vrf mismatch occurs for the outgoing interface, that particular outgoing interface will be made inactive.

Examples

Configuring Multicast Static Route with L2VN1 to SVI:

```
switch(config)# ip multicast-static-route vlan10 10.10.1.2 239.255.255.250 vlan30
```

Removing the configured Multicast Static Route with L2VN1 to SVI:

```
switch(config)# no ip multicast-static-route vlan10 10.10.1.2 239.255.255.250
vlan30
```

Command History

Release	Modification
10.11	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

ipv6 multicast-static-route

ipvy multicast-static-route *<INCOMING-INTERFACE-NAME>* {*<SOURCE-ADDRESS | ANY>*} *<GROUP-ADDRESS>* [*<OUTGOING-INTERFACE-NAME>*] vrf *<VRF-NAME>*
no ipv6 multicast-static-route *<INCOMING-INTERFACE-NAME>* {*<SOURCE-ADDRESS | ANY>*} *<GROUP-ADDRESS>* [*<OUTGOING-INTERFACE-NAME>*] vrf *<VRF-NAME>*

Description

Configures a multicast static route for (source, group) on an incoming interface with outgoing interface (s) not involving L3VNI. If a vrf is not specified, default vrf is used.

The **no** form of this command removes the configuration.

Parameter	Description
<INCOMING-INTERFACE-NAME>	Specifies the multicast stream incoming interface name.
<SOURCE-ADDRESS>	Selects the IPv6 source address.
<ANY>	Selects any source address.

Parameter	Description
<GROUP-ADDRESS>	Specifies the IPv6 multicast group address.
<OUTGOING-INTERFACE-NAME>	Specifies the outgoing interface name.
vrf *<VRF-NAME>*	Configures the specified VRF. The default is default vrf.

Usage

If the incoming interface is attached to different vrf than the vrf spcified in the multicast static route command, route will be made inactive. If the vrf mismatch occurs for the outgoing interface, that particular outgoing interface will be made inactive.

Examples

Configuring Multicast Static Route with a outgoing interface:

```
switch(config)# ipv6 multicast-static-route vlan10 2001::1 ff02::c vlan20
```

Removing the configured Multicast Static Route with a outgoing interface:

```
switch(config)# no ipv6 multicast-static-route vlan10 2001::1 ff02::c vlan20
```

Configuring Static (*, Group) Multicast Route with multiple outgoing interfaces:

```
switch(config)# ipv6 multicast-static-route vlan50 any ff0e::c vlan70 vrf red
switch(config)# ipv6 multicast-static-route vlan50 any ff0e::c vlan80 vrf red
```

Removing configured Static (*, Group) Multicast Route with multiple outgoing interfaces:

```
switch(config)# no ipv6 multicast-static-route vlan50 any ff0e::c vlan70 vrf red
switch(config)# no ipv6 multicast-static-route vlan50 any ff0e::c vlan80 vrf red
```

Command History

Release	Modification
10.11	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100	`config`	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

Platforms	Command context	Authority
8320 8325 8360 8400 9300 10000		

ipv6 multicast-static-route (l3vni)

```
ipv6 multicast-static-route <INCOMING-INTERFACE-NAME> {<SOURCE-ADDRESS | ANY>} <GROUP-ADDRESS>  vrf <VRF-NAME>
ipv6 multicast-static-route  {<SOURCE-ADDRESS | ANY>} <GROUP-ADDRESS> [<OUTGOING-INTERFACE-NAME>]vrf <VRF-NAME>
no ipv6 multicast-static-route <INCOMING-INTERFACE-NAME> {<SOURCE-ADDRESS | ANY>} <GROUP-ADDRESS> vrf <VRF-NAME>
no ipv6 multicast-static-route  {<SOURCE-ADDRESS | ANY>} <GROUP-ADDRESS> [<OUTGOING-INTERFACE-NAME>]vrf <VRF-NAME>
```

Description

Configures a multicast static route for (source, group) involving L3VNI tunnels. If a vrf is not specified, default vrf is used.

The **no** form of this command removes the configuration.

Parameter	Description
<INCOMING-INTERFACE-NAME>	Specifies the multicast stream incoming interface name.
<SOURCE-ADDRESS>	Selects the IPv6 source address.
<ANY>	Selects any source address.
<GROUP-ADDRESS>	Specifies the IPv6 multicast group address.
<OUTGOING-INTERFACE-NAME>	Specifies the outgoing interface name.
vrf *<VRF-NAME>*	Configures the specified VRF. The default is default vrf.

Usage

If the incoming interface is attached to different vrf than the vrf spcified in the multicast static route command, route will be made inactive. If the vrf mismatch occurs for the outgoing interface, that particular outgoing interface will be made inactive.

Examples

Configuring Multicast Static Route with L2VN1 to SVI:

```
switch(config)# ipv6 multicast-static-route vlan10 2001::1 ff02::c vlan30
```

Removing the configured Multicast Static Route with L2VN1 to SVI:

```
switch(config)# no ipv6 multicast-static-route vlan10 2001::1 ff02::c vlan30
```

Command History

Release	Modification
10.11	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	config	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

redistribute static

```
redistribute static
no redistribute static
```

Description

Exports all static multicast routes configured on a VRF to the corresponding PIM router. The **no** form of this command disables the redistribution.

Usage

Static multicast routes give the flexibility to program a specific path for multicast traffic from the source to the client without having to rely on the underlying protocols to build a multicast route. They can be configured on all the routers in the path or on a specific section of routers. The remaining section of routers can be configured to run the native PIM protocol. In such cases, the static multicast route is exported to PIM domain as PIM joins using this command.

Examples

Configuring redistribute static routes to PIM for IPv4:

```
switch(config)# router pim
switch(config-pim)# redistribute static
```

Disabling redistribute static routes to PIM for IPv4:

```
switch(config)# router pim
switch(config-pim)# no redistribute static
```

Configuring redistribute static routes to PIM for IPv4 on vrf red:

```
switch(config)# router pim vrf red
switch(config-pim)# redistribute static
```

Disabling redistribute static routes to PIM for IPv4 on vrf red:

```
switch(config)# router pim vrf red
switch(config-pim)# no redistribute static
```

Configuring redistribute static routes to PIM for IPv6:

```
switch(config)# router pim6
switch(config-pim)# redistribute static
```

Disabling redistribute static routes to PIM for IPv6:

```
switch(config)# router pim6
switch(config-pim)# no redistribute static
```

Configuring redistribute static routes to PIM for IPv6 on vrf red:

```
switch(config)# router pim6 vrf red
switch(config-pim)# redistribute static
```

Disabling redistribute static routes to PIM for IPv6 on vrf red:

```
switch(config)# router pim6 vrf red
switch(config-pim)# no redistribute static
```

Command History

Release	Modification
10.11	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100	config config-pim	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

Platforms	Command context	Authority
8320 8325 8360 8400 9300 10000		

show capacities multicast static route

```
show capacities multicast-static-route
show capacities-status multicast-static route
```

Description

Displays the maximum number of IPv4 and IPv6 static multicast routes that can be configured on the devices.

Examples

Displaying the maximum number of multicast static routes configured on the device:

```
switch# show capacities static-multicast-route
System Capacities: Filter Static Multicast Route
Capacities Name                                                                  Value
--------------------------------------------------------------------------------------
---
Maximum number of IPv4/IPv6 Static multicast nexthops supported           65536
Maximum number of IPv4/IPv6 Static multicast routes supported             4096
Maximum number of IPv4/IPv6 Summarized static multicast routes supported  1024

switch# show capacities-status static-multicast-route
System Capacities Status: Filter Static Multicast Route
Capacities Status Name                                Value    Maximum
--------------------------------------------------------------------------------
---
Number of IPv4/IPv6 Static multicast nexthops           10       65536
Number of IPv4/IPv6 Static multicast routes             33       4096
Number of IPv4/IPv6 Summarized static multicast routes  6        1024
```

Command History

Release	Modification
10.11	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320	Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

Platforms	Command context	Authority
8325 8360 8400 9300 10000		

show ip multicast-static-route

```
show ip multicst-static-route [all vrfs | vrf <VRF-NAME>]
```

Description

Displays the multicast static route and corresponding summarized route information for the specified VRF. If VRF is not specified, the default VRF is displayed.

Parameter	Description
[all vrfs]	Selects all VRFs to display.
[vrf <*VRF-NAME*>]	Specifies the VRF to display. The default is default vrf.

Examples

Displaying the multicast static route and corresponding summarized route information for all vrfs:

```
switch# show ip multicast-static-route all-vrfs
VRF : red


Group Address                 : 239.255.255.250
Source Address                : 40.40.40.2
Route type                    : Static
Incoming interface            : 1/1/2
Outgoing Interface List       :
Interface      State
---------      -----
vlan10         forwarding

VRF : blue

Group Address                 : 239.255.255.250
Source Address                : Any
Route type                    : Static-Summarized
Incoming interface            : 1/1/3
Outgoing Interface List       :
Interface      State
---------      -----
vlan20         forwarding
vlan30         forwarding
```

Command History

Release	Modification
10.11	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip multicast-static-route detail

```
show ip multicst-static-route <GROUP-ADDRESS> {<SOURCE-ADDRESS | ANY>} detail [all vrfs | vrf <VRF-NAME>]
```

Description

Displays the multicast static route and corresponding summarized route information for the given group address in the given VRF detail. If VRF is not specified, the default VRF is displayed.

Parameter	Description
<*GROUP-ADDRESS*>	Specifies the group address.
<*SOURCE-ADDRESS*>	Specifies the source address.
<*ANY*>	Selects any source address.
[all vrfs]	Selects all VRFs to display.
[vrf <*VRF-NAME*>]	Specifies the VRF to display. The default is default vrf.

Examples

Displaying the multicast static route information for a specific group:

```
switch# show ip multicast-static-route 239.255.255.250 40.40.40.3 detail vrf red

VRF : red

Group Address                 : 239.255.255.250
Source Address                : 40.40.40.2
Route type                    : Static
Incoming interface            : 1/1/2
Outgoing Interface List       :
Interface      State        Vteps
---------      -----        -----
vni1000        forwarding   2.2.2.2, 3.3.3.3
```

Displaying the multicast static route information for any group on vrf red:

```
switch# show ip multicast-static-route 239.255.255.250 any detail vrf red
VRF : red

Group Address                 : 239.255.255.250
Source Address                : Any
Route type                    : Static
Incoming interface            : 1/1/2
Outgoing Interface List       :

Interface      State        Vteps
---------      -----        -----
vni1000        forwarding   2.2.2.2, 3.3.3.3
```

Command History

Release	Modification
10.11	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ip multicast-static-route (group)

`show ip multicast-static-route <GROUP-ADDRESS> {<SOURCE-ADDRESS | ANY>} [all vrfs | vrf <VRF-NAME>]`

Description

Displays the multicast static route and corresponding summarized route information for the given group address in the given VRF briefly. If VRF is not specified, the default VRF is displayed.

Parameter	Description
<GROUP-ADDRESS>	Specifies the group address.
<SOURCE-ADDRESS>	Specifies the source address.
<ANY>	Selects any source address.
[all vrfs]	Selects all VRFs to display.
[vrf *<VRF-NAME>*]	Specifies the VRF to display. The default is default vrf.

Examples

Displaying the multicast static route information for all vrfs:

```
switch# show ip multicast-static-route 239.255.255.250 all-vrfs

VRF : red

Group Address                 : 239.255.255.250
Source Address                : 40.40.40.2
Route type                    : Static
Incoming interface            : 1/1/2
Outgoing Interface List       :
Interface      State
---------      -----
vlan10         forwarding

VRF : blue

Group Address                 : 239.255.255.250
Source Address                : Any
Route type                    : Static-summarized
Incoming interface            : 1/1/3
Outgoing Interface List       :
Interface      State
---------      -----
vlan20         forwarding
vlan30         forwarding
```

Displaying the multicast static route information for a specific group on vrf red:

```
switch# show ip multicast-static-route 239.255.255.250 40.40.40.4 vrf red
VRF : red

Group Address                 : 239.255.255.250
Source Address                : Any
Route type                    : Static
Incoming interface            : 1/1/2
Outgoing Interface List       :
Interface      State
---------      -----
vlan10         forwarding
```

Displaying the multicast static route information for a specific group and source :

```
switch# show ip multicast-static-route 239.255.255.250 40.40.40.2 all-vrfs
VRF : red

Group Address                 : 239.255.255.250
Source Address                : 40.40.40.2
Route type                    : Static
Incoming interface            : 1/1/2
Outgoing Interface List       :
Interface      State
---------      -----
vlan10         forwarding

VRF : blue
```

```
Group Address                 : 239.255.255.250
Source Address                : 40.40.40.2
Route type                    : Static
Incoming interface            : vlan40
Outgoing Interface List       :
Interface      State
---------      -----
vlan20         forwarding
vlan30         forwarding
```

Displaying the multicast static route information for a specific group and any source :

```
switch# show ip multicast-static-route 239.255.255.250 any all-vrfs
VRF : red

Group Address                 : 239.255.255.250
Source Address                : Any
Route type                    : Static-summarized
Incoming interface            : 1/1/2
Outgoing Interface List       :
Interface      State
---------      -----
vlan10         forwarding

VRF : blue

Group Address                 : 239.255.255.250
Source Address                : Any
Route type                    : Static-summarized
Incoming interface            : vlan40
Outgoing Interface List       :
Interface      State
---------      -----
vlan20         forwarding
vlan30         forwarding
```

Command History

Release	Modification
10.11	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 multicast-static-route

`show ipv6 multicast-static-route [all vrfs | vrf <VRF-NAME>]`

Description

Displays the multicast static route and corresponding summarized route information for the specified VRF. If VRF is not specified, the default VRF is displayed.

Parameter	Description
[all vrfs]	Selects all VRFs to display.
[vrf <*VRF-NAME*>]	Specifies the VRF to display. The default is default vrf.

Examples

Displaying the multicast static route and corresponding summarized route information for all vrfs:

```
switch# show ipv6 multicast-static-route all-vrfs

VRF : red

Group Address                 : ff0e::c
Source Address                : 2001::2
Route type                    : Static
Incoming interface            : vlan200
Outgoing Interface List       :
Interface      State
---------      -----
vlan10         forwarding

VRF : blue

Group Address                 : ff0e::c
Source Address                : Any
Route type                    : Static-Summarized
Incoming interface            : vlan200
Outgoing Interface List       :
Interface      State
---------      ----------
vlan10        forwarding
```

Displaying the multicast static route information for a specific group:

```
switch# show ipv6 multicast-static-route ff0e::c all-vrfs

VRF : red

Group Address                 : ff0e::c
Source Address                : 2001::2
Route type                    : Static
Incoming interface            : vlan200
Outgoing Interface List       :
Interface      State
---------      -----
vlan10         forwarding

VRF : blue
```

```
Group Address                 : ff0e::c
Source Address                : Any
Route type                    : Static-Summarized
Incoming interface            : vlan200
Outgoing Interface List       :
Interface      State
---------      ----------
vlan10         forwarding
```

Displaying the multicast static route information for a specific group and source:

```
switch# show ipv6 multicast-static-route ff0e::c 2001::2 all-vrfs

VRF : red

Group Address                 : ff0e::c
Source Address                : 2001::2
Route type                    : Static
Incoming interface            : vlan100
Outgoing Interface List       :
Interface      State
---------      -----
vlan10         forwarding

VRF : blue

Group Address                 : ff0e::c
Source Address                : 200::2
Route type                    : Static
Incoming interface            : vlan200
Outgoing Interface List       :
Interface      State
---------      ----------
vlan10         forwarding
```

Displaying the multicast static route information for a specific group and any source:

```
switch# show ipv6 multicast-static-route ff0e::c any all-vrfs

VRF : red

Group Address                 : ff0e::c
Source Address                : Any
Route type                    : Static-summarized
Incoming interface            : 1/1/3
Outgoing Interface List       :
Interface      State
---------      -----
vlan10         forwarding

VRF : blue

Group Address                 : ff0e::c
Source Address                : Any
Route type                    : Static-summarized
Incoming interface            : vlan200
Outgoing Interface List       :
Interface      State
```

```
---------      ----------
vlan10         forwarding
```

Command History

Release	Modification
10.11	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 multicast-static-route detail

`show ipv6 multicast-static-route <GROUP-ADDRESS> {<SOURCE-ADDRESS | ANY>} detail [all vrfs | vrf <VRF-NAME>]`

Description

Displays the multicast static route and corresponding summarized route information for the given group address in the given VRF detail. If VRF is not specified, the default VRF is displayed.

Parameter	Description
<*GROUP-ADDRESS*>	Specifies the group address.
<*SOURCE-ADDRESS*>	Specifies the source address.
<*ANY*>	Selects any source address.
[all vrfs]	Selects all VRFs to display.
[vrf <*VRF-NAME*>]	Specifies the VRF to display. The default is default vrf.

Examples

Displaying the multicast static route information for a specific group:

```
switch# show ipv6 multicast-static-route ff0e::c 2002::2 detail vrf red
VRF : red
```

```
Group Address                 : ff0e::c
Source Address                : 2002:2
Route type                    : Static
Incoming interface            : 1/1/2
Outgoing Interface List       :
Interface      State        Vteps
---------      -----        -----
vni1000        forwarding   2.2.2.2, 3.3.3.3
```

Displaying the multicast static route information for any group on vrf red:

```
switch# show ipv6 multicast-static-route ff0e::c any detail vrf red
VRF : red

Group Address                 : ff0e::c
Source Address                : Any
Route type                    : Static
Incoming interface            : 1/1/2
Outgoing Interface List       :
Interface      State        Vteps
---------      -----        -----
vni1000        forwarding   2.2.2.2, 3.3.3.3
```

Command History

Release	Modification
10.11	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show ipv6 multicast-static-route (group)

`show ipv6 multicst-static-route <GROUP-ADDRESS> {<SOURCE-ADDRESS | ANY>} [all vrfs | vrf <VRF-NAME>]`

Description

Displays the multicast static route and corresponding summarized route information for the given group address in the given VRF briefly. If VRF is not specified, the default VRF is displayed.

Parameter	Description
<GROUP-ADDRESS>	Specifies the group address.
<SOURCE-ADDRESS>	Specifies the source address.
<ANY>	Selects any source address.
[all vrfs]	Selects all VRFs to display.
[vrf *<VRF-NAME>*]	Specifies the VRF to display. The default is default vrf.

Examples

Displaying the multicast static route information for a specific group:

```
switch# show ipv6 multicast-static-route ff0e::c 2002::2 vrf red


VRF : red

Group Address                 : ff0e::c
Source Address                : 2002::2
Route type                    : Static
Incoming interface            : 1/1/2
Outgoing Interface List       :
Interface      State
---------      -----
vlan10         forwarding
```

Command History

Release	Modification
10.11	Command introduced.

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show running-config

```
show running-config
```

Description

Displays the running configuration.

Examples

Displaying the running configuration:

```
switch# show running-config
!
-----------
-----------
ip multicast-static-route vlan10 10.10.1.2 239.255.255.250 vlan20
ip multicast-static-route vlan10 10.10.1.2 239.255.255.250 1/1/2
ip multicast-static-route vlan21 any 239.255.255.250 1/1/2
ip multicast-static-route vlan30 10.10.1.2 239.255.255.250 1/1/16 vrf red
ip multicast-static-route 1/1/1 10.10.1.2 239.255.255.250 1/1/2
ipv6 multicast-static-route vlan10 2001::1 ff02::c vlan20
ipv6 multicast-static-route vlan50 any ff0e::c vlan70 vrf red
ipv6 multicast-static-route vlan50 any ff0e::c vlan80 vrf red
ipv6 multicast-static-route vlan10 2001::1 ff02::c vlan20
ipv6 multicast-static-route vlan10 2001::1 ff02::c 1/1/1
```

Command History

Release	Modification
10.11	Command introduced.

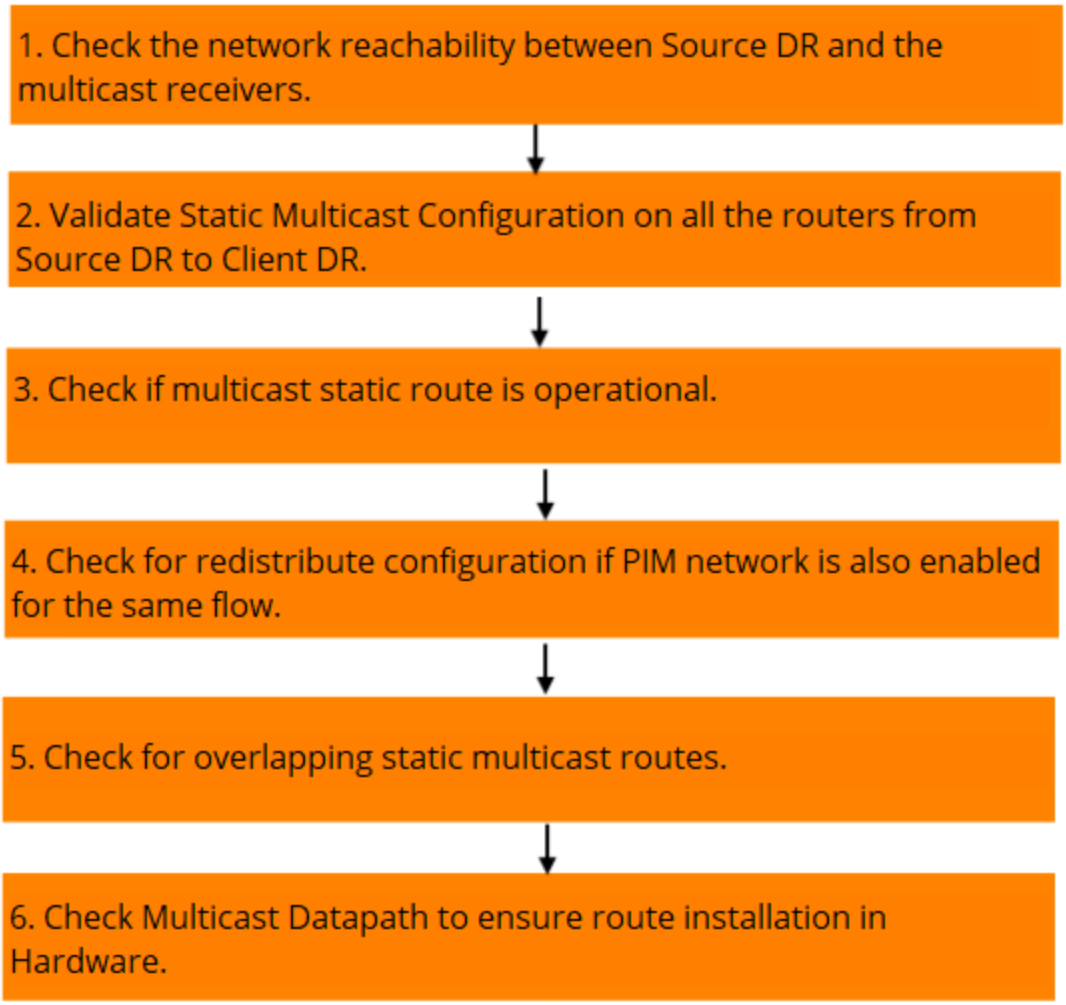
Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 8360 8400 9300 10000	Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

Debugging and Troubleshooting

The recommended static multicast route troubleshooting flow is provided in Figure 1, Static multicast route troubleshooting flow. Additional tips and guidance for each step are provided below.

Figure 1 *Static multicast route troubleshooting flow*



Step 1: Check the network reachability between Source DR and the multicast receivers.

a. Ensure there is connectivity between Source DR and Client DR devices where static multicast routes are configured.
b. Since static multicast routes use L3 interfaces to forward the traffic, the IPv4 or IPv6 address has to be configured.
c. It is not mandatory to run unicast routing protocols between Source DR and Client DR devices to achieve static multicast routing.

Step 2: Validate static multicast configuration on all the routers from Source DR to Client DR.

a. Ensure there are static multicast routes configured on all devices between Source DR and Client DR devices so that they form a forwarding path.

```
switch# show running-config
Current configuration:
!
-----------------------------------------------------------------------------
ip multicast-static-route vlan10 10.10.1.2 239.255.255.250 vlan20
ip multicast-static-route vlan10 10.10.1.2 239.255.255.250 1/1/2
ip multicast-static-route 1/1/1 10.10.1.2 239.255.255.250 1/1/2
```

```
ipv6 multicast-static-route vlan10 2001::1 ff02::c vlan20
ipv6 multicast-static-route vlan50 any ff0e::c vlan70 vrf red
ipv6 multicast-static-route vlan50 any ff0e::c vlan80 vrf red
```

Step 3: Check for ovelapping static multicast routes.

a. Configuration of overlapping static multicast routes can cause duplicate traffic or traffic drop.
b. Traffic forwarding is based on longest prefix match, so {S, G} static routes are preferred over {*, G} routes even when both entries are configured.
c. Configuration of overlapping static multicast routes on the device should be avoided if possible.

```
switch# show running-config
Current configuration:
!
------------------------------------------------------------------------------
ip multicast-static-route vlan4016 10.100.1.2 231.0.0.1 vlan4020
ip multicast-static-route vlan4016 any 231.0.0.1 vlan4021
```

Step 4: Check if multicast static route is operational.

a. Ensure that the static multicast routes configured are operation.
    a. If the upstream interface of the configured static multicast route is not operationally up, the static multicast route is considered non-operational and is not programmed into the hardware.
    b. If the upstream interface of the configured static multicast route is not with an IP address, the static multicast route is considered non-operational and is not programmed into the hardware.
    c. If the downstream interface(s) of the configured static multicast route is not operationally up, the static multicast route may be programmed as a bridge entry in the hardware.
    d. If the downstream interface(s) of the configured static multicast route is not configured with an IP address, the static multicast route may be programmed as a bridge entry in the hardware.

```
switch# show ip multicast-static-route 239.255.255.250 40.40.40.2 all-vrfs
VRF: blue

Group Address               : 239.255.255.250
Source Address              : 40.40.40.2
Route type                  : Static
Incoming interface          : vlan40
Outgoing interface list     :
Interface         State
----------        -----
vlan20            forwarding
vlan30            forwarding
```

Step 5: Check for redistribute configuration if PIM network is also enabled for the same flow.

a. For the redistribute mode where static multicast routes are redistributed into PIM domain as joins, the `redistribute` command should be configured in the route PIM context.

b. While redistributing the static multicast routes, do not configure static multicast routes on ECMP upstream paths as this can cause duplicate traffic.
c. Verify PIM mroutes on the neighboring router to the redistributing device to ensure successful redistribution.

```
switch# show running-config
Current configuration:
!
router pim
redistribute static
------------------------------------------------------------------------------
ip multicast-static-route vlan4016 10.100.1.2 231.0.0.1 vlan4020

switch2# show ip mroute
IP Multicast Route Entries

VRF: default
Total number of entries: 1
Group Address          : 231.0.0.1
Source Address         : 10.100.1.1
SSM Mroute             : False
Neighbor               :
Uptime                 : 00:15:51
State                  : route
Incoming interface     : vlan100
Outgoing interface List:
Interface          State
---------          -----
vlan4016           forwarding
```

Step 6: Check multicast datapath to ensure route installation in hardware.

a. Check multicast datapath command on all the devices to verify the routes are successful programmed.
b. Check mulitcast datapath command on all the devices to verify if the static multicast routes are active and that traffic is being forwarded using the static multicast route.

```
switch# show ip multicast routing datapath group 239.1.1.1 source 10.1.1.2 port vlan10

Multicast Routing Data-path Details
VRF                          : default
Source                       : 10.1.1.2/32
Group                        : 239.1.1.1/32
Primary Upstream Interface   : vlan10
From                         : static
Type                         : route
Replication Group Index      : 4097
Hardware Status              : active
Error Code                   : None
Retries for programming      : 0
Upstream Interface           : vlan10
     State                   : forwarding
Downstream Interface         : vlan20
     State                   : forwarding
```

Frequently Asked Questions

1. Can I enable both PIM and Static Multicast Route for the same flow in a network?

No, if a static multicast route is configured and operational, PIM does not learn the matching flow, and hence does not produce an mroute for this flow. Once static multicast route is deleted, PIM starts learning this flow and programs mroute into the forwarding table.

2. Does Static Multicast Route rely on the underlying unicast routing protocol?

Static multicast routes do not rely on the underlying unicast routing protocols to be operational. They rely on the configured path to forward the traffic from multicast source to receivers. For example, if the network only requires multicast forwarding using static multicast routing, OSPF/BGP for unicast traffic forwarding is not required. Currently, static multicast route do not use RPF checks or ensure reachability to Source before programming an mroute into the forwarding table.

3. Are there are any platform differences to be aware of?

Static Multicast Routing is supported on the 6200, 6300, 6400, 8100, 8320, 8325, 8360, 8400 and 10000 platforms. However, summarized static multicast route is not supported on the 8400 platform.

4. Is the Active-Active command required on VSX deployments?

Static multicast route feature is agnostic to Active-Active configuration in VSX devices. With static multicast route, VSX-primary routes the packet while VSX-Secondary programs a bridge entry in the forwarding table irrespective of active-active configuration.

5. Does the solution work for all types of interfaces?

The solution works with all types of underlay interfaces that are currently supported in AOS-CX. Static multicast on VxLAN and GRE tunnels are not supported.

6. Can I replace PIM with Static Multicast route on my network?

No. Static multicast route is not a substitute for PIM. It should be used in small networks under a single administrative domain and for very specific cases as mentioned in Use cases.

7. What is the difference between static multicast routing as described in this chapter versus the following command?

```
switch# router pim
ip mroute 10.1.1.1/32 10.2.2.2
```

The `router pim` command configures multicast routing to use a separate path for RPF, which is different from unicast routing. It still requires a multicast protocol, like PIM-SM, to route the packet. Static multicast routing as described in this chapter program multicast forwarding directly into the hardware without PIM.

8. How can I avoid flooding when static multicast routing is defined?

Configure IGMP Snooping at the mutlicast receiver network.

Chapter 17
Support and Other Resources

Accessing HPE Aruba Networking Support

HPE Aruba Networking Support Services	https://www.arubanetworks.com/support-services/
AOS-CX Switch Software Documentation Portal	https://www.arubanetworks.com/techdocs/AOS-CX/help_portal/Content/home.htm
HPE Aruba Networking Support Portal	https://networkingsupport.hpe.com/home
North America telephone	1-800-943-4526 (US & Canada Toll-Free Number) +1-408-754-1200 (Primary - Toll Number) +1-650-385-6582 (Backup - Toll Number - Use only when all other numbers are not working)
International telephone	https://www.arubanetworks.com/support-services/contact-support/

Be sure to collect the following information before contacting Support:

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Other useful sites

Other websites that can be used to find information:

Airheads social forums and Knowledge Base	https://community.arubanetworks.com/
HPE Aruba Networking Hardware Documentation and Translations Portal	https://www.arubanetworks.com/techdocs/hardware/DocumentationPortal/Content/home.htm

HPE Aruba Networking software	https://networkingsupport.hpe.com/downloads
Software licensing and Feature Packs	https://lms.arubanetworks.com/
End-of-Life information	https://www.arubanetworks.com/support-services/end-of-life/
HPE Aruba Networking Developer Hub	https://developer.arubanetworks.com/

Accessing Updates

You can access updates from the HPE Aruba Networking Support Portal at https://networkingsupport.hpe.com.

Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.

To subscribe to eNewsletters and alerts:

https://networkingsupport.hpe./notifications/subscriptions (requires an active HPE Aruba Networking Support Portal account to manage subscriptions). Security notices are viewable without an HPE Aruba Networking Support Portal account.

Warranty Information

To view warranty information for your product, go to https://www.arubanetworks.com/support-services/product-warranties/.

Regulatory Information

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at https://www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional regulatory information

HPE Aruba Networking is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements, environmental data (company programs, product recycling, energy efficiency), and safety information and compliance data, (RoHS and WEEE). For more information, see https://www.arubanetworks.com/company/about-us/environmental-citizenship/.

Documentation Feedback

HPE Aruba Networking is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (docsfeedback-switching@hpe.com). When submitting your feedback, include the document title, part number, edition, and publication date located on the front cover of the document. For online help

content, include the product name, product version, help edition, and publication date located on the legal notices page.