Configure Nexus L2 EVPN over SR MPLS with VPC Anycast Gateway

Contents

Introduction

This document describes how to deploy L2 Ethernet VPN over Segment Routing (SR) Multiprotocol Label Switching with virtual Port Channel on Nexus9K.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Border Gateway Protocol (BGP)
- Open Shortest Path First (OSPF)
- MPLS
- Label Distribution Protocol (LDP)
- Resource Reservation Protocol (RSVP)
- EVPN
- SR
- vPC

Components Used

The information in this document is based on these software and hardware versions:

- Nexus switch 92360C that runs Release 9.3(10) for H1 and H3.
- Nexus switch 93180YC-FX that runs Release 10.2(3) for Spine.
- Nexus switch 93240YC that runs Release 10.2(3) for Leaf.

The information in this document was created from the devices in a specific lab environment. All of

the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Background Information

VPLS/L2-EVPN is a Multipoint-to-Multipoint Layer 2 VPN Service that connects multiple branches of a Customer, in a single logical switched architecture over an IP/MPLS network.

Overview of Layer2 EVPN-MPLS SR

EVPN (RFC 7432) is BGP MPLS-based solution which has been used for next generation Ethernet services in virtualized data center network. It uses several blocks such as Route Distinguisher (RD), Route Target (RT), and Virtual Routing and Forwarding (VRF) from MPLS technologies that exist.

In contrast to VPLS , EVPN enables control-plane based MAC learn in the core. In EVPN, PEs that participate in the EVPN instances learn custom MAC routes in control-plane with Multiprotocol (MP)-BGP protocol. Control-plane MAC learn provides a number of benefits that allow EVPN to address the VPLS shortcomings, which includes support for multihome with per-flow load balancing.
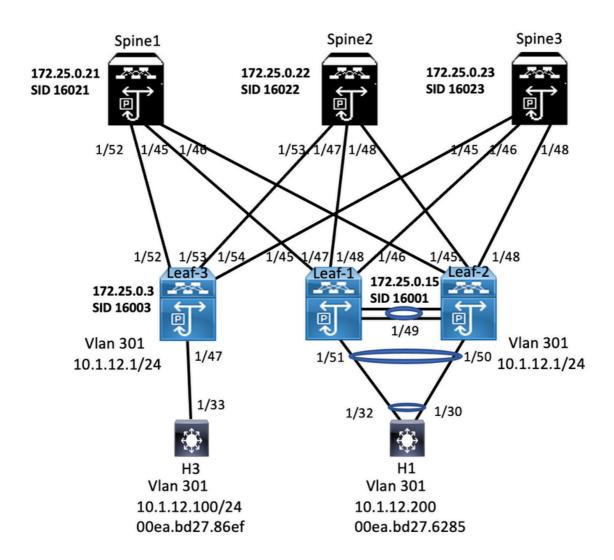
SR L2 EVPN is new feature available in NXOS 9.3(1) that is supported on Nexus 9300 FX2 series platform.

Limitations for L2 EVPN over SR MPLS

- SR L2 EVPN flooding is based on the ingress replication mechanism
- It uses EVPN Type 3 Route for BUM Traffic
- MPLS core does not support multicast
- Address Resolution Protocol (ARP) suppression is not supported
- Consistency check on VPC is not supported
- The same L2 EVPN instance (EVI) and L3 EVI cannot be configured together

Configure

Network Diagram

High-Level Configuration

1. Install Features
2. Configure IP address - Underlay
3. Configure IGP - OSPF
4. Configure MP - BGP
5. Configure VLAN and EVPN Overlay
6. Configure e-BGP between Hosts and LEAFs
7. Configure VPC on LEAF 1 and 2

Spine1

Enable Feature, Label-Range, Route-map, Label-Index	Interface Configuration	BGP/EVPN Configuration	
	interface Ethernet1/45		
	description connected to Leaf1 - 1/45 - 192.168.1.9		
install feature-set mpls	mtu 9216		
allow feature-set mpls	logging event port link-status		
feature-set mpls	no ip redirects		
feature bgp	ip address 192.168.1.10/30	router bgp 64087	template peer EBGP-ACCESS
feature mpls segment-routing	ip arp timeout 14400	router-id 172.25.0.21	remote-as 65534
feature mpls evpn	mpls ip forwarding	bestpath as-path multipath-relax	description EBGP-PEERING-to-ACCESS
feature interface-vlan	interface Ethernet1/46	bestpath med missing-as-worst	address-family ipv4 unicast
feature mpls oam	description connected to Leaf2- 1/46 - 192.168.2.9	log-neighbor-changes	disable-peer-as-check
feature mpls segment-routing traffic-engineering	mtu 9216	nexthop suppress-default-resolution	send-community
	logging event port link-status	address-family ipv4 unicast	send-community extended
	no ip redirects	network 172.25.0.21/32	default-originate
segment-routing	ip address 192.168.2.10/30	maximum-paths 4	no advertise local-labeled-route
mpls	ip arp timeout 14400	nexthop route-map NH-RESTRICT	soft-reconfiguration inbound
global-block 16000 24000	mpls ip forwarding	allocate-label route-map node-sid-label	address-family ipv4 labeled-unicast
connected-prefix-sid-map	interface Ethernet1/52	address-family ipv4 labeled-unicast	disable-peer-as-check
address-family ipv4	description connected to Leaf3 - 1/52 - 192.168.3.9	prefix-priority high	send-community
172.25.0.21/32 absolute 16021	mtu 9216	address-family l2vpn evpn	send-community extended
	logging event port link-status	retain route-target all	soft-reconfiguration inbound
ip prefix-list NH-RESTRICT seq 5 permit 0.0.0.0/0	no ip redirects	neighbor 192.168.1.9	address-family l2vpn evpn
ip prefix-list node-sid-loopback seq 5 permit 172.25.0.21/32	ip address 192.168.3.10/30	inherit peer EBGP-ACCESS	disable-peer-as-check
route-map NH-RESTRICT deny 10	ip arp timeout 14400	neighbor 192.168.2.9	send-community
match ip address prefix-list NH-RESTRICT	mpls ip forwarding	inherit peer EBGP-ACCESS	send-community extended
route-map NH-RESTRICT permit 20	interface loopback0	neighbor 192.168.3.9	route-map NH_UNCHG out
route-map NH_UNCHG permit 10	ip address 172.25.0.21/32	inherit peer EBGP-ACCESS	encapsulation mpls
set ip next-hop unchanged	icam monitor scale		

Spine2

Enable Feature, Label-Range, Route-map, Label-Index
```
install feature-set mpls
  allow feature-set mpls
feature-set mpls
feature bgp
feature mpls segment-routing
feature mpls evpn
feature interface-vlan
feature mpls oam
feature mpls segment-routing traffic-engineering

segment-routing
  mpls
    global-block 16000 24000
    connected-prefix-sid-map
      address-family ipv4
        172.25.0.22/32 absolute 16022

ip prefix-list NH-RESTRICT seq 5 permit 0.0.0.0/0
ip prefix-list node-sid-loopback seq 5 permit 172.25.0.22/32
route-map NH-RESTRICT deny 10
  match ip address prefix-list NH-RESTRICT
route-map NH-RESTRICT permit 20
route-map NH_UNCHG permit 10
  set ip next-hop unchanged
```

Interface Configuration
```
Ethernet1/47
  description connected to Leaf1 - 1/47 - 192.168.1.13
  mtu 9216
  logging event port link-status
  no ip redirects
  ip address 192.168.1.14/30
  ip arp timeout 14400
  mpls ip forwarding
interface Ethernet1/48
  description connected to Leaf2 - 1/45 - 192.168.2.13
  mtu 9216
  logging event port link-status
  no ip redirects
  ip address 192.168.2.14/30
  ip arp timeout 14400
  mpls ip forwarding
interface Ethernet1/53
  description connected to Leaf3 - 1/53 - 192.168.3.13
  mtu 9216
  logging event port link-status
  no ip redirects
  ip address 192.168.3.14/30
  ip arp timeout 14400
  mpls ip forwarding
interface loopback0
  ip address 172.25.0.22/32
icam monitor scale
```

BGP/EVPN Configuration
```
router bgp 64087
  router-id 172.25.0.22
  bestpath as-path multipath-relax
  bestpath med missing-as-worst
  log-neighbor-changes
  nexthop suppress-default-resolution
  address-family ipv4 unicast
    network 172.25.0.22/32
    maximum-paths 4
    nexthop route-map NH-RESTRICT
    allocate-label route-map node-sid-label
  address-family ipv4 labeled-unicast
    prefix-priority high
  address-family l2vpn evpn
    retain route-target all
  neighbor 192.168.1.13
    inherit peer EBGP-ACCESS
  neighbor 192.168.2.13
    inherit peer EBGP-ACCESS
  neighbor 192.168.3.13
    inherit peer EBGP-ACCESS

template peer EBGP-ACCESS
  remote-as 65534
  description EBGP-PEERING-to-ACCESS
  address-family ipv4 unicast
    disable-peer-as-check
    send-community
    send-community extended
    default-originate
    no advertise local-labeled-route
    soft-reconfiguration inbound
  address-family ipv4 labeled-unicast
    disable-peer-as-check
    send-community
    send-community extended
    soft-reconfiguration inbound
  address-family l2vpn evpn
    disable-peer-as-check
    send-community
    send-community extended
    route-map NH_UNCHG out
  encapsulation mpls
```

Leaf-1

Enable Feature, Label-Range, Route-map, Label-Index
```
install feature-set mpls
feature-set mpls
nv overlay evpn
feature bgp
feature mpls segment-routing
feature mpls evpn
feature interface-vlan
Feature lacp
feature vpc
feature mpls oam
feature nv overlay
fabric forwarding anycast-gateway-mac 0000.0000.1111
vlan 1,301-310
segment-routing
  mpls
    global-block 16000 24000
    connected-prefix-sid-map
      address-family ipv4
        172.25.0.15/32 absolute 16001
vlan 301
  evi auto

vrf context VPN-A
  evi 30001
vrf context VPN-B
  rd auto
  address-family ipv4 unicast
    route-target import 302:302
    route-target import 302:302 evpn
    route-target export 302:302
    route-target export 302:302 evpn

ip prefix-list node-sid-loopback seq 10 permit 172.25.0.15/32
ip as-path access-list LOCALLY-ORIGINATE seq 1 permit "^65534"
ip as-path access-list LOCALLY-ORIGINATE seq 2 permit "^$"
route-map NODE-SID-MED permit 10
  match ip address prefix-list node-sid-loopback
  set metric 100
route-map NODE-SID-MED permit 20
route-map SET_NH permit 5
  match community MATCH-65534:65534
  set ip next-hop unchanged
route-map SET_NH permit 10
  match as-path LOCALLY-ORIGINATE
  set ip next-hop 172.25.0.15
```

VPC Configuration
```
vpc domain 21
  peer-switch
  peer-keepalive destination 10.88.238.243 source 10.88.238.242
  peer-gateway
  ip arp synchronize
interface Ethernet1/49
  switchport
  switchport mode trunk
  switchport trunk allowed vlan 301-310
  channel-group 10 mode active
interface Ethernet1/51
  switchport
  switchport mode trunk
  switchport trunk allowed vlan 301-310
  channel-group 30 mode active
interface port-channel10
  switchport
  switchport mode trunk
  switchport trunk allowed vlan 301-310
  spanning-tree port type network
  vpc peer-link
interface port-channel30
  switchport mode trunk
  switchport trunk allowed vlan 301-310
  vpc 30
```

Interface Configuration
```
interface Ethernet1/45
  description connected to spine1 - 1/45 - 192.168.1.10
  mtu 9216
  logging event port link-status
  no ip redirects
  ip address 192.168.1.9/30
  ip arp timeout 14400
  mpls ip forwarding
  no shutdown
interface Ethernet1/47
  description connected to spine2 - 1/47 - 192.168.1.14
  mtu 9216
  logging event port link-status
  no ip redirects
  ip address 192.168.1.13/30
  ip arp timeout 14400
  mpls ip forwarding
interface Vlan301
  no shutdown
  vrf member VPN-A
  no ip redirects
  ip address 10.1.12.1/24
  ip directed-broadcast ip-dir-bcast
  no ipv6 redirects
  ip arp timeout 720
  fabric forwarding mode anycast-gateway

interface loopback0
  ip address 172.25.0.1/32
  ip address 172.25.0.15/32 secondary
interface loopback1
  ip address 172.25.0.201/32
icam monitor scale
```

BGP/EVPN Configuration
```
router bgp 65534
  router-id 172.25.0.1
  disable-policy-batching
  bestpath as-path multipath-relax
  bestpath med missing-as-worst
  log-neighbor-changes
  event-history detail size large
  nexthop suppress-default-resolution
  address-family ipv4 unicast
    network 172.25.0.1/32
    network 172.25.0.15/32
    network 172.25.0.201/32
    maximum-paths 4
    maximum-paths ibgp 4
    allocate-label route-map node-sid-label
  address-family ipv4 labeled-unicast
    prefix-priority high
  address-family l2vpn evpn
  neighbor 192.168.1.10
    inherit peer EBGP-SPINE
  neighbor 192.168.1.14
    inherit peer EBGP-SPINE

router bgp 65534
template peer EBGP-SPINE
  remote-as 64087
  description EBGP-PEERING-to-AGG
  address-family ipv4 unicast
    allows-in 1
    send-community
    send-community extended
    route-map NODE-SID-MED out
    no advertise local-labeled-route
    soft-reconfiguration inbound
  address-family ipv4 labeled-unicast
    allows-in 1
    send-community
    send-community extended
    route-map NODE-SID-MED out
    soft-reconfiguration inbound always
  address-family l2vpn evpn
    allows-in 1
    send-community
    send-community extended
    filter-list LOCALLY-ORIGINATE out
    route-map SET_NH out
  encapsulation mpls

vrf VPN-A
  bestpath as-path multipath-relax
  allocate-index 2001
  address-family ipv4 unicast
    network 10.1.12.0/24
    advertise l2vpn evpn
    maximum-paths 4
vrf VPN-B
  bestpath as-path multipath-relax
  allocate-index 2002
  address-family ipv4 unicast
    network 10.1.13.0/24
    advertise l2vpn evpn
    maximum-paths 4
evpn
  evi 1000
    encapsulation mpls
    source-interface loopback0
```

Leaf-2

Enable Feature, Label-Range, Route-map, Label-Index
```
install feature-set mpls
  allow feature-set mpls
feature-set mpls
nv overlay evpn
feature bgp
feature mpls segment-routing
feature mpls evpn
feature interface-vlan
feature lacp
feature vpc
feature mpls oam
feature nv overlay

forwarding anycast-gateway-mac 0000.0000.1111
vlan 1,301-310
segment-routing
  mpls
    global-block 16000 24000
    connected-prefix-sid-map
      address-family ipv4
        172.25.0.15/32 absolute 16001
vlan 301
  evi auto

ip prefix-list node-sid-loopback seq 10 permit 172.25.0.15/32
ip as-path access-list LOCALLY-ORIGINATE seq 1 permit "^65534"
ip as-path access-list LOCALLY-ORIGINATE seq 2 permit "^$"
route-map NODE-SID-MED permit 10
  match ip address prefix-list node-sid-loopback
  set metric 100
route-map NODE-SID-MED permit 20
route-map SET_NH permit 5
  match community MATCH-65534:65534
  set ip next-hop unchanged
route-map SET_NH permit 10
  match as-path LOCALLY-ORIGINATE
  set ip next-hop 172.25.0.15

vrf context VPN-A
  evi 30001
vrf context VPN-B
  rd auto
  address-family ipv4 unicast
    route-target import 302:302
    route-target import 302:302 evpn
    route-target export 302:302
    route-target export 302:302 evpn
```

VPC Configuration
```
vpc domain 21
  peer-switch
  peer-keepalive destination 10.88.238.242 source 10.88.238.243
  peer-gateway
  ip arp synchronize
port-channel10
  switchport
  switchport mode trunk
  switchport trunk allowed vlan 301-310
  spanning-tree port type network
  vpc peer-link
interface port-channel30
  switchport
  switchport mode trunk
  switchport trunk allowed vlan 301-310
  vpc 30
                                               fabric
interface Ethernet1/49
  switchport
  switchport mode trunk
  switchport trunk allowed vlan 301-310
  channel-group 10 mode active
interface Ethernet1/50
  switchport
  switchport mode trunk
  switchport trunk allowed vlan 301-310
  channel-group 30 mode active
```

Interface Configuration
```
interface loopback0
  ip address 172.25.0.2/32
  ip address 172.25.0.15/32 secondary
                                    interface
interface loopback1
  ip address 172.25.0.201/32
  icam monitor scale
interface Ethernet1/45
  description connected to spine2 - 1/48 - 192.168.2.14
  mtu 9216
  logging event port link-status
  no ip redirects
  ip address 192.168.2.13/30
  ip arp timeout 14400
  mpls ip forwarding
  no shutdown
interface Ethernet1/46
  description connected to Spine1- 1/46 - 192.168.2.10
  mtu 9216
  logging event port link-status
  no ip redirects
  ip address 192.168.2.9/30
  ip arp timeout 14400
  mpls ip forwarding
  no shutdown

interface Vlan1
  no ip redirects
  no ipv6 redirects
interface Vlan301
  no shutdown
  vrf member VPN-A
  no ip redirects
  ip address 10.1.12.1/24
  ip directed-broadcast ip-dir-bcast
  no ipv6 redirects
  ip arp timeout 720
  fabric forwarding mode anycast-gateway
```

BGP/EVPN Configuration
```
router bgp 65534
  router-id 172.25.0.2
  disable-policy-batching
  bestpath as-path multipath-relax
  bestpath med missing-as-worst
  log-neighbor-changes
  event-history detail size large
  nexthop suppress-default-resolution
  address-family ipv4 unicast
    network 172.25.0.2/32
    network 172.25.0.15/32
    network 172.25.0.201/32
    maximum-paths 4
    maximum-paths ibgp 4
    allocate-label route-map node-sid-label
  address-family ipv4 labeled-unicast
    prefix-priority high
  address-family l2vpn evpn
  neighbor 192.168.2.10
    inherit peer EBGP-SPINE
  neighbor 192.168.2.14
    inherit peer EBGP-SPINE

vrf VPN-A
  bestpath as-path multipath-relax
  allocate-index 2001
  address-family ipv4 unicast
    network 10.2.12.0/24
    advertise l2vpn evpn
    maximum-paths 4
vrf VPN-B
  bestpath as-path multipath-relax
  allocate-index 2002
  address-family ipv4 unicast
    network 10.2.13.0/24
    advertise l2vpn evpn
    maximum-paths 4
evpn
  evi 1000
    encapsulation mpls
    source-interface loopback0

router bgp 65534
template peer EBGP-SPINE
  remote-as 64087
  description EBGP-PEERING-to-AGG
  address-family ipv4 unicast
    allows-in 1
    send-community
    send-community extended
    route-map NODE-SID-MED out
    no advertise local-labeled-route
    soft-reconfiguration inbound
  address-family ipv4 labeled-unicast
    allows-in 1
    send-community
    send-community extended
    route-map NODE-SID-MED out
    soft-reconfiguration inbound always
  address-family l2vpn evpn
    allows-in 1
    send-community
    send-community extended
    filter-list LOCALLY-ORIGINATE out
    route-map SET_NH out
  encapsulation mpls
```

Leaf-3		
Enable Feature, Label-Range, Route-map, Label-Index	Interface Configuration	BGP/EVPN Configuration

	ip access-group deny-to-core_ra in	router bgp 65534
	vrf member VPN-A	router-id 172.25.0.3
	no ip redirects	disable-policy-batching
	ip address 10.1.12.1/24	bestpath as-path multipath-relax
	fabric forwarding mode anycast-gateway	bestpath med missing-as-worst
	interface Vlan302	log-neighbor-changes
install feature-set mpls	ip access-group deny-to-core_ra in	event-history detail size large
feature-set mpls	vrf member VPN-B	nexthop suppress-default-resolution
nv overlay evpn	no ip redirects	address-family ipv4 unicast
feature bgp	ip address 10.3.13.1/24	network 172.25.0.3/32
feature mpls segment-routing	ip directed-broadcast ip-dir-bcast	maximum-paths 4
feature mpls evpn	ip arp timeout 720	maximum-paths ibgp 4
feature mpls oam	Ethernet1/47	allocate-label route-map node-sid-label
feature nv overlay	switchport	address-family ipv4 labeled-unicast
	switchport mode trunk	prefix-priority high
fabric forwarding anycast-gateway-mac 0000.0000.1111	switchport trunk allowed vlan 301-310	address-family l2vpn evpn
vlan 1,301	interface Ethernet1/52	neighbor 192.168.3.10
segment-routing	description connected to Spine1 - 1/52 - 192.168.3.10	inherit peer EBGP-SPINE
mpls	mtu 9216	neighbor 192.168.3.14
global-block 16000 24000	logging event port link-status	inherit peer EBGP-SPINE
connected-prefix-sid-map	no ip redirects	vrf VPN-A
address-family ipv4	ip address 192.168.3.9/30	bestpath as-path multipath-relax
172.25.0.3/32 absolute 16003	ip arp timeout 14400	allocate-index 2001
vlan 301	mpls ip forwarding	address-family ipv4 unicast
evi auto		advertise l2vpn evpn
		maximum-paths 4

ip prefix-list node-sid-loopback seq 10 permit 172.25.0.3/32		
ip as-path access-list LOCALLY-ORIGINATE seq 1 permit "^65534"		
ip as-path access-list LOCALLY-ORIGINATE seq 2 permit "^$"		
route-map NODE-SID-MED permit 10		
match ip address prefix-list node-sid-loopback		
set metric 100		
route-map NODE-SID-MED permit 20		
route-map SET_NH permit 5		
match community MATCH-65534:65534	interface Ethernet1/53	
set ip next-hop unchanged	description connected to Spine2 - 1/53 - 20.3.1.14	
route-map SET_NH permit 10	mtu 9216	
match as-path LOCALLY-ORIGINATE	logging event port link-status	
set ip next-hop 172.25.0.3	no ip redirects	vrf VPN-B
	ip address 192.168.3.13/30	bestpath as-path multipath-relax
vrf context VPN-A	ip arp timeout 14400	allocate-index 2002
evi 30001	mpls ip forwarding	address-family ipv4 unicast
vrf context VPN-B	no shutdown	network 10.3.13.0/24
rd auto		advertise l2vpn evpn
address-family ipv4 unicast		maximum-paths 4
route-target import 302:302	interface loopback0	evpn
route-target import 302:302 evpn	ip address 172.25.0.3/32	evi 1000
route-target export 302:302	icam monitor scale	encapsulation mpls
route-target export 302:302 evpn		

Interface column (middle) – interface Ethernet1/47:

BGP column right side additional:

| template peer EBGP-SPINE |
| remote-as 64087 |
| description EBGP-PEERING-to-AGG |
| address-family ipv4 unicast |
| allowas-in 1 |
| send-community |
| send-community extended |
| route-map NODE-SID-MED out |
| no advertise local-labeled-route |
| soft-reconfiguration inbound |
| address-family ipv4 labeled-unicast |
| allowas-in 1 |
| send-community |
| send-community extended |
| route-map NODE-SID-MED out |
| soft-reconfiguration inbound always |
| address-family l2vpn evpn |
| allowas-in 1 |
| send-community |
| send-community extended |
| route-map SET_NH out |
| encapsulation mpls |

Host-1 (H1) Configuration

interface Ethernet1/30
  switchport
  switchport mode trunk
  switchport trunk allowed vlan 301-310
  channel-group 30 mode active
  no shutdown

interface Vlan301
  no shutdown
  no ip redirects
  ip address 10.1.12.100/24

interface Ethernet1/32
  switchport
  switchport mode trunk
  switchport trunk allowed vlan 301-310
  channel-group 30 mode active
  no shutdown

interface port-channel30
  switchport
  switchport mode trunk
  switchport trunk allowed vlan 301-310

Host-3 (H3) Configuration

interface Vlan301
  no shutdown
  no ip redirects
  ip address 10.1.12.200/24

interface Ethernet1/33
  switchport
  switchport mode trunk
  switchport trunk allowed vlan 301-310
  no shutdown

Verify

Use this section in order to confirm that your configuration works properly

```
ping 10.1.12.200
PING 10.1.12.200 (10.1.12.200): 56 data bytes
64 bytes from 10.1.12.200: icmp_seq=0 ttl=254 time=1.14 ms
64 bytes from 10.1.12.200: icmp_seq=1 ttl=254 time=0.687 ms
64 bytes from 10.1.12.200: icmp_seq=2 ttl=254 time=0.658 ms
64 bytes from 10.1.12.200: icmp_seq=3 ttl=254 time=0.636 ms
64 bytes from 10.1.12.200: icmp_seq=4 ttl=254 time=0.699 ms
--- 10.1.12.200 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.636/0.763/1.14 ms
H1# show ip int brie
IP Interface Status for VRF "default"(1)
Interface        IP Address     Interface Status
Vlan301          10.1.12.100    protocol-up/link-up/admin-up

H1# show mac address-table
Legend:
    * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
    age - seconds since last seen,+ - primary entry using vPC Peer-Link,
    (T) - True, (F) - False, C - ControlPlane MAC, ~ - vsan
    VLAN   MAC Address    Type   age   Secure NTFY Ports
--------+---------------+-------+-----+------+----+-------------
* 301   0000.0000.1111 dynamic 0     F    F   Po30
* 301   00ea.bd27.86ef dynamic 0     F    F   Po30
G  -    00ea.bd27.6285 static  -     F    F   sup-eth1(R)
G 301   00ea.bd27.6285 static  -     F    F   sup-eth1(R)
```

```
H2# show ip interface brief
Interface    IP Address    Interface Status
Vlan301      10.1.12.200   protocol-up/link-up/admin-up
H3# ping 10.1.12.100
PING 10.1.12.100 (10.1.12.100): 56 data bytes
64 bytes from 10.1.12.100: icmp_seq=0 ttl=254 time=1.211 ms
64 bytes from 10.1.12.100: icmp_seq=1 ttl=254 time=0.694 ms
64 bytes from 10.1.12.100: icmp_seq=2 ttl=254 time=0.68 ms
64 bytes from 10.1.12.100: icmp_seq=3 ttl=254 time=0.673 ms
64 bytes from 10.1.12.100: icmp_seq=4 ttl=254 time=0.624 ms
--- 10.1.12.100 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.624/0.776/1.211 ms
H3# show int vlan 301
Vlan301 is up, line protocol is up, autostate enabled
    Hardware is EtherSVI, address is 00ea.bd27.86ef
H3# show mac address-table
Legend:
    * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
    age - seconds since last seen,+ - primary entry using vPC Peer-Link,
    VLAN   MAC Address    Type   age   Secure NTFY Ports
--------+---------------+-------+-----+------+----+-------------
* 301   0000.0000.1111 dynamic 0     F    F   Eth1/33
* 301   00ea.bd27.6285 dynamic 0     F    F   Eth1/33
G  -    00ea.bd27.86ef static  -     F    F   sup-eth1(R)
G 301   00ea.bd27.86ef static  -     F    F   sup-eth1(R)
```

```
spine-1# show bgp l2vpn evpn
BGP routing table information for VRF default, address family L2VPN EVPN
BGP table version is 188, Local Router ID is 172.25.0.21
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-i
njected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup, 2 - Network
    Next Hop     Metric   LocPrf   Weight Path
Route Distinguisher: 172.25.0.1:5
*>e[5]:[0]:[0]:[24]:[10.1.12.0]/224
                    172.25.0.15  4294967295         0 65534 i
Route Distinguisher: 172.25.0.1:37164
*>e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[0]:[0.0.0.0]/216
                    172.25.0.15  4294967295         0 65534 i
*>e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[32]:[10.1.12.100]/272
                    172.25.0.15  4294967295         0 65534 i
*>e[3]:[0]:[32]:[172.25.0.15]/88
                    172.25.0.15  4294967295         0 65534 i
Route Distinguisher: 172.25.0.2:37164
*>e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[0]:[0.0.0.0]/216
                    172.25.0.15  4294967295         0 65534 i
*>e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[32]:[10.1.12.100]/272
                    172.25.0.15  4294967295         0 65534 i
*>e[3]:[0]:[32]:[172.25.0.15]/88
                    172.25.0.15  4294967295         0 65534 i

Route Distinguisher: 172.25.0.3:37164
*>e[2]:[0]:[0]:[48]:[00ea.bd27.86ef]:[0]:[0.0.0.0]/216
                    172.25.0.3   4294967295         0 65534 i
*>e[2]:[0]:[0]:[48]:[00ea.bd27.86ef]:[32]:[10.1.12.200]/272
                    172.25.0.3   4294967295         0 65534 i
*>e[3]:[0]:[32]:[172.25.0.3]/88
                    172.25.0.3   4294967295         0 65534 i

spine-1# show ip int brie

IP Interface Status for VRF "default"(1)
Interface    IP Address     Interface Status
Lo0          172.25.0.21    protocol-up/link-up/admin-up
Eth1/45      192.168.1.10   protocol-up/link-up/admin-up
Eth1/46      192.168.2.10   protocol-up/link-up/admin-up
Eth1/52      192.168.3.10   protocol-up/link-up/admin-up
spine-1#
```

```
BGP routing table information for VRF default, address family L2VPN EVPN
EVPN
BGP table version is 188, Local Router ID is 172.25.0.22
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid,
>-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-
i
njected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup, 2 -
b
Network      Next Hop      Metric   LocPrf   Weight Path
Route Distinguisher: 172.25.0.1:5
*>e[5]:[0]:[0]:[24]:[12.1.12.0]/224
                    172.25.0.15  4294967295         0 65534 i
Route Distinguisher: 172.25.0.1:37164
*>e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[0]:[0.0.0.0]/216
                    172.25.0.15  4294967295         0 65534 i
*>e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[32]:[10.1.12.100]/272
                    172.25.0.15  4294967295         0 65534 i
*>e[3]:[0]:[32]:[172.25.0.15]/88
                    172.25.0.15  4294967295         0 65534 i

Route Distinguisher: 172.25.0.2:37164
*>e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[0]:[0.0.0.0]/216
                    172.25.0.15  4294967295         0 65534 i
*>e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[32]:[10.1.12.100]/272

Route Distinguisher: 172.25.0.3:37164
*>e[2]:[0]:[0]:[48]:[00ea.bd27.86ef]:[0]:[0.0.0.0]/216
                    172.25.0.3   4294967295         0 65534 i
*>e[2]:[0]:[0]:[48]:[00ea.bd27.86ef]:[32]:[10.1.12.200]/272
                    172.25.0.3   4294967295         0 65534 i
*>e[3]:[0]:[32]:[172.25.0.3]/88
                    172.25.0.3   4294967295         0 65534 i

spine2# show ip int brie

IP Interface Status for VRF "default"(1)
Interface    IP Address     Interface Status
Lo0          172.25.0.22    protocol-up/link-up/admin-up
Eth1/47      192.168.1.14   protocol-up/link-up/admin-up
Eth1/48      192.168.2.14   protocol-up/link-up/admin-up
Eth1/53      192.168.3.14   protocol-up/link-up/admin-up
spine2#
```

Troubleshoot

This section provides information you can use to troubleshoot your configuration.

```
Leaf1# show l2
l2      l2protocol l2rib  l2route
Leaf1# show nve evi
EVI   Vlan Label  Oper State EVI State
----- ---- ------ ---------- -------------
301   301  964878 UP         evi-add-complete
Leaf1#
Leaf1# show bgp l2vpn evpn
  Network      Next Hop  Metric  LocPrf  Weight Path
Route Distinguisher: 172.25.0.1:37164   (L2VNI 301)
*>l[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[0]:[0.0.0.0]/216
                    172.25.0.15       100   32768 i
*>e[2]:[0]:[0]:[48]:[00ea.bd27.86ef]:[0]:[0.0.0.0]/216
                    172.25.0.3   4294967295        0 64087 655
34 i
*>l[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[32]:[10.1.12.100]/272
                    172.25.0.15       100   32768 i
*>e[2]:[0]:[0]:[48]:[00ea.bd27.86ef]:[32]:[10.1.12.200]/272
                    172.25.0.3   4294967295        0 64087 655
34 i
*>e[3]:[0]:[32]:[172.25.0.3]/88
                    172.25.0.3   4294967295        0 64087 655
34 i
*>l[3]:[0]:[32]:[172.25.0.15]/88
                    172.25.0.15       100   32768 i
```

```
Leaf2# show nve evi
EVI   Vlan Label  Oper State EVI State
----- ---- ------ ---------- -------------
301   301  964878 UP         evi-add-complete
Leaf2#
Leaf2# sho bgp l2vpn evpn
  Network      Next Hop  Metric  LocPrf  Weight Path
Route Distinguisher: 172.25.0.2:37164   (L2VNI 301)
*>l[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[0]:[0.0.0.0]/216
                    172.25.0.15       100   32768 i
*>e[2]:[0]:[0]:[48]:[00ea.bd27.86ef]:[0]:[0.0.0.0]/216
                    172.25.0.3   4294967295        0 64087 655
34 i
*>l[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[32]:[10.1.12.100]/272
                    172.25.0.15       100   32768 i
*>e[2]:[0]:[0]:[48]:[00ea.bd27.86ef]:[32]:[10.1.12.200]/272
                    172.25.0.3   4294967295        0 64087 655
34 i
*>e[3]:[0]:[32]:[172.25.0.3]/88
                    172.25.0.3   4294967295        0 64087 655
34 i
*>l[3]:[0]:[32]:[172.25.0.15]/88
                    172.25.0.15       100   32768 i
```

```
Leaf3# sho bgp l2vpn evpn
  Network      Next Hop  Metric  LocPrf  Weight Path
Route Distinguisher: 172.25.0.1:5
*>e[5]:[0]:[0]:[24]:[12.1.12.0]/224
                    172.25.0.15  4294967295         0 64087 655
34 i
* e                 172.25.0.15  4294967295         0 64087 655
34 i
Route Distinguisher: 172.25.0.1:37164
* e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[0]:[0.0.0.0]/216
                    172.25.0.15  4294967295         0 64087 655
34 i
*>e                 172.25.0.15  4294967295         0 64087 655
34 i
* e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[32]:[10.1.12.100]/272
                    172.25.0.15  4294967295         0 64087 655
34 i
*>e                 172.25.0.15  4294967295         0 64087 655
34 i
* e[3]:[0]:[32]:[172.25.0.15]/88
                    172.25.0.15  4294967295         0 64087 655
34 i
*>e                 172.25.0.15  4294967295         0 64087 655
34 i

Route Distinguisher: 172.25.0.2:37164
* e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[0]:[0.0.0.0]/216
                    172.25.0.15  4294967295         0 64087 655
34 i
*>e                 172.25.0.15  4294967295         0 64087 655
34 i
* e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[32]:[10.1.12.100]/272
                    172.25.0.15  4294967295         0 64087 655
34 i
*>e                 172.25.0.15  4294967295         0 64087 655
34 i
* e[3]:[0]:[32]:[172.25.0.15]/88
                    172.25.0.15  4294967295         0 64087 655
34 i
*>e                 172.25.0.15  4294967295         0 64087 655
34 i

Route Distinguisher: 172.25.0.3:37164   (L2VNI 301)
*>e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[0]:[0.0.0.0]/216
                    172.25.0.15  4294967295         0 64087 655
34 i
* e                 172.25.0.15  4294967295         0 64087 655
34 i
*>l[2]:[0]:[0]:[48]:[00ea.bd27.86ef]:[0]:[0.0.0.0]/216
                    172.25.0.3        100   32768 i
*>e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[32]:[10.1.12.100]/272
                    172.25.0.15  4294967295         0 64087 655
```

```
* e                 172.25.0.15  4294967295         0 64087 655
34 i
*>l[2]:[0]:[0]:[48]:[00ea.bd27.86ef]:[32]:[10.1.12.200]/272
                    172.25.0.3        100   32768 i
*>l[3]:[0]:[32]:[172.25.0.3]/88
                    172.25.0.3        100   32768 i
*>e[3]:[0]:[32]:[172.25.0.15]/88
                    172.25.0.15  4294967295         0 64087 655
34 i
* e                 172.25.0.15  4294967295         0 64087 655
34 i
Route Distinguisher: 172.25.0.3:3
*>e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[32]:[10.1.12.100]/272
                    172.25.0.15  4294967295         0 64087 655
34 i
* e                 172.25.0.15  4294967295         0 64087 655
34 i
*>e[5]:[0]:[0]:[24]:[12.1.12.0]/224
                    172.25.0.15  4294967295         0 64087 655
34 i
Leaf3#
```

```
Route Distinguisher: 172.25.0.3:37164
* e[2]:[0]:[0]:[48]:[00ea.bd27.86ef]:[0]:[0.0.0.0]/216
                    172.25.0.3   4294967295         0 64087 655
34 i
*>e                 172.25.0.3   4294967295         0 64087 655
34 i
* e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[32]:[10.1.12.100]/272
                    172.25.0.3   4294967295         0 64087 655
34 i
*>e                 172.25.0.3   4294967295         0 64087 655
34 i
* e[3]:[0]:[32]:[172.25.0.3]/88
                    172.25.0.3   4294967295         0 64087 655
34 i
*>e                 172.25.0.3   4294967295         0 64087 655
34 i
Route Distinguisher: 172.25.0.2:5
*>e[2]:[0]:[0]:[48]:[00ea.bd27.86ef]:[32]:[10.1.12.200]/272
                    172.25.0.3   4294967295         0 64087 655
34 i
```

```
Route Distinguisher: 172.25.0.3:37164
* e[2]:[0]:[0]:[48]:[00ea.bd27.86ef]:[0]:[0.0.0.0]/216
                    172.25.0.3   4294967295         0 64087 655
34 i
*>e                 172.25.0.3   4294967295         0 64087 655
34 i
* e[2]:[0]:[0]:[48]:[00ea.bd27.6285]:[32]:[10.1.12.100]/272
                    172.25.0.3   4294967295         0 64087 655
34 i
*>e                 172.25.0.3   4294967295         0 64087 655
34 i
* e[3]:[0]:[32]:[172.25.0.3]/88
                    172.25.0.3   4294967295         0 64087 655
34 i
*>e                 172.25.0.3   4294967295         0 64087 655
34 i
Route Distinguisher: 172.25.0.1:5
*>e[2]:[0]:[0]:[48]:[00ea.bd27.86ef]:[32]:[10.1.12.200]/272
                    172.25.0.3   4294967295         0 64087 655
34 i
*>l[5]:[0]:[0]:[24]:[12.1.12.0]/224
                    0.0.0.0           100   32768 i
```

```
Leaf1# sho mac address-table
    VLAN   MAC Address    Type    age   Secure NTFY Ports
--------+---------------+-------+-----+------+----+-------------
+ 301   00ea.bd27.6285 dynamic NA    F    F   Po30
C 301   00ea.bd27.86ef dynamic NA    F    F   sr-peer(172.25.0.3)
G  -    0000.0000.1111 static  -     F    F   sup-eth1(R)
G 301   c014.fea3.bc87 static  -     F    F   vPC Peer-Link(R)
G  -    c014.fea3.ca07 static  -     F    F   sup-eth1(R)
G 301   c014.fea3.ca07 static  -     F    F   sup-eth1(R)
Leaf1#
```

```
Leaf2# sho mac address-table
Legend:
    * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
    age - seconds since last seen,+ - primary entry using vPC Peer-Link,
    (T) - True, (F) - False, C - ControlPlane MAC, ~ - vsan,
    (NA)- Not Applicable
    VLAN   MAC Address    Type    age   Secure NTFY Ports
--------+---------------+-------+-----+------+----+-------------
+ 301   00ea.bd27.6285 dynamic NA    F    F   Po30
C 301   00ea.bd27.86ef dynamic NA    F    F   sr-peer(172.25.0.3)
G  -    0000.0000.1111 static  -     F    F   sup-eth1(R)
G  -    c014.fea3.bc87 static  -     F    F   sup-eth1(R)
G 301   c014.fea3.bc87 static  -     F    F   sup-eth1(R)
G 301   c014.fea3.ca07 static  -     F    F   vPC Peer-Link(R)
Leaf2#
```

```
Leaf3# show mac address-table
Legend:
    * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
    age - seconds since last seen,+ - primary entry using vPC Peer-Link,
    (T) - True, (F) - False, C - ControlPlane MAC, ~ - vsan,
    (NA)- Not Applicable
    VLAN   MAC Address    Type    age   Secure NTFY Ports
--------+---------------+-------+-----+------+----+-------------
C 301   00ea.bd27.6285 dynamic NA    F    F   sr-peer(172.25.0.15)
* 301   00ea.bd27.86ef dynamic NA    F    F   Eth1/47
G  -    0000.0000.1111 static  -     F    F   sup-eth1(R)
G  -    c014.fea3.cadf static  -     F    F   sup-eth1(R)
G 301   c014.fea3.cadf static  -     F    F   sup-eth1(R)
```