

Arista Professional Services

EVPN Solution Guide

Please contact eos-consulting-services@arista.com with any questions. Alternatively, feel free to comment on the document & tag eos-consulting-services@arista.com as we welcome the feedback. This document is intended for Arista Internal Use only.

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Document Revision History

Revision	Name	Date	Comments
0.1	Arista Professional Services	Nov 17th 2020	First draft released
1.0	Arista Professional Services	Dec 9th 2020	EVPN Interworking with IPVPN
--	Arista Professional Services	Feb 17th 2020	Shared with ACSP
1.1	Arista Professional Services	May 5th 2021	BGP unnumbered
1.2	Arista Professional Services	May 10th 2021	A-A Multihoming
1.3	Arista Professional Services	May 28th 2021	EVPN L3 Gateway
1.4	Arista Professional Services	April 1st 2021	L2 EVPN + VLAN translation
1.5	Arista Professional Services	Sept 1st 2021	EVPN multidomain
1.6	Arista Professional Services	Nov 18th 2021	EVPN single-active multihoming
1.7	Arista Professional Services	29 Jun 2022	EVPN mac blacklisting
1.8	Arista Professional Services	25 Jul 2022	MLAG route-map for optimal forwarding

Overview

This document intends to provide the Professional Service Team with considerations and configuration guidelines for the most relevant EVPN use cases and features. It is recommended before continuing into the following sections that the reader has become familiar with the EVPN terminology and functionality. These are some links to reference material.

- [EVPN Deployment Guide](#)
- [EVPN Route Types and Packet Walkthrough](#)
- [EVPN-VXLAN Training](#)
- [EVPN Hardware Resource Utilization](#)
- [EVPN ARP-a-Thon](#)

Platform support

Platform	Feature Support	EOS Release
7050X/7050X2 7300X/7320X 7060X/7060X2/7260X 7280R/7500R	Symmetric IRB (V4) Asymmetric IRB (V4)	4.20.1F
7160	Symmetric IRB (V4) Asymmetric IRB (V4)	4.20.2F (V4) 4.21.0F (V6)
7050X3	Symmetric IRB (V4) Asymmetric IRB (V4)	4.21.0F
7020R/7280R2/7500R2	Symmetric IRB (V4) Asymmetric IRB (V4)	4.20.5F

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7280R3/7500R3	Symmetric IRB (V4) Asymmetric IRB (V4)	4.23.2F
7050X/7050X2/7050SX3 7260X/7260X3 7060X/7060X2	Symmetric IRB (V6) Asymmetric IRB (V6)	4.22.1F
7280R/7280R2	Symmetric IRB (V6) Asymmetric IRB (V6)	4.22.0F
7280R3/7500R3	Symmetric IRB (V6) Asymmetric IRB (V6)	4.23.2F

Platform	Feature Support	EOS Release
7050X/7050X2 7260X/7260X3 7060X/7060X2 7280R/7280R2 7500R/7500R2 7300X/7320X 7020R 7160 7250	Symmetric IRB (Default VRF)	4.22.0F

Platform	Feature Support	EOS Release
7050X/7050X2	Centralized IRB	4.20.6F
7060X	Centralized IRB	4.20.6F
7280R/7500R	Centralized IRB	4.20.6F
7280R3/7500R3	Centralized IRB	4.23.2F
7300/7320/7300X3/7050X3	Centralized IRB	4.23.2F
7260X, 7260X2, 7260X3	Centralized IRB	4.23.2F

Platform	Feature Support	EOS Release
7280R/7280R2 7500R/7500R2	EVPN Multihoming L2 (2-Way)	4.22.0F
7050X3/7300X3 720XP	EVPN Multihoming L2 (2-Way)	4.22.1F
7050X3/7300X3 720XP 7280R/7280R2 7500R/7500R2	EVPN Multihoming + IRB	4.23.2F
7050X3/7300X3 720XP 7280R/7280R2 7500R/7500R2	EVPN Multihoming L2 (4-Way)	4.24.1F

Platform	Feature Support	EOS Release
7050X3/720XP	Symmetric IRB (V4/V6) Asymmetric IRB (V4/V6) Centralized IRB (V4/V6) (IPv6 Underlay)	4.24.1F

Router-ID

For BGP correct operation it is required to set a unique router-id per device. When no ID has been specified, the local router ID is set to the following:

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- The loopback IP address when a single loopback interface is configured.
- The loopback with the highest IP address when multiple loopback interfaces are configured.
- The highest IP address on a physical interface when no loopback interfaces are configured.

To avoid issues with VRFs not having active interfaces or software electing the wrong address if router-id is not set, the following global configuration is recommended (supported from 4.22 onwards):

```
router general
  router-id ipv4 <loopback0>
```

This will force a router-id on all the VRFs defined to be set to loopback 0. Specific router-ID configuration under BGP is then no longer needed.

Route Distinguisher and Route Target

The RD will be a global unique value per MAC-VRF or IP -VRF on each device. An unique Route-Distinguisher will contribute to improved convergence time, ensure proper ECMP, and assist in validation of route origination when troubleshooting. The auto RD feature will be used on MAC-VRF when using VLAN-Based model while it will be configured manually on VLAN-Aware-Bundle and IP-VRF as this feature is not supported in these cases. Auto RD will set the RD to [`<router-id>:<vlan-id>`](#).

The RT will be a global significant value per MAC-VRF or IP -VRF in the EVPN domain. The RT will be set to [`<vni-id>:<vni-id>`](#) on MAC-VRF (VLAN-Based and VLAN-Aware-Bundle) or IP -VRF. In cases where 4 bytes ASN are used and ASN is used as site identifier, we can use the higher 16 bits of the ASN site identifier as part of the RT value [`<asn_site_id>:<vni_id>`](#). The auto RT feature will not be used due to the limitations on several imports required and no 4-byte ASN support.

Route Distinguisher and Route Target configuration template

```
vlan <vlan_id>
  rd auto
  route-target both <vni_id>:<vni_id>
  redistribute learned

vlan-aware-bundle <tenant_name>
  rd <loopback0_ip>:<vni_id>
  route-target both <vni_id>:<vni_id>
  redistribute learned
  vlan <vlan_id>-<vlan_id>

vrf <vrf_name>
  rd <loopback0_ip>:<vni_id>
  route-target evpn import <vni_id>:<vni_id>
  route-target evpn export <vni_id>:<vni_id>
  redistribute connected

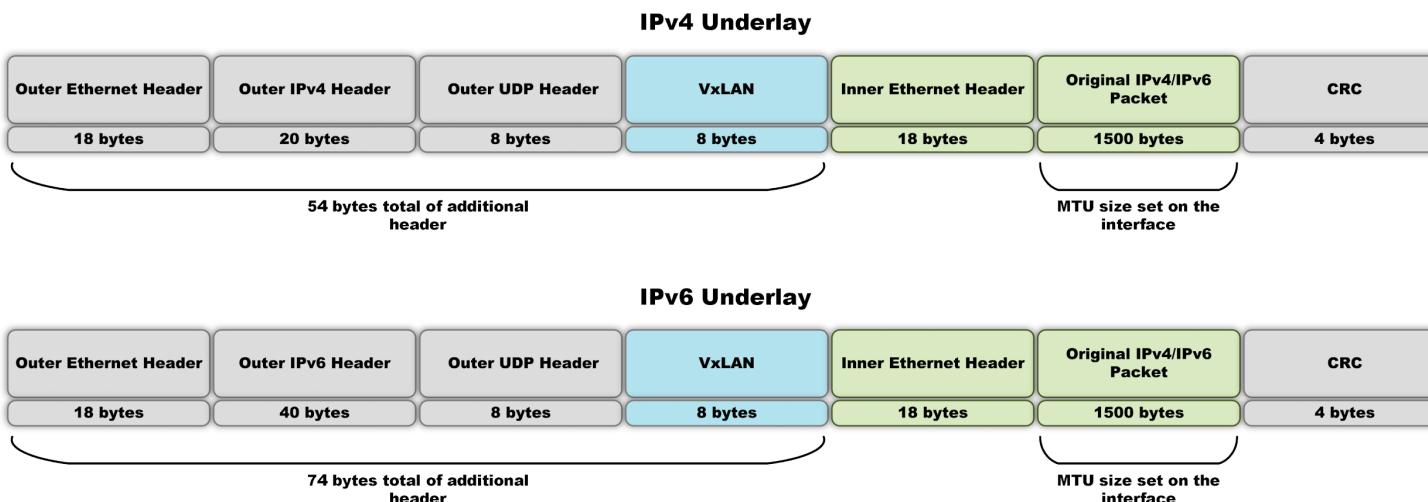
vrf <vrf_name>
  rd <loopback0_ip>:<vni_id>
  route-target evpn import <asn_site_id>:<vni_id>
  route-target evpn export <asn_site_id>:<vni_id>
  redistribute connected
```

MTU

In VxLAN implementations, it is imperative the infrastructure between VxLAN tunnel endpoints support jumbo frames in order to accommodate the following requirements

- VxLAN encapsulation adds up to 54 bytes of overhead to the overall size of an Ethernet frame
- VTEPs must not fragment VXLAN packets. VTEPs running EOS will set the Don't Fragment (DF) bit in the Outer IP header of the VXLAN packet

On Arista devices the default IP MTU size on L3 interfaces or routed ports is set to 1500 bytes, this represents the maximum size of the IP packet that can be encapsulated within an ethernet frame leaving the interface. Therefore the MTU size of L3 interfaces in the underlay must be set to a minimum of 1554 bytes or 1574 bytes, whether IPv4 or IPv6 is used as IP transport between VxLAN tunnel endpoints to support an MTU of 1500 bytes in the overlay.



In EOS the MTU configuration applied to an SVI interface has no effect on the incoming traffic, only the L3 MTU setting of the egress interface is enforced. In VXLAN, this means:

1. Incoming traffic arriving to a VTEP and vxlan encapsulated, will use the MTU set in the underlay (egress interface towards the Fabric). Traffic will be fragmented or dropped after encapsulation if the MTU size of the IP packet exceeds the MTU value configured on the egress interface, in this case the underlay egress MTU.
2. In the destination VTEP, the egress interface will be the SVI towards the end host. Traffic will be fragmented or dropped after decapsulation if the MTU size of the IP packet exceeds the MTU value configured on the egress interface (SVI interface towards the end host).

Note: The behaviour above has been tested in Trident3 platforms.

In [Jericho/Jericho+](#), L3 MTU set in a SVI is not enforced for VxLAN packets on decap sent over SVI (on trunk ports).
["Encapsulated packets are not dropped if they violate the underlay Mtu"](#) (fixed from 4.25.3.1)
Check also [TOI to support L3 MTU in J2](#).

Hence, to support Jumbo frames of size 9000 bytes in VxLAN, and to avoid fragmentation, which result in drops and performance degradation, it is recommended to set the MTU size in the underlay and the overlay to 9214. This configuration can be applied via the "interface default" global command to avoid setting this explicitly in every SVI.

Important: Customer must be made aware that due to the VxLAN encapsulation, the theoretical maximum packet size that can be encapsulated in VxLAN is 9164 when the L3 MTU size is set in the underlay and the overlay to 9214 (IP packet 9164 + 50 VxLAN header = 9214 bytes). As a general rule the host maximum MTU should be set to 9000 bytes.

The following MTU settings will be used as a recommended practice for the L3 underlay and L3 overlay interfaces in an EVPN domain.

```

GLOBAL
interface defaults
  mtu 9214

UNDERLAY
interface ethernet <interface_id>
  no switchport
  ip address <ipv4_address>/<netmask>

OVERLAY
interface vlan <vlan_id>
  ip address virtual <ipv4_address>/<netmask>

interface Ethernet<interface_id>.<subinterface_id>
  encapsulation dot1q vlan <vlan_id>
  ip address <ipv4_address>/<netmask>

interface port-channel <po_id>
  no switchport
  ip address <ipv4_address>/<netmask>

```

Note: Starting from 4.23.1F, [MTU for L3 interfaces](#) can be set globally, if the global and interface level MTU is set, then interface MTU will take precedence.

Default send-community

Note: starting from 4.24.0F, we can globally configure the send-community: <https://eos.arista.com/eos-4-24-0f/bgp-send-community-global-setting/>

```
router bgp <asn>
neighbor default send-community
```

This will advertise standard, extended and large communities by default. Today we set this option for both the underlay and EVPN overlay peer-groups, so it will reduce the number of commands required to do this.

Summarization

In general, summarization of subnets should be avoided within the Fabric, since it can result in route black-holing under link failures.

In standard spine-leaf topology, it is possible though to summarize the subnets used for the point-to-point links on the spines. This will reduce the number of /31 routes installed in the routing tables considerably, but is not generally recommended.

```
#Spine-1
aggregate-address <p2p spine-leaf aggregate net> summary-only
```

Note however, we typically use summarization on the service or border leaf for aggregating the spine-leaf topology to outside corporate resources when applicable.

ARP and MAC aging timer

It is recommended to configure the ARP timer on the Leafs to be less than the MAC aging timer of the downstream switch. This will result in periodic ARP requests being sent by the VTEP Leafs, and consequently the virtual MAC entry on the downstream switch being refreshed before the MAC age-out timer. Without the timer change, the vMAC entry will only be learnt/refreshed, when ARP requests/replies are sent by the Leaf from the virtual IP, rather than any routed traffic which would be sourced from the system MAC of the Leaf.

To achieve this, Increase mac aging timer of L2 downstream switch to 2 hours. Reduce arp timeout on VTEP to 1.5 hours.

EVPN Service Model

It is recommended to use VLAN-Aware-Bundle over VLAN-Based service model as this simplifies the configuration and reduces the administrative overhead associated with the creation of L2VPN services for each tenant. However, the following two factors need to be considered when using VLAN-Aware-Bundle

- VLANs to VLAN-Aware-Bundle mapping must be consistent on all VTEPs that provide L2VPN service
- Interoperability testing needs to be carried out in multi-vendor deployments due to the lack of support of this features across vendors

MLAG Shared Router MAC address

It is recommended to enable the MLAG shared router MAC address feature in S-IRB or L3 EVPN deployments as it provides the following benefits

- Reduces the traffic across the peer link.
- Eliminated the consumption of overlay ECMP next hops.
- Reduces the network impact due to traffic lost in MLAG split brain scenarios.

Note: On SL or BL it could be worth configuring statically the MAC address used by this feature as there could be an impact if both peers in the MLAG are RMA'ed and the MLAG system ID changes

Refer to the [EVPN MLAG Shared Router MAC](#) for more information.

MLAG iBGP sessions in the overlay

With MLAG, in some scenarios it is recommended to establish iBGP sessions for every tenant to exchange routes with its MLAG peer. This is required to ensure reachability in the following cases:

- When L3 subinterfaces are used for connectivity with firewalls or load balancers deployed in active/standby mode, an iBGP session per tenant VRF is required between the MLAG peers to prevent traffic loss in the event of a single link failure between the SL <-> FW link.
- When using L3 orphan ports (non MLAG, single-homed connections). With "MLAG shared router mac address" traffic might be hashed to the remote peer and needs to be routed over the peer link.

Refer to this [presentation](#) for more information.

MLAG route-map for optimal forwarding

This enhancement is set to avoid hashing EVPN sessions over the peer-links in MLAG scenarios. From the Spines perspective, by default the loopback0 of any leaf will be seen as an 2-ECMP path towards an MLAG pair. A route-map can be set in the leaves as follows:

```
router bgp <asn_number>
neighbor UNDERLAY_MLAG_PEER_V4 route-map RM-MLAG-PEER in
!
route-map RM-MLAG-PEER permit 10
  set origin incomplete
```

This will ensure paths over peer-links are less desirable.

Reference: [AVD](#)

Note: the fabric var "mlag_ibgp_origin_incomplete" is enabled by default in AVD.

VPN Import Pruning

- Optimize memory resource utilization.
- A better alternative is considering RT Constraint.
- Only needs to be enabled on the VTEPs not on RS.
- Prevent the dynamic allocation of VLANs for L3VNI that are not locally configured which could be a limiting factor in large scale EVPN domains.

```
router bgp <asn_number>
  address-family evpn
    route import match-failure action discard
```

Refer to the [VPN import pruning](#) for more information.

SNAT for SVIs (optional)

Some customers may require the ability to ping end hosts from the Arista VTEPs to facilitate operations and troubleshooting. In most deployments, the configured IP addresses will be shared across multiple VTEPs. Traffic sourced from the switch (ping, SSH, traceroute etc.) will opt to use this shared IP address as a source IP, however the reply (destined to the IP address virtual) could end up being sent to the wrong VTEP. To avoid this situation, the source IP is NATed to some other unique IP (aka borrowed IP) on the switch.

In order to support overlay VRFs the borrowed IP must be chosen in the same VRF. So the user is expected to ensure that there is at least one non-virtual IP on some interface in the overlay VRF.

AVD tool for example, defines a loopback interface per VRF with a unique IP address on each VTEP for this purpose as follows:

```
interface Loopback100
  vrf red
  ip address <ip_address_1>/32
!
interface Loopback101
  vrf blue
  ip address <ip_address_2>/32

ip address virtual source-nat vrf red address <ip_address_1>
ip address virtual source-nat vrf blue address <ip_address_2>
```

Refer to this [TOI](#) for more information and an alternative method using a shared VXLAN SVI.

EVPN MAC blacklisting

EVPN blacklisting, inherently, is designed to indicate a problem condition such as a host being misconfigured with the same (duplicate) MAC address or an L2 loop within the network. This can also occur in scenarios with significant mac moves such as VMotion or migration from legacy network to Arista.

In order to remedy such a situation, a PE that detects a MAC mobility event via local learning starts an M-second timer (with a default value of M = 180), and if it detects N MAC moves before the timer expires (with a default value of N = 5), it concludes that a duplicate-MAC situation has occurred. The PE MUST alert the operator and stop sending and processing any BGP MAC/IP Advertisement routes of that MAC address.

```
32806 Oct 11 21:48:40 sjc3-cpl-01 Bgp: 3076: %EVPN-3-BLACKLISTED_DUPLICATE_MAC: MAC address 00:16:3e:80:00:15 on VLAN 32 has been blacklisted for moving 5 or more times within the past 180 seconds
```

The host-flap threshold/timeout can be increased to an appropriate value so that blacklisting can be avoided using the following command. This could be useful in migration scenarios where an appropriate non-default value can be configured for threshold/timeout.

```
router-bgp <asn>
address-family evpn
  "[ no | default ] host-flap detection window <timeout>" 
  "[ no | default ] host-flap detection threshold <threshold>"

Default timeout = 180 seconds
Default threshold = 5

Note: these timers might need to be adjusted based on the specific requirements of your deployment.
```

This can be noted either on the device log using "[show bgp evpn host-flap](#)". EVPN blacklisting, once occurred, can be manually cleared using the command "[clear bgp evpn host-flap](#)".

In EOS versions 4.22.2 and above, EVPN blacklisting gets cleared automatically once the MAC address ages out.

```
Dec 26 22:06:22 PBL01-PRD Bgp: %EVPN-3-BLACKLISTED_DUPLICATE_MAC_RECOVERY: MAC address 00:09:0f:09:0b:16 on VLAN 9 has been removed from the MAC move blacklist
```

There is one situation, a side effect (a hardware limitation) of blacklisting on T3 platforms where the MAC addresses don't age out as seen in SR194132 because T3 considers switching between vxlan data plane learned mac entry vs evpn learned mac entry as mac move which it shouldn't if next hop vtep is the same.

From 4.26.1 we can configure the aging timer to age out mac addresses after blacklisting has occurred. The CLI to enable this feature is:

```
[ no | default ] host-flap detection expiry timeout <SECONDS> seconds
```

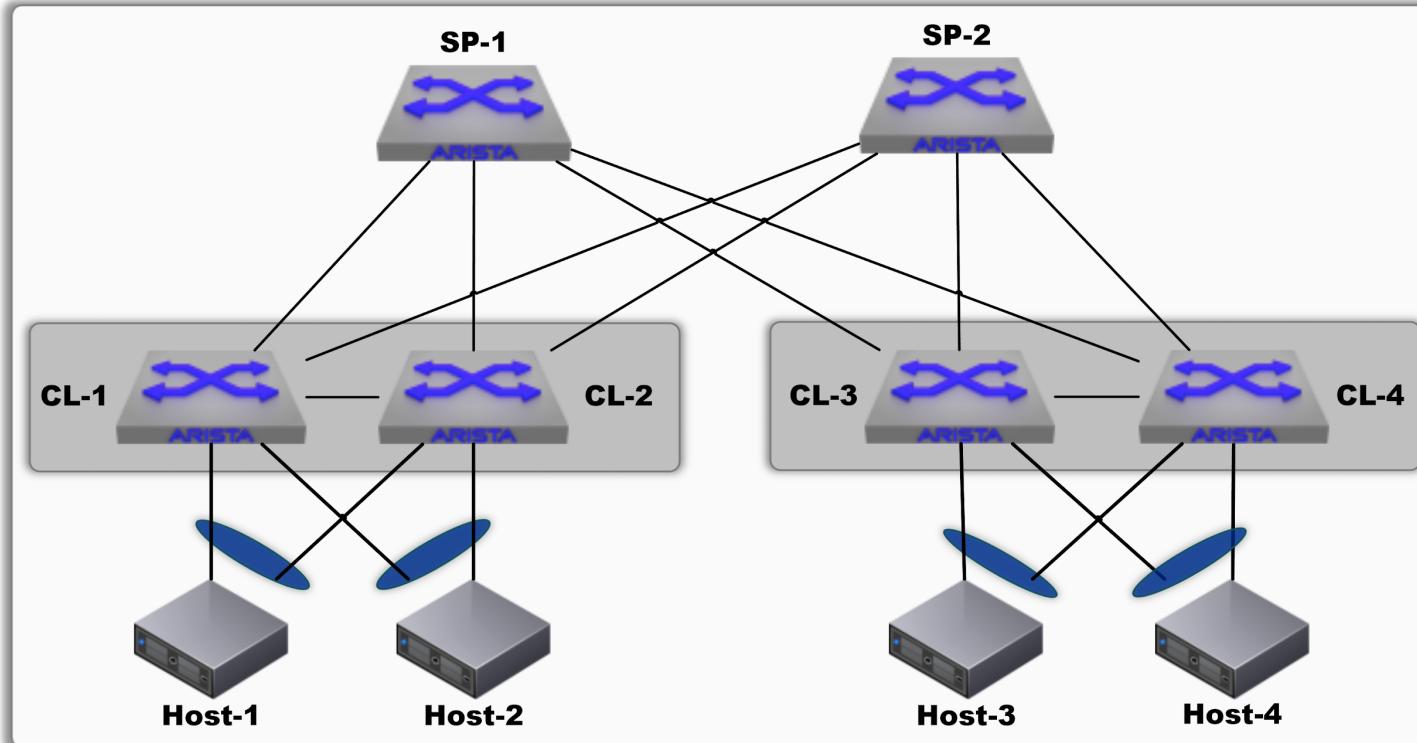
Refer to the [TOI](#), and [TAC KMS](#) for more information.

EVPN Asymmetric IRB

Deployment Consideration

- Ideal deployment model to use when all VLANs, SVIs and VRFs are required on all VTEPs
- Most the traffic in the EVPN domain is east-west instead of north-south
- Routing at the ingress VTEP and VxLAN bridging towards the egress VTEP
- Support for low to middle scale deployments (<=25K MAC address).
- Not recommended for multi-tenant environments
- Easier to troubleshoot
- Easy to automate when compared to S-IRB

Topology



Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
SP-1	192.168.100.101	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb1
SP-2	192.168.100.102	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb2
CL-1	192.168.100.1	192.168.200.1	65000.1	N/A	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa1
CL-2	192.168.100.2	192.168.200.1	65000.1	N/A	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa2
CL-3	192.168.100.3	192.168.200.3	65000.3	N/A	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa3
CL-4	192.168.100.4	192.168.200.3	65000.3	N/A	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa4
Host-1	N/A	N/A	N/A	N/A	VLAN10	10.10.10.1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	N/A	VLAN20	10.10.20.2/24	0000.0000.2222
Host-3	N/A	N/A	N/A	N/A	VLAN10	10.10.10.3/24	0000.0000.3333
Host-4	N/A	N/A	N/A	N/A	VLAN20	10.10.20.4/24	0000.0000.4444

Important Notes

- Selective could be enabled on the leaf switches to optimize the consumption of hardware resources (Adjacency Table). The only downside is an initial one-time delay (microseconds) when installing the remote ARP entries into hardware.

Configuration

The following configuration is required for Asymmetric IRB:

- Underlay
 - Multi-agent model (ArBGP)
 - eBGP IPv4 Unicast peering between spines and leaf switches
 - iBGP IPv4 Unicast peering between MLAG pair
 - MLAG
- Overlay
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VxLAN
 - VLAN to VNI mapping (L2VNI)

- BGP/EVPN
 - MAC-VRF
- Tenant
 - VLAN
 - Anycast Gateway
- Platform specific (See [Appendix A](#))

Note: Configuration lines in red font color are not supported in vEOS.

Compute Leaf

Action	CL-1	CL-2
service routing protocols model multi-agent	service routing protocols model multi-agent	
vlan 10,20	vlan 10,20	
link	<pre>interface Ethernet1 no switchport ip address 192.168.1.1/31 ! interface Ethernet2 no switchport ip address 192.168.2.1/31</pre>	<pre>interface Ethernet1 no switchport ip address 192.168.1.3/31 ! interface Ethernet2 no switchport ip address 192.168.2.3/31</pre>
back0	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.1/32 ! router general router-id ipv4 192.168.100.1</pre>	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.2/32 ! router general router-id ipv4 192.168.100.2</pre>
back1	<pre>interface Loopback1 description VTEP IP ip address 192.168.200.1/32</pre>	<pre>interface Loopback1 description VTEP IP ip address 192.168.200.1/32</pre>
config	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000</pre>	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000</pre>
gateway Virtual ess	<pre>interface Vlan10 ip address virtual 10.10.10.254/24 ! interface Vlan20 ip address virtual 10.10.20.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>	<pre>interface Vlan10 ip address virtual 10.10.10.254/24 ! interface Vlan20 ip address virtual 10.10.20.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>
route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>
IBGP Underlay	router bgp 65000.1	router bgp 65000.1

```

bgp asn notation asdot
update wait-install
no bgp default ipv4-unicast
timers bgp 5 15
distance bgp 20 200 200
maximum-paths 2 ecmp 2
neighbor default send-community
neighbor OVERLAY_SPINE_EVPN peer group
neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000
neighbor OVERLAY_SPINE_EVPN update-source Loopback0
neighbor OVERLAY_SPINE_EVPN bfd
neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2
neighbor OVERLAY_SPINE_EVPN maximum-routes 0
neighbor UNDERLAY_MLAG_PEER_V4 peer group
neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1
neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self
neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000
neighbor UNDERLAY_SPINE_V4 peer group
neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000
neighbor UNDERLAY_SPINE_V4 maximum-routes 12000
neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4
neighbor 192.168.1.0 peer group UNDERLAY_SPINE_V4
neighbor 192.168.2.0 peer group UNDERLAY_SPINE_V4
neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN
neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN
redistribute connected route-map CONNECTED
!
vlan 10
  rd auto
  route-target both 1010:1010
  redistribute learned
!
vlan 20
  rd auto
  route-target both 1020:1020
  redistribute learned
!
address-family evpn
  neighbor OVERLAY_SPINE_EVPN activate
!
address-family ipv4
  neighbor UNDERLAY_MLAG_PEER_V4 activate
  neighbor UNDERLAY_SPINE_V4 activate
!
```

```

bgp asn notation asdot
update wait-install
no bgp default ipv4-unicast
timers bgp 5 15
distance bgp 20 200 200
maximum-paths 2 ecmp 2
neighbor default send-community
neighbor OVERLAY_SPINE_EVPN peer group
neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000
neighbor OVERLAY_SPINE_EVPN update-source Loopback0
neighbor OVERLAY_SPINE_EVPN bfd
neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2
neighbor OVERLAY_SPINE_EVPN maximum-routes 0
neighbor UNDERLAY_MLAG_PEER_V4 peer group
neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1
neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self
neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000
neighbor UNDERLAY_SPINE_V4 peer group
neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000
neighbor UNDERLAY_SPINE_V4 maximum-routes 12000
neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4
neighbor 192.168.1.2 peer group UNDERLAY_SPINE_V4
neighbor 192.168.2.2 peer group UNDERLAY_SPINE_V4
neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN
neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN
redistribute connected route-map CONNECTED
!
vlan 10
  rd auto
  route-target both 1010:1010
  redistribute learned
!
vlan 20
  rd auto
  route-target both 1020:1020
  redistribute learned
!
address-family evpn
  neighbor OVERLAY_SPINE_EVPN activate
!
address-family ipv4
  neighbor UNDERLAY_MLAG_PEER_V4 activate
  neighbor UNDERLAY_SPINE_V4 activate
!
```

Function	CL-3	CL-4
GP	service routing protocols model multi-agent	service routing protocols model multi-agent
N	vlan 10,20	vlan 10,20
es Uplink	interface Ethernet1 no switchport ip address 192.168.1.5/31 ! interface Ethernet2 no switchport ip address 192.168.2.5/31	interface Ethernet1 no switchport ip address 192.168.1.7/31 ! interface Ethernet2 no switchport ip address 192.168.2.7/31
Loopback0 ter ID	interface Loopback0 description BGP Router ID ip address 192.168.100.3/32 ! router general router-id ipv4 192.168.100.3	interface Loopback0 description BGP Router ID ip address 192.168.100.4/32 ! router general router-id ipv4 192.168.100.1
Loopback1 IP	interface Loopback1 description Logical VTEP ip address 192.168.200.3/32	interface Loopback1 description Logical VTEP ip address 192.168.200.3/32
VAN	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020
G Config	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30

	<pre> no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
cast Gateway al MAC address	<pre> interface Vlan10 ip address virtual 10.10.10.254/24 ! interface Vlan20 ip address virtual 10.10.20.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>	<pre> interface Vlan10 ip address virtual 10.10.10.254/24 ! interface Vlan20 ip address virtual 10.10.20.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>
refix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
P and IBGP erlay /EVPN	<pre> router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>	<pre> router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>

Spines

Function	SP-1	SP-2
erBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
leaf Downlinks	<pre> interface Ethernet1 no switchport ip address 192.168.1.0/31 ! interface Ethernet2 no switchport ip address 192.168.1.2/31 ! </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.2.0/31 ! interface Ethernet2 no switchport ip address 192.168.2.2/31 ! </pre>

	<pre>interface Ethernet3 no switchport ip address 192.168.1.4/31 ! interface Ethernet4 no switchport ip address 192.168.1.6/31</pre>	<pre>interface Ethernet3 no switchport ip address 192.168.2.4/31 ! interface Ethernet4 no switchport ip address 192.168.2.6/31</pre>
GP Loopback0 (Router ID)	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.101/32 ! router general router-id ipv4 192.168.100.101</pre>	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.102/32 ! router general router-id ipv4 192.168.100.102</pre>
P-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>
BGP and iBGP Underlay GP/EVPN	<pre>router bgp 65000.65000 bgp asn notation asdot router-id 192.168.100.101 update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.1.0/24 peer-group UNDERLAY_LEAF_V4 peer- filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multipath 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept</pre>	<pre>router bgp 65000.65000 bgp asn notation asdot router-id 192.168.100.102 update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.2.0/24 peer-group UNDERLAY_LEAF_V4 peer- filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multipath 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept</pre>

Verification

The verification steps below have been carried out host-1 in the environment as these steps are similar to the remaining hosts.

show bgp evpn summary	
Verify the eBGP IPv4 EVPN peering between spines and leaf switches is established	
CL-1	<pre>CL-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.1, local AS number 65000.1 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd Pf Acc 192.168.100.101 4 65000.65000 99250 99088 0 0 00:01:55 Estab 12 12 192.168.100.102 4 65000.65000 99220 99195 0 0 00:01:54 Estab 12 12</pre>
CL-3	<pre>CL-3#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.3, local AS number 65000.3 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd Pf Acc 192.168.100.101 4 65000.65000 15 16 0 0 00:00:20 Estab 12 12 192.168.100.102 4 65000.65000 16 12 0 0 00:00:20 Estab 12 12</pre>
SP-1	<pre>SP-1#show bgp evpn summary BGP summary information for VRF default</pre>

Commented [1]: looks like "show bgp evpn summary" is not part of show-tech, we should create a custom show-tech profile for evpn?

```

Router identifier 192.168.100.101, local AS number 65000.65000
Neighbor Status Codes: m - Under maintenance
  Neighbor      V  AS        MsgRcvd  MsgSent  InQ  OutQ  Up/Down State  PfxRcd  PfxAcc
  192.168.100.1  4  65000.1    1191     1202    0     0  01:22:03 Estab   6       6
  192.168.100.2  4  65000.1    46039    46080   0     0  2d05h Estab   6       6
  192.168.100.3  4  65000.3     26      26     0     0  00:01:06 Estab   6       6
  192.168.100.4  4  65000.3     26      27     0     0  00:01:04 Estab   6       6

```

show interfaces vxlan 1

Verify the interface VxLAN 1 is connected on CL-1
 Verify EVPN is used for flood list population and remote MAC learning on CL-1
 Verify VLAN 10 and VLAN 20 are mapped to the correct VNIs on CL-1
 Verify CL-3 and CL-4 VTEP IP is under the flood VTEP list for VLAN 10 and VLAN 20 on CL-1

```

CL-1#show interfaces vxlan 1
Vxlan1 is up, line protocol is up (connected)
  Hardware is Vxlan
  Source interface is Loopback1 and is active with 192.168.200.1
  Replication/Flood Mode is headend with Flood List Source: EVPN
  Remote MAC learning via EVPN
  VNI mapping to VLANs
  Static VLAN to VNI mapping is
    [10, 1010]      [20, 1020]
  Note: All Dynamic VLANs used by VCS are internal VLANs.
    Use 'show vxlan vni' for details.
  Static VRF to VNI mapping is not configured
  Headend replication flood vtep list is:
    10 192.168.200.3
    20 192.168.200.3
  MLAG Shared Router MAC is 0000.0000.0000

```

show bgp evpn route-type imet vni <vni_id>next-hop <vtep_ip> detail

Verify CL-1 and CL-2 advertise the membership of VNI 1010 via EVPN Type-3 IMET routes

```

CL-3#show bgp evpn route-type imet vni 1010 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for imet 192.168.200.1, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
BGP routing table entry for imet 192.168.200.1, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1

```

show mac address-table dynamic

Verify Host-1 MAC address has been learned behind Po1 on CL-1.

```

CL-1#show mac address-table dynamic
  Mac Address Table
  -----
  Vlan      Mac Address      Type      Ports      Moves      Last Move
  ----      -----          ----      ----      ----      -----
  10      0000.0000.1111    DYNAMIC    Po1       1       0:08:45 ago
  10      0000.0000.3333    DYNAMIC    Vx1       1       0:09:01 ago
  20      0000.0000.2222    DYNAMIC    Po2       1       0:08:39 ago
  20      0000.0000.4444    DYNAMIC    Vx1       1       0:09:01 ago

```

Arista Internal Use Only

```
Total Mac Addresses for this criterion: 4
```

```
Multicast Mac Address Table
```

Vlan	Mac Address	Type	Ports
---	-----	---	-----

```
Total Mac Addresses for this criterion: 0
```

show arp

Verify Host-1 ARP entry is presented on CL-1.

```
CL-1#show arp
Address      Age (sec)  Hardware Addr  Interface
192.168.1.0   0:00:00  0000.0000.bbb1  Ethernet1
192.168.2.0   0:00:00  0000.0000.bbb2  Ethernet2
10.10.10.1    2:02:52  0000.0000.1111  Vlan10, Port-Channel1
10.10.10.3    -        0000.0000.3333  Vlan10, Vxlan1
10.10.20.2    1:33:01  0000.0000.2222  Vlan20, Port-Channel2
10.10.20.4    -        0000.0000.4444  Vlan20, Vxlan1
172.16.0.2    0:00:00  0000.0000.aaa2  Vlan4094, Port-Channel1000
```

show bgp evpn route-type mac-ip <mac_address> next-hop <vtap_ip> detail

Verify CL-1 and CL-2 advertise Host-1 MAC address and IP to MAC bindings via EVPN Type-2 MAC-IP routes. EVPN Type-2 MAC-IP routes in Asymmetric IRB are single labeled (L2VNI)

```
CL-3#show bgp evpn route-type mac-ip 0000.0000.1111 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for mac-ip 0000.0000.1111, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111 10.10.10.1, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111 10.10.10.1, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
```

ping <remote_host_ip>

Verify connectivity between Host-1 and Host-3 and Host-4

Host-1	<pre> HOST-1#ping 10.10.10.3 PING 10.10.10.3 (10.10.10.3) 72(100) bytes of data. 80 bytes from 10.10.10.3: icmp_seq=1 ttl=64 time=26.5 ms 80 bytes from 10.10.10.3: icmp_seq=2 ttl=64 time=27.9 ms 80 bytes from 10.10.10.3: icmp_seq=3 ttl=64 time=23.1 ms 80 bytes from 10.10.10.3: icmp_seq=4 ttl=64 time=26.6 ms 80 bytes from 10.10.10.3: icmp_seq=5 ttl=64 time=23.1 ms --- 10.10.10.3 ping statistics --- 5 packets transmitted, 5 received, 0% packet loss, time 76ms rtt min/avg/max/mdev = 23.180/25.499/27.911/1.959 ms, pipe 3, ipg/ewma 19.012/25.933 ms HOST-1#ping 10.10.20.4 PING 10.10.20.4 (10.10.20.4) 72(100) bytes of data. 80 bytes from 10.10.20.4: icmp_seq=1 ttl=63 time=20.5 ms 80 bytes from 10.10.20.4: icmp_seq=2 ttl=63 time=23.9 ms 80 bytes from 10.10.20.4: icmp_seq=3 ttl=63 time=23.7 ms 80 bytes from 10.10.20.4: icmp_seq=4 ttl=63 time=23.5 ms 80 bytes from 10.10.20.4: icmp_seq=5 ttl=63 time=25.1 ms --- 10.10.20.4 ping statistics --- 5 packets transmitted, 5 received, 0% packet loss, time 76ms rtt min/avg/max/mdev = 20.532/23.384/25.131/1.542 ms, pipe 2, ipg/ewma 19.146/22.031 ms </pre>
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EVPN Symmetric IRB

Deployment Consideration

- Ideal deployment model to use when all VLANs, SVIs and VRFs are not required on all VTEPs
- Most the traffic in the EVPN domain is east-west instead of north-south
- Routing at the ingress VTEP and egress VTEP
- Support for middle to high scale deployments (>=25K MAC address).
- Recommended for multi-tenancy environments
- More difficult to troubleshoot when compared to A-IRB
- Easier to migrate to L3 EVPN scenarios

Topology

Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
SP-1	192.168.100.101	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb1
SP-2	192.168.100.102	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb2
CL-1	192.168.100.1	192.168.200.1	65000.1	Red Red	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa1
CL-2	192.168.100.2	192.168.200.1	65000.1	Red Red	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa2
CL-3	192.168.100.3	192.168.200.3	65000.3	Red Red	VLAN30 VLAN40	10.10.30.254/24 10.10.40.254/24	0000.0000.aaa3
CL-4	192.168.100.4	192.168.200.3	65000.3	Red Red	VLAN30 VLAN40	10.10.30.254/24 10.10.40.254/24	0000.0000.aaa4
Host-1	N/A	N/A	N/A	N/A	VLAN10	10.10.10.1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	N/A	VLAN20	10.10.20.2/24	0000.0000.2222
Host-3	N/A	N/A	N/A	N/A	VLAN30	10.10.30.3/24	0000.0000.3333
Host-4	N/A	N/A	N/A	N/A	VLAN40	10.10.40.4/24	0000.0000.4444

Important Notes

- By default, EVPN Type-2 MAC-IP routes are tagged with the Dual-VNI. This behavior can be disabled per MAC-VRF basis by configuring '**no redistribute host-route**'. However, this can lead to suboptimal traffic flow traversing the spines switches twice when the destination network is present on two or more VTEPs at same time.
- Due to the consumption of overlay ECMP next hops (J/J+ VxlanOverlay table and T3 OverlayEcmp table) a cautious approach needs to be taken with the placement of the tenant SVIs in the EVPN domain if L2VPN services are required in a large number of VTEPs.

- Selective ARP could be enabled on the leaf switches to increase the scale as remote ARP entries are not stored in the kernel but in DRAM.
- The number of VLANs allocated to L2VPN services could be significantly impacted in an EVPN domain with a large number of VRFs, this is due to the dynamic VLAN allocation for local and non local defined L3VNI. The maximum number of VLANs that can be configured on a device are 4096 VLANs - VRF (Total number of VRF is the EVPN domain) - routed ports (VLAN allocated to local routed ports). RT Constrained (Not supported in EOS as of 4.25.0F) or VPN import pruning can be used to overcome this problem.

Configuration

The following configuration is required for Symmetric IRB:

- Underlay
 - Multi-agent model (ArBGP)
 - eBGP IPv4 Unicast peering between spines and leaf switches
 - iBGP IPv4 Unicast peering between MLAG pair
 - MLAG
- Overlay
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VXLAN
 - MLAG Shared Router MAC Address
 - VLAN to VNI mapping (L2VNI)
 - VRF to VNI mapping (L3VNI)
 - BGP/EVPN
 - MAC-VRF
 - IP-VRF
- Tenant
 - VLAN
 - Tenant VRF
 - Anycast Gateway
- Platform specific (See [Appendix A](#))

Note: Configuration lines in red font color are not supported in vEOS.

Compute Leaf

Function	CL-1	CL-2
SP	service routing protocols model multi-agent	service routing protocols model multi-agent
VN	vlan 10,20	vlan 10,20
Instance	vrf instance red ! ip routing vrf red	vrf instance red ! ip routing vrf red
es Uplink	interface Ethernet1 no switchport ip address 192.168.1.1/31 ! interface Ethernet2 no switchport ip address 192.168.2.1/31	interface Ethernet1 no switchport ip address 192.168.1.3/31 ! interface Ethernet2 no switchport ip address 192.168.2.3/31
Loopback0 er ID	interface Loopback0 description BGP Router ID ip address 192.168.100.1/32 ! router general router-id ipv4 192.168.100.1	interface Loopback0 description BGP Router ID ip address 192.168.100.2/32 ! router general router-id ipv4 192.168.100.2
Loopback1 IP	interface Loopback1 description VTEP IP ip address 192.168.200.1/32	interface Loopback1 description VTEP IP ip address 192.168.200.1/32
VN	interface Vxlan vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vrf red vni 2000	interface Vxlan vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vrf red vni 2000
G Config	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk

	<pre> switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
Host Gateway MAC address	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>
Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
Peer and iBGP Overlay EVPN	<pre> router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vrf red rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>	<pre> router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vrf red rd 192.168.100.2:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>

Function	CL-3	CL-4
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 30,40	vlan 30,40
VRF Instance	vrf instance red ! ip routing vrf red	vrf instance red ! ip routing vrf red
Spines Uplink	interface Ethernet1 no switchport ip address 192.168.1.5/31 ! interface Ethernet2 no switchport ip address 192.168.2.5/31	interface Ethernet1 no switchport ip address 192.168.1.7/31 ! interface Ethernet2 no switchport ip address 192.168.2.7/31
BGP Loopback0 outer ID	interface Loopback0 description BGP Router ID ip address 192.168.100.3/32 ! router general router-id ipv4 192.168.100.3	interface Loopback0 description BGP Router ID ip address 192.168.100.4/32 ! router general router-id ipv4 192.168.100.4
VTI Loopback1 VTEP IP	interface Loopback1 description Logical VTEP ip address 192.168.200.3/32	interface Loopback1 description Logical VTEP ip address 192.168.200.3/32
VxLAN	interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf red vni 2000	interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf red vni 2000
MLAG Config	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000
Anycast Gateway Virtual MAC address	interface Vlan30 vrf red ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf red ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99	interface Vlan30 vrf red ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf red ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99
Prefix Route-map	ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P	ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P
BGP and IBGP Underlay IGP/EVPN	router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2	router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2

<pre> neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf red rd 192.168.100.3:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>	<pre> neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf red rd 192.168.100.4:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>
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Spine

Function	SP-1	SP-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
Leaf Downlinks	<pre> interface Ethernet1 no switchport ip address 192.168.1.0/31 ! interface Ethernet2 no switchport ip address 192.168.1.2/31 ! interface Ethernet3 no switchport ip address 192.168.1.4/31 ! interface Ethernet4 no switchport ip address 192.168.1.6/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.2.0/31 ! interface Ethernet2 no switchport ip address 192.168.2.2/31 ! interface Ethernet3 no switchport ip address 192.168.2.4/31 ! interface Ethernet4 no switchport ip address 192.168.2.6/31 </pre>
BGP Loopback0 (Router ID)	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.101/32 ! router general router-id ipv4 192.168.100.101 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.102/32 ! router general router-id ipv4 192.168.100.102 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>

eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.1.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_EVPN peer group neighbor OVERLAY_EVPN update-source Loopback0 neighbor OVERLAY_EVPN bfd neighbor OVERLAY_EVPN ebgp-multipath 2 neighbor OVERLAY_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept </pre>	<pre> router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.2.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_EVPN peer group neighbor OVERLAY_EVPN update-source Loopback0 neighbor OVERLAY_EVPN bfd neighbor OVERLAY_EVPN ebgp-multipath 2 neighbor OVERLAY_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept </pre>
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Verification

The verification steps below that have been carried out host-1 in the environment as these steps are similar to the remaining hosts.

show bgp evpn summary	
Verify the eBGP IPv4 EVPN peering between spines and leaf switches is established	
CL-1	<pre> CL-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.1, local AS number 65000.1 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.101 4 65000.65000 75305 75251 0 0 23:23:33 Estab 16 16 192.168.100.102 4 65000.65000 75250 75281 0 0 00:06:47 Estab 16 16 </pre>
CL-3	<pre> CL-3#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.3, local AS number 65000.3 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.101 4 65000.65000 14526 14529 0 0 17:08:45 Estab 16 16 192.168.100.102 4 65000.65000 14554 14521 0 0 17:08:45 Estab 16 16 </pre>
SP-1	<pre> SP-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.101, local AS number 65000.65000 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.1 4 65000.1 19900 19927 0 0 23:23:51 Estab 8 8 192.168.100.2 4 65000.1 75249 75320 0 0 3d16h Estab 8 8 192.168.100.3 4 65000.3 14538 14535 0 0 17:09:23 Estab 8 8 192.168.100.4 4 65000.3 14523 14525 0 0 17:09:23 Estab 8 8 </pre>

show interfaces vxlan 1	
Verify the interface VxLAN 1 is connected on CL-1	
CL-1	Verify EVPN is used for flood list population and remote MAC learning on CL-1
CL-1	Verify VLAN10, VLAN20 and VRF red are mapped to the correct VNIs on CL-1
CL-1	Verify MLAG share router MAC is set to the MLAG system ID on CL-1
CL-1	<pre> CL-1#show interfaces vxlan 1 Vxlan1 is up, line protocol is up (connected) Hardware is Vxlan Source interface is Loopback1 and is active with 192.168.200.1 Replication/Flood Mode is headend with Flood List Source: EVPN Remote MAC learning via EVPN VNI mapping to VLANs Static VLAN to VNI mapping is [10, 1010] [20, 1020] </pre>

```
Dynamic VLAN to VNI mapping for 'evpn' is
[4092, 2000]
Note: All Dynamic VLANs used by VCS are internal VLANs.
      Use 'show vxlan vni' for details.
Static VRF to VNI mapping is
[red, 2000]
MLAG Shared Router MAC is 0200.0000.aaa1
```

show bgp evpn route-type imet vni <vni_id>next-hop <vtep_ip> detail

Verify CL-1 and CL-2 advertise the membership of VNI 1010 via EVPN Type-3 IMET routes

```
CL-3#show bgp evpn route-type imet vni 1010 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for imet 192.168.200.1, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
BGP routing table entry for imet 192.168.200.1, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
```

show mac address-table dynamic

Verify Host-1 MAC address has been learned behind Po1 on CL-1.

```
CL-1#show mac address-table dynamic
  Mac Address Table
  -----
  Vlan     Mac Address      Type      Ports      Moves      Last Move
  ----  -----  -----  -----  -----  -----
    10      0000.0000.1111  DYNAMIC   Po1       1      21:55:32 ago
    20      0000.0000.2222  DYNAMIC   Po2       1      21:55:29 ago
  4092    0200.0000.aaa3  DYNAMIC   Vx1       1      16:40:03 ago
Total Mac Addresses for this criterion: 3

  Multicast Mac Address Table
  -----
  Vlan     Mac Address      Type      Ports
  ----  -----  -----  -----
Total Mac Addresses for this criterion: 0
```

show arp vrf <vrf_name>

Verify Host-1 ARP entry is presented on CL-1.

```
CL-1#show arp vrf red
Address          Age (sec)  Hardware Addr  Interface
10.10.10.1      N/A        0000.0000.1111  Vlan10, Port-Channel1
10.10.20.2      N/A        0000.0000.2222  Vlan20, Port-Channel2
```

show ip route vrf <vrf_name>

Verify the host routes for Host-1 along with VLAN10 networks are presented in the VRF red routing table on CL-3. These routes must be known via CL-1 VTEP IP + VRF red L3VNI + CL-1 MLAG system ID MAC.

CL-3

```

CL-3#show ip route vrf red

VRF: red
Codes: C - connected, S - static, K - kernel,
       O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
       R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
       O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
       NG - Nexthop Group Static Route, V - VXLAN Control Service,
       DH - DHCP client installed default route, M - Martian,
       DP - Dynamic Policy Route, L - VRF Leaked,
       RC - Route Cache Route

Gateway of last resort is not set

      B E      10.10.10.1/32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
      B E      10.10.10.0/24 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
      B E      10.10.20.2/32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
      B E      10.10.20.0/24 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
      C      10.10.30.0/24 is directly connected, Vlan30
      C      10.10.40.0/24 is directly connected, Vlan40
  
```

show bgp evpn route-type mac-ip <mac_address> next-hop <vtep_ip> detail

Verify CL-1 and CL-2 advertise Host-1 MAC address and IP to MAC bindings via EVPN Type-2 MAC-IP routes. EVPN Type-2 MAC-IP routes in Symmetric IRB are dual labeled (L2VNI and L3VNI) as well as they contain the EVPN router MAC of the VTEP that originates the advertisements

CL-3

```

CL-3#show bgp evpn route-type mac-ip 0000.0000.1111 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for mac-ip 0000.0000.1111, Route Distinguisher: 192.168.100.1:10
  Paths: 2 available
    65000.65000 65000.1
      192.168.200.1 from 192.168.100.101 (192.168.100.101)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
        Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
          VNI: 1010 ESI: 0000:0000:0000:0000:0000
    65000.65000 65000.1
      192.168.200.1 from 192.168.100.102 (192.168.100.102)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
        Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
          VNI: 1010 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111, Route Distinguisher: 192.168.100.2:10
  Paths: 2 available
    65000.65000 65000.1
      192.168.200.1 from 192.168.100.101 (192.168.100.101)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
        Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
          VNI: 1010 ESI: 0000:0000:0000:0000:0000
    65000.65000 65000.1
      192.168.200.1 from 192.168.100.102 (192.168.100.102)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
        Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
          VNI: 1010 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111 10.10.10.1, Route Distinguisher: 192.168.100.1:10
  Paths: 2 available
    65000.65000 65000.1
      192.168.200.1 from 192.168.100.102 (192.168.100.102)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
        Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
          EvpnRouterMac:02:00:00:00:aa:a1
          VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
    65000.65000 65000.1
      192.168.200.1 from 192.168.100.101 (192.168.100.101)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
        Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
          EvpnRouterMac:02:00:00:00:aa:a1
          VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111 10.10.10.1, Route Distinguisher: 192.168.100.2:10
  Paths: 2 available
    65000.65000 65000.1
      192.168.200.1 from 192.168.100.102 (192.168.100.102)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
        Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
          EvpnRouterMac:02:00:00:00:aa:a1
          VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
    65000.65000 65000.1
      192.168.200.1 from 192.168.100.101 (192.168.100.101)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
        Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
          EvpnRouterMac:02:00:00:00:aa:a1
          VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
  
```

```
show bgp evpn route-type ip-prefix <network>next-hop <vtep_ip> detail
```

Verify CL-1 and CL-2 advertise VLAN10 network via EVPN Type-5 IP-Prefix routes

```
CL-3#show bgp evpn route-type ip-prefix 10.10.10.0/24 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.100.1:2000
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:aa:a1
        VNI: 2000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:aa:a1
        VNI: 2000
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.100.2:2000
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:aa:a1
        VNI: 2000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:aa:a1
        VNI: 2000
```

```
ping <remote_host_ip>
```

Verify connectivity between Host-1 and Host-3 and Host-4

```
HOST-1#ping 10.10.30.3
PING 10.10.30.3 (10.10.30.3) 72(100) bytes of data.
80 bytes from 10.10.30.3: icmp_seq=1 ttl=62 time=32.4 ms
80 bytes from 10.10.30.3: icmp_seq=2 ttl=62 time=31.6 ms
80 bytes from 10.10.30.3: icmp_seq=3 ttl=62 time=29.5 ms
80 bytes from 10.10.30.3: icmp_seq=4 ttl=62 time=31.8 ms
80 bytes from 10.10.30.3: icmp_seq=5 ttl=62 time=23.3 ms

--- 10.10.30.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 64ms
rtt min/avg/max/mdev = 23.323/29.767/32.460/3.373 ms, pipe 4, ipg/ewma 16.079/30.904 ms

HOST-1#ping 10.10.40.4
PING 10.10.40.4 (10.10.40.4) 72(100) bytes of data.
80 bytes from 10.10.40.4: icmp_seq=1 ttl=62 time=23.7 ms
80 bytes from 10.10.40.4: icmp_seq=2 ttl=62 time=20.2 ms
80 bytes from 10.10.40.4: icmp_seq=3 ttl=62 time=22.4 ms
80 bytes from 10.10.40.4: icmp_seq=4 ttl=62 time=22.7 ms
80 bytes from 10.10.40.4: icmp_seq=5 ttl=62 time=19.8 ms

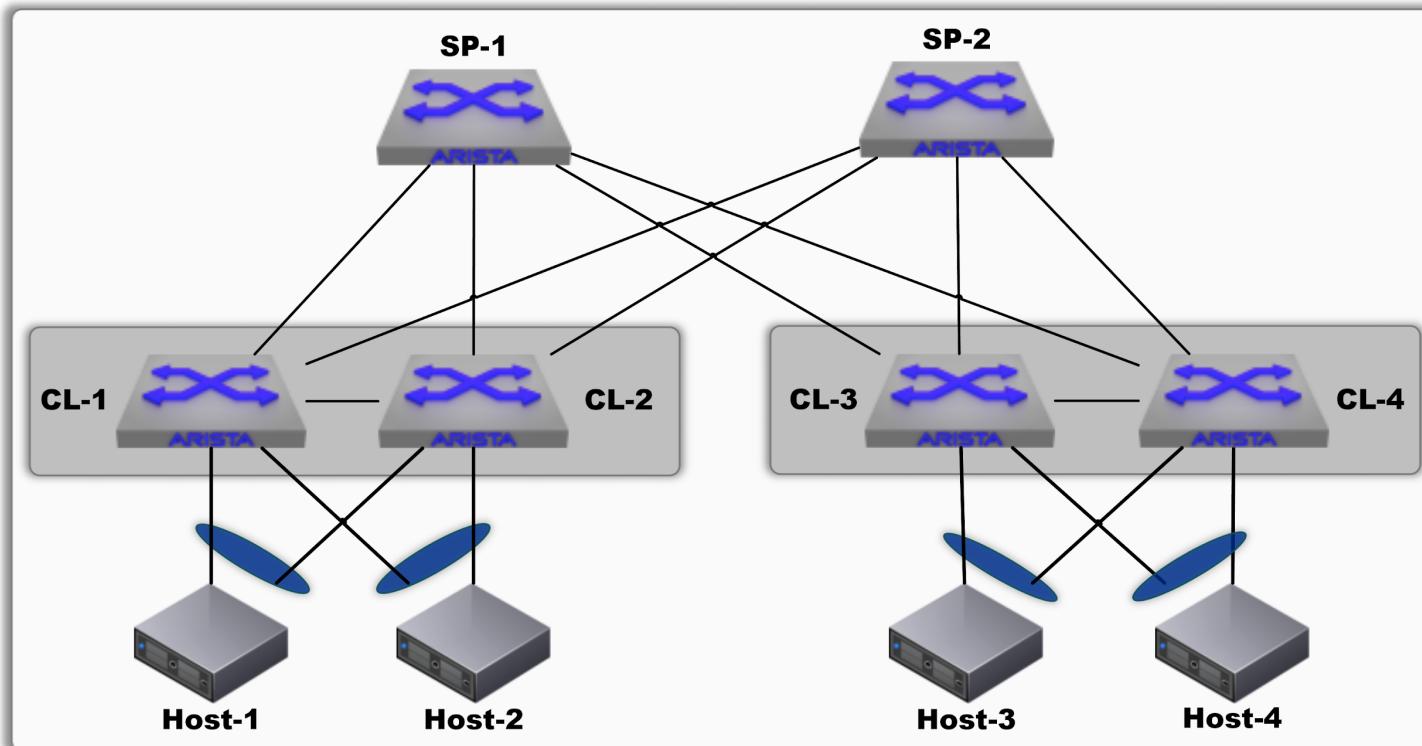
--- 10.10.40.4 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 66ms
rtt min/avg/max/mdev = 19.877/21.812/23.701/1.491 ms, pipe 3, ipg/ewma 16.579/22.713 ms
```

EVPN Symmetric IRB in Default VRF

Deployment Consideration

- Most of the traffic in the EVPN domain is east-west instead of north-south
- Routing at the ingress VTEP and egress VTEP
- Support for middle to high scale deployments (<=25K MAC address)
- More difficult to troubleshoot when compared to A-IRB
- Only to be used for the use case described in the [RFE 353701](#).

Topology



Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
SP-1	192.168.100.101	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb1
SP-2	192.168.100.102	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb2
CL-1	192.168.100.1	192.168.200.1	65000.1	Default Default	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa1
CL-2	192.168.100.2	192.168.200.1	65000.1	Default Default	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa2
CL-3	192.168.100.3	192.168.200.3	65000.3	Default Default	VLAN30 VLAN40	10.10.30.254/24 10.10.40.254/24	0000.0000.aaa3
CL-4	192.168.100.4	192.168.200.3	65000.3	Default Default	VLAN30 VLAN40	10.10.30.254/24 10.10.40.254/24	0000.0000.aaa4
Host-1	N/A	N/A	N/A	N/A	VLAN10	10.10.10.1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	N/A	VLAN20	10.10.20.2/24	0000.0000.2222
Host-3	N/A	N/A	N/A	N/A	VLAN30	10.10.30.3/24	0000.0000.3333
Host-4	N/A	N/A	N/A	N/A	VLAN40	10.10.40.4/24	0000.0000.4444

Important Notes

- By default, EVPN Type-2 MAC-IP routes are tagged with the Dual-VNI. This behavior can be disabled by configuring 'no redistribute host-route' under the MAC-VRF. However, this can lead to suboptimal traffic flow in situations where the destination network is present on two or more VTEPs at same time.
- Due to the consumption of overlay ECMP next hops a cautious approach needs to be taken with the placement of the tenant SVIs in the EVPN domain if L2VPN services are required in a large number of VTEPs

Configuration

The following configuration is required for Symmetric IRB in Default VRF:

- Underlay
 - ArBGP
 - eBGP IPv4 Unicast peering between spines and leaf switches
 - iBGP IPv4 Unicast peering between MLAG pair
 - MLAG
 - BGP

- 'redistribute connected' needs to be configured without a route-map, however, additional route filtering needs to be applied to the eBGP IPv4 unicast peering between the spine and leaf switches to prevent that overlay routes get advertised in the underlay.
- Overlay
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VxLAN
 - MLAG Shared Router MAC Address
 - VLAN to VNI mapping (L2VNI)
 - VRF to VNI mapping (L3VNI)
 - BGP/EVPN
 - MAC-VRF
 - IP-VRF
 - A route-map applied to 'route target export evpn' is mandatory to generate/export the tenant subnets as a type-5 routes
- Tenant
 - VLAN
 - Anycast Gateway
- Platform specific (See [Appendix A](#))

Note: Configuration lines in red font color are not supported in vEOS.

Compute Leaf

Function	CL-1	CL-2
BGP	service routing protocols model multi-agent	service routing protocols model multi-agent
LAN	vlan 10,20	vlan 10,20
VRF Instance	N/A	N/A
Spines Uplink	<pre>interface Ethernet1 no switchport ip address 192.168.1.1/31 ! interface Ethernet2 no switchport ip address 192.168.2.1/31</pre>	<pre>interface Ethernet1 no switchport ip address 192.168.1.3/31 ! interface Ethernet2 no switchport ip address 192.168.2.3/31</pre>
BGP Loopback0 Router ID	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.1/32 ! router general router-id ipv4 192.168.100.1</pre>	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.2/32 ! router general router-id ipv4 192.168.100.2</pre>
VTEP IP	<pre>interface Loopback1 description VTEP IP ip address 192.168.200.1/32</pre>	<pre>interface Loopback1 description VTEP IP ip address 192.168.200.1/32</pre>
VxLAN	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vrf default vni 2000</pre>	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vrf default vni 2000</pre>
LAG Config	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000</pre>	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000</pre>
Anycast Gateway	<pre>interface Vlan10 ip address virtual 10.10.10.254/24</pre>	<pre>interface Vlan10 ip address virtual 10.10.10.254/24</pre>

Virtual MAC address	<pre>! interface Vlan20 ip address virtual 10.10.20.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>	<pre>! interface Vlan20 ip address virtual 10.10.20.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>
-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! ip prefix-list TENANT_NETWORK seq 10 permit 10.10.10.0/24 seq 20 permit 10.10.20.0/24 ! route-map UNDERLAY_ONLY permit 10 match ip address prefix-list LOOPBACK ! route-map UNDERLAY_ONLY permit 20 match ip address prefix-list P2P ! route-map TENANT_NETWORK permit 10 match ip address prefix-list TENANT_NETWORK</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! ip prefix-list TENANT_NETWORK seq 10 permit 10.10.10.0/24 seq 20 permit 10.10.20.0/24 ! route-map UNDERLAY_ONLY permit 10 match ip address prefix-list LOOPBACK ! route-map UNDERLAY_ONLY permit 20 match ip address prefix-list P2P ! route-map TENANT_NETWORK permit 10 match ip address prefix-list TENANT_NETWORK</pre>
BGP and iBGP Underlay EVPN	<pre>router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 route-map UNDERLAY_ONLY out neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vrf default rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 route-target export evpn route-map TENANT-NETWORK ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate</pre>	<pre>router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 route-map UNDERLAY_ONLY out neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vrf default rd 192.168.100.2:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 route-target export evpn route-map TENANT-NETWORK ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate</pre>

Function	CL-3	CL-4
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 30,40	vlan 30,40
VRF Instance	N/A	N/A
Spines Uplink	interface Ethernet1	interface Ethernet1

	<pre> no switchport ip address 192.168.1.5/31 ! interface Ethernet2 no switchport ip address 192.168.2.5/31 </pre>	<pre> no switchport ip address 192.168.1.7/31 ! interface Ethernet2 no switchport ip address 192.168.2.7/31 </pre>
BGP Loopback0 Router ID	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.3/32 ! router general router-id ipv4 192.168.100.3 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.4/32 ! router general router-id ipv4 192.168.100.4 </pre>
VTI Loopback1 VTEP IP	<pre> interface Loopback1 description Logical VTEP ip address 192.168.200.3/32 </pre>	<pre> interface Loopback1 description Logical VTEP ip address 192.168.200.3/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf default vni 2000 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf default vni 2000 </pre>
MLAG Config	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
Anycast Gateway Virtual MAC address	<pre> interface Vlan30 ip address virtual 10.10.30.254/24 ! interface Vlan40 ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>	<pre> interface Vlan30 ip address virtual 10.10.30.254/24 ! interface Vlan40 ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! ip prefix-list TENANT_NETWORK seq 10 permit 10.10.30.0/24 seq 20 permit 10.10.40.0/24 ! route-map UNDERLAY_ONLY permit 10 match ip address prefix-list LOOPBACK ! route-map UNDERLAY_ONLY permit 20 match ip address prefix-list P2P ! route-map TENANT_NETWORK permit 10 match ip address prefix-list TENANT_NETWORK </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! ip prefix-list TENANT_NETWORK seq 10 permit 10.10.30.0/24 seq 20 permit 10.10.40.0/24 ! route-map UNDERLAY_ONLY permit 10 match ip address prefix-list LOOPBACK ! route-map UNDERLAY_ONLY permit 20 match ip address prefix-list P2P ! route-map TENANT_NETWORK permit 10 match ip address prefix-list TENANT_NETWORK </pre>
eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 </pre>	<pre> router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 </pre>

<pre> neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 route-map UNDERLAY_ONLY out neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf default rd 192.168.100.3:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 route-target export evpn route-map TENANT_NETWORK ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>	<pre> neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 route-map UNDERLAY_ONLY out neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf default rd 192.168.100.4:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 route-target export evpn route-map TENANT_NETWORK ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>
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Spine

Function	SP-1	SP-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
Leaf Downlinks	<pre> interface Ethernet1 no switchport ip address 192.168.1.0/31 ! interface Ethernet2 no switchport ip address 192.168.1.2/31 ! interface Ethernet3 no switchport ip address 192.168.1.4/31 ! interface Ethernet4 no switchport ip address 192.168.1.6/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.2.0/31 ! interface Ethernet2 no switchport ip address 192.168.2.2/31 ! interface Ethernet3 no switchport ip address 192.168.2.4/31 ! interface Ethernet4 no switchport ip address 192.168.2.6/31 </pre>
BGP Loopback0 (Router ID)	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.101/32 ! router general router-id ipv4 192.168.100.101 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.102/32 ! router general router-id ipv4 192.168.100.102 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>

eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.1.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multipath 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept </pre>	<pre> router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.2.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multipath 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept </pre>
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Verification

The verification steps below that have been carried out host-1 in the environment as these steps are similar to the remaining hosts.

show bgp evpn summary	
Verify the eBGP IPv4 EVPN peering between spines and leaf switches is established	
CL-1	<pre> CL-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.1, local AS number 65000.1 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.101 4 65000.65000 61763 61693 0 0 07:23:07 Estab 16 16 192.168.100.102 4 65000.65000 61721 61734 0 0 07:23:07 Estab 16 16 </pre>
CL-3	<pre> CL-3#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.3, local AS number 65000.3 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.101 4 65000.65000 22170 22159 0 0 1d02h Estab 16 16 192.168.100.102 4 65000.65000 22172 22166 0 0 1d02h Estab 16 16 </pre>
SP-1	<pre> SP-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.101, local AS number 65000.65000 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.1 4 65000.1 6346 6388 0 0 07:23:39 Estab 8 8 192.168.100.2 4 65000.1 61699 61791 0 0 3d00h Estab 8 8 192.168.100.3 4 65000.3 982 995 0 0 01:09:10 Estab 8 8 192.168.100.4 4 65000.3 977 990 0 0 01:09:10 Estab 8 8 </pre>

show interfaces vxlan 1	
Verify the interface VxLAN 1 is connected on CL-1	
	Verify EVPN is used for flood list population and remote MAC learning on CL-1
	Verify VLAN10, VLAN20 and VRF default are mapped to the correct VNIs on CL-1
	Verify MLAG share router MAC is set to the MLAG system ID on CL-1
CL-1	<pre> CL-1#show interfaces vxlan 1 Vxlan1 is up, line protocol is up (connected) Hardware is Vxlan Source interface is Loopback1 and is active with 192.168.200.1 Replication/Flood Mode is headend with Flood List Source: EVPN Remote MAC learning via EVPN VNI mapping to VLANs Static VLAN to VNI mapping is [10, 1010] [20, 1020] </pre>

```
Dynamic VLAN to VNI mapping for 'evpn' is
[4092, 2000]
Note: All Dynamic VLANs used by VCS are internal VLANs.
    Use 'show vxlan vni' for details.
Static VRF to VNI mapping is
[default, 2000]
MLAG Shared Router MAC is 0200.0000.aaa1
```

show bgp evpn route-type imet vni <vni_id>next-hop <step_ip> detail

Verify CL-1 and CL-2 advertise the membership of VNI 1010 via EVPN Type-3 IMET routes

```
CL-3#show bgp evpn route-type imet vni 1010 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for imet 192.168.200.1, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
BGP routing table entry for imet 192.168.200.1, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
```

show mac address-table dynamic

Verify Host-1 MAC address has been learned behind Po1 on CL-1.

```
CL-1#show mac address-table dynamic
  Mac Address Table
  -----
  Vlan     Mac Address       Type      Ports      Moves   Last Move
  ----     -----           ----      ----      ----   -----
    10      0000.0000.1111   DYNAMIC   Po1       1      6:11:04 ago
    20      0000.0000.2222   DYNAMIC   Po2       1      6:11:01 ago
  4092    0200.0000.aaa3   DYNAMIC   Vx1       1      0:55:36 ago
Total Mac Addresses for this criterion: 3

  Multicast Mac Address Table
  -----
  Vlan     Mac Address       Type      Ports
  ----     -----           ----      ----
Total Mac Addresses for this criterion: 0
```

show arp

Verify Host-1 ARP entry is presented on CL-1.

```
CL-1#show arp
  Address      Age (sec)  Hardware Addr  Interface
  192.168.1.0   0:00:00  0000.0000.bbb1  Ethernet1
  192.168.2.0   0:00:00  0000.0000.bbb2  Ethernet2
  10.10.10.1    1:00:44  0000.0000.1111  Vlan10, Port-Channel1
  10.10.20.2    1:29:39  0000.0000.2222  Vlan20, Port-Channel2
  172.16.0.2    0:00:01  0000.0000.aaa2  Vlan4094, Port-Channel1000
```

show ip route

Verify the host routes for Host-1 along with VLAN10 networks are presented in the VRF red routing table on CL-3. These routes must be known via CL-1 VTEP IP + VRF red L3VNI + CL-1 MLAG system ID MAC.

```
CL-3#show ip route

VRF: default
Codes: C - connected, S - static, K - kernel,
       0 - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
       R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
       O3 - OSPFv3, A B - BGP Aggregate, A 0 - OSPF Summary,
       NG - Nexthop Group Static Route, V - VXLAN Control Service,
       DH - DHCP client installed default route, M - Martian,
       DP - Dynamic Policy Route, L - VRF Leaked,
       RC - Route Cache Route

Gateway of last resort is not set

C      172.16.0.0/30 is directly connected, Vlan4094
B E    10.10.10.1/32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
B E    10.10.10.0/24 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
B E    10.10.20.2/32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
B E    10.10.20.0/24 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
C      10.10.30.0/24 is directly connected, Vlan4094
C      10.10.40.0/24 is directly connected, Vlan4094
C      192.168.1.4/31 is directly connected, Ethernet1
B I    192.168.1.6/31 [200/0] via 172.16.0.2, Vlan4094
C      192.168.2.4/31 is directly connected, Ethernet2
B I    192.168.2.6/31 [200/0] via 172.16.0.2, Vlan4094
B E    192.168.0.0/22 [20/0] via 192.168.1.4, Ethernet1
          via 192.168.2.4, Ethernet2
B E    192.168.100.1/32 [20/0] via 192.168.1.4, Ethernet1
          via 192.168.2.4, Ethernet2
B E    192.168.100.2/32 [20/0] via 192.168.1.4, Ethernet1
          via 192.168.2.4, Ethernet2
C      192.168.100.3/32 is directly connected, Loopback0
B I    192.168.100.4/32 [200/0] via 172.16.0.2, Vlan4094
B E    192.168.100.101/32 [20/0] via 192.168.1.4, Ethernet1
B E    192.168.100.102/32 [20/0] via 192.168.2.4, Ethernet2
B E    192.168.200.1/32 [20/0] via 192.168.1.4, Ethernet1
          via 192.168.2.4, Ethernet2
C      192.168.200.3/32 is directly connected, Loopback1
```

show bgp evpn route-type mac-ip <mac_address> next-hop <vtep_ip> detail

Verify CL-1 and CL-2 advertise Host-1 MAC address and IP to MAC bindings via EVPN Type-2 MAC-IP routes. EVPN Type-2 MAC-IP routes in Symmetric IRB are dual labeled (L2VNI and L3VNI) as well as they contain the EVPN router MAC of the VTEP that originates the advertisements.

```
CL-3#show bgp evpn route-type mac-ip 0000.0000.1111 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for mac-ip 0000.0000.1111, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111 10.10.10.1, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
        EvpnRouterMac:02:00:00:00:aa:a1
        VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
```

```

65000.65000 65000.1
 192.168.200.1 from 192.168.100.101 (192.168.100.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:02:00:00:00:aa:a1
  VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111 10.10.10.1, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:02:00:00:00:aa:a1
  VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:02:00:00:00:aa:a1
  VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000

```

show bgp evpn route-type ip-prefix <network> next-hop <step_ip> detail

Verify CL-1 and CL-2 advertise VLAN10 network via EVPN Type-5 IP-Prefix routes

```

CL-3#show bgp evpn route-type ip-prefix 10.10.10.0/24 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.100.1:2000
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:aa:a1
        VNI: 2000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:aa:a1
        VNI: 2000
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.100.2:2000
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:aa:a1
        VNI: 2000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:aa:a1
        VNI: 2000

```

ping <remote_host_ip>

Verify connectivity between Host-1 and Host-3 and Host-4

```

HOST-1#ping 10.10.30.3
PING 10.10.30.3 (10.10.30.3) 72(100) bytes of data.
80 bytes from 10.10.30.3: icmp_seq=1 ttl=62 time=29.9 ms
80 bytes from 10.10.30.3: icmp_seq=2 ttl=62 time=23.2 ms
80 bytes from 10.10.30.3: icmp_seq=3 ttl=62 time=22.3 ms
80 bytes from 10.10.30.3: icmp_seq=4 ttl=62 time=28.3 ms
80 bytes from 10.10.30.3: icmp_seq=5 ttl=62 time=22.0 ms

--- 10.10.30.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 78ms
rtt min/avg/max/mdev = 22.098/25.211/29.951/3.281 ms, pipe 3, ipg/ewma 19.626/27.510 ms

HOST-1#ping 10.10.40.4
PING 10.10.40.4 (10.10.40.4) 72(100) bytes of data.
80 bytes from 10.10.40.4: icmp_seq=1 ttl=62 time=22.0 ms
80 bytes from 10.10.40.4: icmp_seq=2 ttl=62 time=20.3 ms
80 bytes from 10.10.40.4: icmp_seq=3 ttl=62 time=20.3 ms
80 bytes from 10.10.40.4: icmp_seq=4 ttl=62 time=22.7 ms
80 bytes from 10.10.40.4: icmp_seq=5 ttl=62 time=22.6 ms

--- 10.10.40.4 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 79ms
rtt min/avg/max/mdev = 20.380/21.631/22.706/1.049 ms, pipe 2, ipg/ewma 19.853/21.889 ms

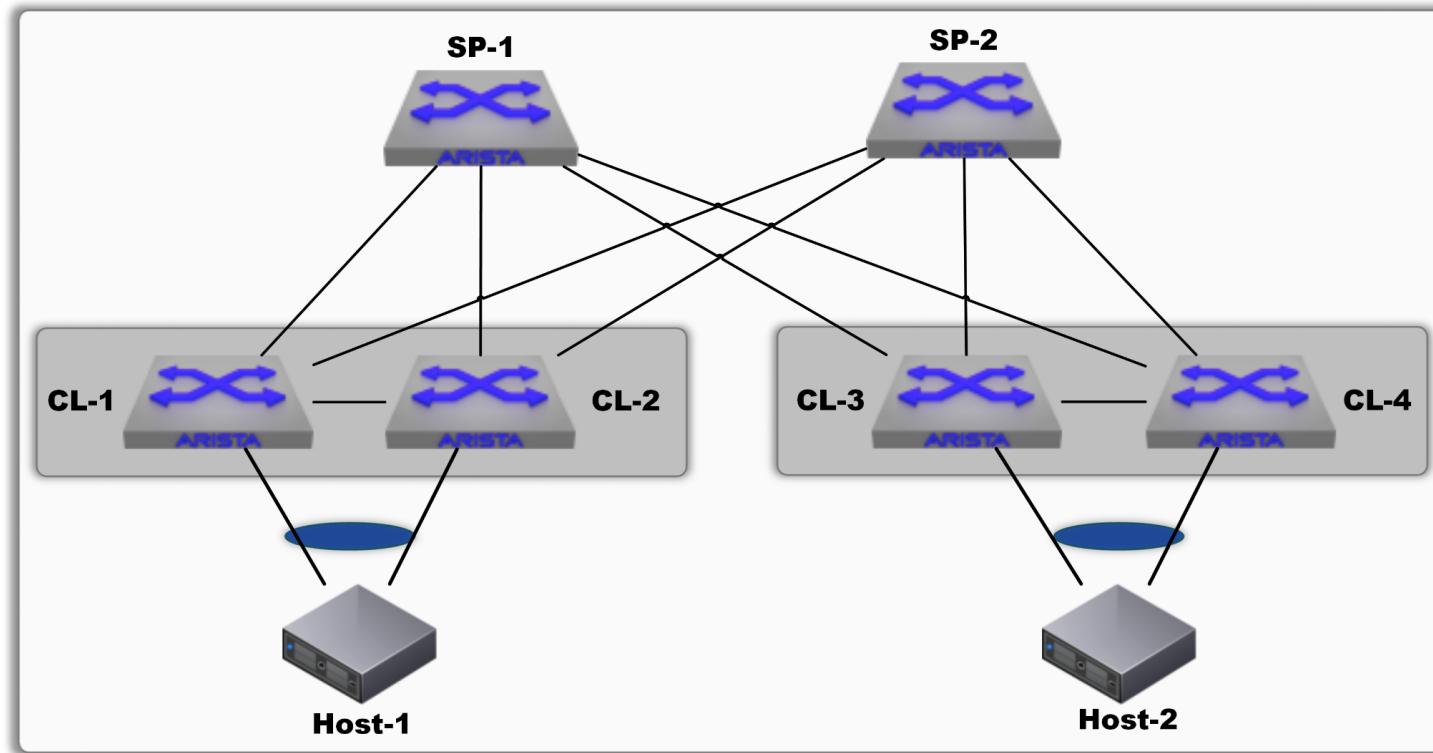
```

EVPN Symmetric IRB with IPv6 overlay

Deployment Consideration

- Easy extension of the EVPN symmetric IRB model to support IPv6 in the overlay.
- Underlay still runs IPv4 only.
- SVIs can be configured with IPv6 only, or dual stack (IPv4 and IPv6). Configs below use dual stack with Anycast gateway.
- Check platform support for ND Proxy and ND suppression. Additional TOI info: [4.23.0F](#) and [4.23.1F](#)
- The EVPN address family carries both ipv4 and ipv6 routes.

Topology



Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
SP-1	192.168.100.101	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb1
SP-2	192.168.100.102	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb2
CL-1	192.168.100.1	192.168.200.1	65000.1	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 fc00:10::254/24 10.10.20.254/24 fc00:20::254/24 10.10.30.254/24 fc00:30::254/24 10.10.40.254/24 fc00:40::254/24	0000.0000.aaa1
CL-2	192.168.100.2	192.168.200.1	65000.1	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 fc00:10::254/24 10.10.20.254/24 fc00:20::254/24 10.10.30.254/24 fc00:30::254/24 10.10.40.254/24 fc00:40::254/24	0000.0000.aaa2
CL-3	192.168.100.3	192.168.200.3	65000.3	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 fc00:10::254/24 10.10.20.254/24 fc00:20::254/24 10.10.30.254/24 fc00:30::254/24 10.10.40.254/24 fc00:40::254/24	0000.0000.aaa3
CL-4	192.168.100.4	192.168.200.3	65000.3	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 fc00:10::254/24 10.10.20.254/24 fc00:20::254/24 10.10.30.254/24 fc00:30::254/24 10.10.40.254/24 fc00:40::254/24	0000.0000.aaa4
Host-1	N/A	N/A	N/A	Red Blue	VLAN10 VLAN40	10.10.10.1/24 fc00:10::1/24 10.10.40.1/24 fc00:40::1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	Red Blue	VLAN20 VLAN30	10.10.20.2/24 fc00:20::2/24 10.10.30.2/24 fc00:30::2/24	0000.0000.2222

Important Notes

- Two SVI configuration options:
 - IPv6 SVIs can use "ipv6 virtual-router" with a VIP and a physical address.
 - As with ipv4, "ipv6 address virtual" eliminates the need to configure a unique IP address per SVI (recommended). Supported from 4.25.1F.
- It is a best practice to always configure router-id for the L3 VRF (configured globally in the example). For IPv6 only SVI, router-id is required to be configured on the associated L3 VRF in order for Symmetric IRB to work properly.
- If a dual stack is configured, EVPN originates MAC-IP routes for both locally learned IPv4 and IPv6 hosts.
- "ip virtual-router mac-address" would need to be configured to resolve the virtual IP address to a MAC address. This MAC address is used to both receive and send NDP packets associated with the IP address configured with ipv6 address virtual.
- The use of 'ipv6 address virtual' requires both EVPN IRB and VXLAN tunnel interface. Use of VXLAN routing setup without EVPN IRB configuration does not support this feature. All VTEPs in the EVPN IRB must be configured with SVIs using "ipv6 address virtual". A topology that uses L2-only VTEPs connecting to L3-VTEPs is not supported. Any topology that requires a VXLAN Virtual VTEP address configuration is not supported, and this includes the "Centralized Gateway" model.

Configuration

The following configuration is required for Symmetric IRB:

- Underlay
 - Multi-agent model (ArBGP)
 - eBGP IPv4 Unicast peering between spines and leaf switches
 - iBGP IPv4 Unicast peering between MLAG pair
 - MLAG
- Overlay
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VxLAN
 - MLAG Shared Router MAC Address
 - VLAN to VNI mapping (L2VNI)
 - VRF to VNI mapping (L3VNI)
 - BGP/EVPN
 - MAC-VRF
 - IP-VRF
- Tenant
 - VLANs IPv4 and IPv6
 - Tenant VRF
 - Anycast Gateway IPv4 and IPv6
- Platform specific (See [Appendix A](#))

Note: Configuration lines in red font color are not supported in vEOS.

Compute Leaf

Function	CL-1	CL-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20,30,40	vlan 10,20,30,40
VRF Instance	ipv6 unicast-routing vrf instance blue vrf instance red ip routing vrf red ip routing vrf blue ipv6 unicast-routing vrf red ipv6 unicast-routing vrf blue	ipv6 unicast-routing vrf instance blue vrf instance red ip routing vrf red ip routing vrf blue ipv6 unicast-routing vrf red ipv6 unicast-routing vrf blue
Spines Uplink	<pre>interface Ethernet1 no switchport ip address 192.168.1.1/31 ! interface Ethernet2 no switchport ip address 192.168.2.1/31</pre>	<pre>interface Ethernet1 no switchport ip address 192.168.1.3/31 ! interface Ethernet2 no switchport ip address 192.168.2.3/31</pre>
BGP Loopback0 Router ID	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.1/32</pre>	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.2/32</pre>

Arista Internal Use Only

	<pre> ! router general router-id ipv4 192.168.100.1 </pre>	<pre> ! router general router-id ipv4 192.168.100.2 </pre>
VTE Loopback1 VTEP IP	<pre> interface Loopback1 description VTEP IP ip address 192.168.200.1/32 </pre>	<pre> interface Loopback1 description VTEP IP ip address 192.168.200.1/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>
MLAG Config	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
Anycast Gateway Virtual MAC address	<pre> interface Vlan10 vrf red ipv6 enable ipv6 address virtual fc00:10::254/64 ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ipv6 enable ipv6 address virtual fc00:20::254/64 ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ipv6 enable ipv6 address virtual fc00:30::254/64 ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ipv6 enable ipv6 address virtual fc00:40::254/64 ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>	<pre> interface Vlan10 vrf red ipv6 enable ipv6 address virtual fc00:10::254/64 ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ipv6 enable ipv6 address virtual fc00:20::254/64 ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ipv6 enable ipv6 address virtual fc00:30::254/64 ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ipv6 enable ipv6 address virtual fc00:40::254/64 ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>
IP-Prefix Route- map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
eBGP and IBGP Underlay BGP/EVPN	<pre> router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group </pre>	<pre> router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group </pre>

<pre> neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate ! vrf blue rd 192.168.100.1:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected !</pre>	<pre> neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate ! vrf blue rd 192.168.100.2:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.100.2:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected !</pre>
--	--

Function	CL-3	CL-4
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20,30,40	vlan 10,20,30,40
VRF Instance	ipv6 unicast-routing vrf instance blue vrf instance red ip routing vrf red ip routing vrf blue ipv6 unicast-routing vrf red ipv6 unicast-routing vrf blue	ipv6 unicast-routing vrf instance blue vrf instance red ip routing vrf red ip routing vrf blue ipv6 unicast-routing vrf red ipv6 unicast-routing vrf blue
Spines Uplink	interface Ethernet1 no switchport ip address 192.168.1.5/31 ! interface Ethernet2 no switchport ip address 192.168.2.5/31	interface Ethernet1 no switchport ip address 192.168.1.7/31 ! interface Ethernet2 no switchport ip address 192.168.2.7/31
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID	interface Loopback0 description BGP Router ID

	<pre>ip address 192.168.100.3/32 ! router general router-id ipv4 192.168.100.3</pre>	<pre>ip address 192.168.100.4/32 ! router general router-id ipv4 192.168.100.4</pre>
VTI Loopback1 VTEP IP	<pre>interface Loopback1 description Logical VTEP ip address 192.168.200.3/32</pre>	<pre>interface Loopback1 description Logical VTEP ip address 192.168.200.3/32</pre>
VxLAN	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000</pre>	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000</pre>
MLAG Config	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000</pre>	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000</pre>
Anycast Gateway Virtual MAC address	<pre>interface Vlan10 vrf red ipv6 enable ipv6 address virtual fc00:10::254/64 ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ipv6 enable ipv6 address virtual fc00:20::254/64 ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ipv6 enable ipv6 address virtual fc00:30::254/64 ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ipv6 enable ipv6 address virtual fc00:40::254/64 ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>	<pre>interface Vlan10 vrf red ipv6 enable ipv6 address virtual fc00:10::254/64 ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ipv6 enable ipv6 address virtual fc00:20::254/64 ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ipv6 enable ipv6 address virtual fc00:30::254/64 ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ipv6 enable ipv6 address virtual fc00:40::254/64 ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>
IP-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>
eBGP and iBGP Underlay BGP/EVPN	<pre>router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2</pre>	<pre>router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2</pre>

```

neighbor default send-community
neighbor OVERLAY_SPINE_EVPN peer group
neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000
neighbor OVERLAY_SPINE_EVPN update-source Loopback0
neighbor OVERLAY_SPINE_EVPN bfd
neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2
neighbor OVERLAY_SPINE_EVPN maximum-routes 0
neighbor UNDERLAY_MLAG_PEER_V4 peer group
neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3
neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self
neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000
neighbor UNDERLAY_SPINE_V4 peer group
neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000
neighbor UNDERLAY_SPINE_V4 maximum-routes 12000
neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4
neighbor 192.168.1.4 peer group UNDERLAY_SPINE_V4
neighbor 192.168.2.4 peer group UNDERLAY_SPINE_V4
neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN
neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN
redistribute connected route-map CONNECTED
!
vlan 10
  rd auto
  route-target both 1010:1010
  redistribute learned
!
vlan 20
  rd auto
  route-target both 1020:1020
  redistribute learned
!
vlan 30
  rd auto
  route-target both 1030:1030
  redistribute learned
!
vlan 40
  rd auto
  route-target both 1040:1040
  redistribute learned
!
address-family evpn
  neighbor OVERLAY_SPINE_EVPN activate
!
address-family ipv4
  neighbor UNDERLAY_MLAG_PEER_V4 activate
  neighbor UNDERLAY_SPINE_V4 activate
!
vrf blue
  rd 192.168.100.3:2001
  route-target import evpn 2001:2001
  route-target export evpn 2001:2001
  redistribute connected
!
vrf red
  rd 192.168.100.3:2000
  route-target import evpn 2000:2000
  route-target export evpn 2000:2000
  redistribute connected
!

neighbor default send-community
neighbor OVERLAY_SPINE_EVPN peer group
neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000
neighbor OVERLAY_SPINE_EVPN update-source Loopback0
neighbor OVERLAY_SPINE_EVPN bfd
neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2
neighbor OVERLAY_SPINE_EVPN maximum-routes 0
neighbor UNDERLAY_MLAG_PEER_V4 peer group
neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3
neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self
neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000
neighbor UNDERLAY_SPINE_V4 peer group
neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000
neighbor UNDERLAY_SPINE_V4 maximum-routes 12000
neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4
neighbor 192.168.1.6 peer group UNDERLAY_SPINE_V4
neighbor 192.168.2.6 peer group UNDERLAY_SPINE_V4
neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN
neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN
redistribute connected route-map CONNECTED
!
vlan 10
  rd auto
  route-target both 1010:1010
  redistribute learned
!
vlan 20
  rd auto
  route-target both 1020:1020
  redistribute learned
!
vlan 30
  rd auto
  route-target both 1030:1030
  redistribute learned
!
vlan 40
  rd auto
  route-target both 1040:1040
  redistribute learned
!
address-family evpn
  neighbor OVERLAY_SPINE_EVPN activate
!
address-family ipv4
  neighbor UNDERLAY_MLAG_PEER_V4 activate
  neighbor UNDERLAY_SPINE_V4 activate
!
vrf blue
  rd 192.168.100.4:2001
  route-target import evpn 2001:2001
  route-target export evpn 2001:2001
  redistribute connected
!
vrf red
  rd 192.168.100.4:2000
  route-target import evpn 2000:2000
  route-target export evpn 2000:2000
  redistribute connected
!
```

Spine

Function	SP-1	SP-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
Leaf Downlinks	<pre> interface Ethernet1 no switchport ip address 192.168.1.0/31 ! interface Ethernet2 no switchport ip address 192.168.1.2/31 ! interface Ethernet3 no switchport ip address 192.168.1.4/31 ! interface Ethernet4 no switchport ip address 192.168.1.6/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.2.0/31 ! interface Ethernet2 no switchport ip address 192.168.2.2/31 ! interface Ethernet3 no switchport ip address 192.168.2.4/31 ! interface Ethernet4 no switchport ip address 192.168.2.6/31 </pre>
BGP Loopback0 (Router ID)	interface Loopback0 description BGP Router ID ip address 192.168.100.101/32	interface Loopback0 description BGP Router ID ip address 192.168.100.102/32

	<pre>! router general router-id ipv4 192.168.100.101</pre>	<pre>! router general router-id ipv4 192.168.100.102</pre>
IP-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>
eBGP and iBGP Underlay BGP/EVPN	<pre>router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.1.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multihop 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept</pre>	<pre>router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.2.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multihop 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept</pre>

Verification

The verification steps below have been carried out host-1 in the environment as these steps are similar to the remaining hosts.

show bgp evpn summary	
Verify the eBGP IPv4 EVPN peering between spines and leaf switches is established	
CL-1	<pre>CL-1#show bgp evpn sum BGP summary information for VRF default Router identifier 192.168.100.1, local AS number 65000.1 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.101 4 65000.65000 3183 3124 0 0 03:18:11 Estab 76 76 192.168.100.102 4 65000.65000 3169 3135 0 0 03:18:11 Estab 76 76</pre>
SP-1	<pre>SP-1#show bgp evpn summ BGP summary information for VRF default Router identifier 192.168.100.101, local AS number 65000.65000 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.1 4 65000.1 2899 2952 0 0 03:18:51 Estab 17 17 192.168.100.2 4 65000.1 2912 2951 0 0 03:18:51 Estab 17 17 192.168.100.3 4 65000.3 2905 2950 0 0 03:18:51 Estab 18 18 192.168.100.4 4 65000.3 2919 2950 0 0 03:18:51 Estab 18 18</pre>
show interfaces vxlan 1	
Verify the interface VxLAN 1 is connected on CL-1 Verify EVPN is used for flood list population and remote MAC learning on CL-1 Verify VLAN10, VLAN20 and VRF red are mapped to the correct VNIs on CL-1 Verify MLAG share router MAC is set to the MLAG system ID on CL-1	

```

CL-1#show interface vxlan 1
Vxlan1 is up, line protocol is up (connected)
  Hardware is Vxlan
  Source interface is Loopback1 and is active with 192.168.200.1
  Replication/Flood Mode is headend with Flood List Source: EVPN
  Remote MAC learning via EVPN
  VNI mapping to VLANs
  Static VLAN to VNI mapping is
    [10, 1010]      [20, 1020]      [30, 1030]      [40, 1040]

  Dynamic VLAN to VNI mapping for 'evpn' is
    [4092, 2000]      [4093, 2001]
  Note: All Dynamic VLANs used by VCS are internal VLANs.
        Use 'show vxlan vni' for details.
  Static VRF to VNI mapping is
    [blue, 2001]
    [red, 2000]
  Headend replication flood vtep list is:
    10 192.168.200.5 192.168.200.3
    20 192.168.200.5 192.168.200.3
    30 192.168.200.5 192.168.200.3
    40 192.168.200.5 192.168.200.3
  MLAG Shared Router MAC is 521d.0011.3844

```

show bgp evpn route-type imet vni <vni_id>next-hop <vtep_ip> detail

Verify CL-1 and CL-2 advertise the membership of VNI 1010 via EVPN Type-3 IMET routes

```

CL-3#show bgp evpn route-type imet vni 1010 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for imet 192.168.200.1, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
BGP routing table entry for imet 192.168.200.1, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1

```

show mac address-table dynamic

Verify Host-1 MAC address has been learned behind Po1 on CL-1.

```

CL-1#show mac address-table dynamic
  Mac Address Table
  -----
  Vlan   Mac Address       Type      Ports      Moves   Last Move
  ---   -----           ----      ----      ----   -----
  10    0000.0000.1111   DYNAMIC   Po1       1       2:11:31 ago
  20    0000.0000.2222   DYNAMIC   Vx1       1       3:26:24 ago
  30    0000.0000.2222   DYNAMIC   Vx1       1       3:26:24 ago
  40    0000.0000.1111   DYNAMIC   Po1       1       2:05:22 ago
  4092  521d.0037.4ac8   DYNAMIC   Vx1       1       2:11:35 ago
  4092  521d.008f.1bd3   DYNAMIC   Vx1       1       4:05:30 ago
  4093  521d.0037.4ac8   DYNAMIC   Vx1       1       2:11:35 ago
  4093  521d.008f.1bd3   DYNAMIC   Vx1       1       4:05:30 ago
Total Mac Addresses for this criterion: 8

  Multicast Mac Address Table
  -----
  Vlan   Mac Address       Type      Ports
  ---   -----           ----      ----

```

Total Mac Addresses for this criterion: 0

show arp vrf <vrf_name>

Verify Host-1 ARP entry is presented on CL-1.

```
CL-1#show arp vrf red
Address      Age (sec)  Hardware Addr  Interface
10.10.10.1      N/A  0000.0000.1111  Vlan10, Port-Channel1
10.10.20.2          -  0000.0000.2222  Vlan20, Vxlan1

CL-1#show arp vrf blue
Address      Age (sec)  Hardware Addr  Interface
10.10.30.2      N/A  0000.0000.2222  Vlan30, Vxlan1
10.10.40.1      N/A  0000.0000.1111  Vlan40, Port-Channel1

DC-1#show ipv6 neighbors vrf red | grep fc00
fc00:10::1      N/A  0000.0000.1111  REACH Vl10, Port-Channel1
fc00:20::2          -  0000.0000.2222  REACH Vl20, Vxlan1
DC-1#show ipv6 neighbors vrf blue | grep fc00
fc00:30::2          -  0000.0000.2222  REACH Vl30, Vxlan1
fc00:40::1      N/A  0000.0000.1111  REACH Vl40, Port-Channel1
```

show ip route vrf <vrf_name>

Verify the host routes for Host-1 along with VLAN10 networks are presented in the VRF red routing table on CL-3. These routes must be known via CL-1 VTEP IP + VRF red L3VNI + CL-1 MLAG system ID MAC.

CL-3#show ip route vrf red

```
VRF: red
Codes: C - connected, S - static, K - kernel,
       0 - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
       R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
       O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
       NG - Nexthop Group Static Route, V - VXLAN Control Service,
       DH - DHCP client installed default route, M - Martian,
       DP - Dynamic Policy Route, L - VRF Leaked,
       RC - Route Cache Route

Gateway of last resort:
B E      0.0.0.0/0 [20/0] via VTEP 192.168.200.5 VNI 2000 router-mac 52:1d:00:37:4a:c8
B E      10.10.10.1/32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 52:1d:00:11:38:44
C      10.10.10.0/24 is directly connected, Vlan10
C      10.10.20.0/24 is directly connected, Vlan20
B E      10.10.50.0/24 [20/0] via VTEP 192.168.200.5 VNI 2000 router-mac 52:1d:00:37:4a:c8
```

CL-3#show ipv6 route vrf red

```
VRF: red
Displaying 5 of 10 IPv6 routing table entries
Codes: C - connected, S - static, K - kernel, O3 - OSPFv3, B - BGP, R - RIP, A B - BGP Aggregate, I L1 -
IS-IS level 1, I L2 - IS-IS level 2, DH - DHCP, NG - Nexthop Group Static Route, M - Martian, DP - Dynamic Policy Route, L - VRF Leaked, RC - Route Cache Route
```

```
B      fc00:10::1/128 [20/0]
      via VTEP 192.168.200.1 VNI 2000 router-mac 52:1d:00:11:38:44
C      fc00:10::/64 [0/0]
      via Vlan10, directly connected
C      fc00:20::/64 [0/0]show
      via Vlan20, directly connected
```

CL-3#show ipv6 route vrf blue

```
C      fc00:30::/64 [0/0]
      via Vlan30, directly connected
B      fc00:40::1/128 [20/0]
      via VTEP 192.168.200.1 VNI 2001 router-mac 52:1d:00:11:38:44
C      fc00:40::/64 [0/0]
      via Vlan40, directly connected
```

show ipv6 bgp <route> vrf <vrf_name>

Verify specific ipv6 BGP information in a VRF

CL-3 CL-3#show ipv6 bgp fc00:10::1 vrf red

```
BGP routing table information for VRF red
Router identifier 192.168.100.3, local AS number 65000.3
BGP routing table entry for fc00:10::1/128
Paths: 4 available
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102), imported EVPN route, RD 192.168.100.1:10
      Origin IGP, metric 0, localpref 100, IGP metric 0, weight 0, tag 0
      Received 02:41:42 ago, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000
    TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:id:00:11:38:44
      Remote VNI: 2000
      Rx SAFI: Unicast
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101), imported EVPN route, RD 192.168.100.1:10
      Origin IGP, metric 0, localpref 100, IGP metric 0, weight 0, tag 0
      Received 02:41:42 ago, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000
    TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:id:00:11:38:44
      Remote VNI: 2000
      Rx SAFI: Unicast
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102), imported EVPN route, RD 192.168.100.2:10
      Origin IGP, metric 0, localpref 100, IGP metric 0, weight 0, tag 0
      Received 01:51:05 ago, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000
    TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:id:00:11:38:44
      Remote VNI: 2000
      Rx SAFI: Unicast
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101), imported EVPN route, RD 192.168.100.2:10
      Origin IGP, metric 0, localpref 100, IGP metric 0, weight 0, tag 0
      Received 01:51:05 ago, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000
    TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:id:00:11:38:44
      Remote VNI: 2000
      Rx SAFI: Unicast
```

show bgp evpn route-type mac-ip <mac_address> next-hop <vtap_ip> detail

Verify CL-1 and CL-2 advertise Host-1 MAC address and IP to MAC bindings via EVPN Type-2 MAC-IP routes. EVPN Type-2 MAC-IP routes in Symmetric IRB are dual labeled (L2VNI and L3VNI) as well as they contain the EVPN router MAC of the VTEP that originates the advertisements. Now there are both ipv4 and ipv6 mac-ip routes.

CL-3

```
CL-3#show bgp evpn route-type mac-ip 0000.0000.1111 vni 1010 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for mac-ip 0000.0000.1111, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010 ESI: 0000:0000:0000:0000:0000
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010 ESI: 0000:0000:0000:0000:0000
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111 10.10.10.1, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
      VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
      VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111 10.10.10.1, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
```

```

65000.65000 65000.1
 192.168.200.1 from 192.168.100.101 (192.168.100.101)
  Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
  Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:11:38:44
  VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
65000.65000 65000.1
 192.168.200.1 from 192.168.100.102 (192.168.100.102)
  Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
  Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:11:38:44
  VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111 fc00:10::1, Route Distinguisher: 192.168.100.1:10
  Paths: 2 available
65000.65000 65000.1
 192.168.200.1 from 192.168.100.102 (192.168.100.102)
  Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
  Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:11:38:44
  VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
65000.65000 65000.1
 192.168.200.1 from 192.168.100.101 (192.168.100.101)
  Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
  Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:11:38:44
  VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111 fc00:10::1, Route Distinguisher: 192.168.100.2:10
  Paths: 2 available
65000.65000 65000.1
 192.168.200.1 from 192.168.100.102 (192.168.100.102)
  Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
  Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:11:38:44
  VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
65000.65000 65000.1
 192.168.200.1 from 192.168.100.101 (192.168.100.101)
  Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
  Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:11:38:44
  VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000

```

show bgp evpn route-type ip-prefix <network>next-hop <vip_ip> detail

Verify CL-1 and CL-2 advertise VLAN10 network via EVPN Type-5 IP-Prefix routes

```

CL-3#show bgp evpn route-type ip-prefix 10.10.10.0/24 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.100.1:2000
Paths: 2 available
65000.65000 65000.1
 192.168.200.1 from 192.168.100.102 (192.168.100.102)
  Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
  Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:11:38:44
  VNI: 2000
65000.65000 65000.1
 192.168.200.1 from 192.168.100.101 (192.168.100.101)
  Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
  Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:11:38:44
  VNI: 2000
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.100.2:2000
Paths: 2 available
65000.65000 65000.1
 192.168.200.1 from 192.168.100.102 (192.168.100.102)
  Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
  Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:11:38:44
  VNI: 2000
65000.65000 65000.1
 192.168.200.1 from 192.168.100.101 (192.168.100.101)
  Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
  Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:11:38:44
  VNI: 2000
CL-3#show bgp evpn route-type ip-prefix fc00:10::/64 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for ip-prefix fc00:10::/64, Route Distinguisher: 192.168.100.1:2000
Paths: 2 available
65000.65000 65000.1
 192.168.200.1 from 192.168.100.102 (192.168.100.102)
  Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
  Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:11:38:44
  VNI: 2000
65000.65000 65000.1
 192.168.200.1 from 192.168.100.101 (192.168.100.101)
  Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
  Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:11:38:44
  VNI: 2000

```

```
VNI: 2000
BGP routing table entry for ip-prefix fc00:10::/64, Route Distinguisher: 192.168.100.2:2000
Paths: 2 available
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:11:38:44
      VNI: 2000
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:11:38:44
      VNI: 2000
```

ping <remote_host_ip>

Verify connectivity between Host-1 and Host-3 and Host-4

```
HOST-1#ping vrf red 10.10.20.2
PING 10.10.20.2 (10.10.20.2) 72(100) bytes of data.
80 bytes from 10.10.20.2: icmp_seq=1 ttl=62 time=26.9 ms
80 bytes from 10.10.20.2: icmp_seq=2 ttl=62 time=26.8 ms
80 bytes from 10.10.20.2: icmp_seq=3 ttl=62 time=23.7 ms
80 bytes from 10.10.20.2: icmp_seq=4 ttl=62 time=27.3 ms
80 bytes from 10.10.20.2: icmp_seq=5 ttl=62 time=28.1 ms

--- 10.10.20.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 74ms
rtt min/avg/max/mdev = 23.755/26.605/28.102/1.505 ms, pipe 3, ipg/ewma 18.586/26.827 ms

HOST-1#ping vrf blue 10.10.30.2
PING 10.10.30.2 (10.10.30.2) 72(100) bytes of data.
80 bytes from 10.10.30.2: icmp_seq=1 ttl=62 time=31.5 ms
80 bytes from 10.10.30.2: icmp_seq=2 ttl=62 time=32.8 ms
80 bytes from 10.10.30.2: icmp_seq=3 ttl=62 time=31.1 ms
80 bytes from 10.10.30.2: icmp_seq=4 ttl=62 time=32.1 ms
80 bytes from 10.10.30.2: icmp_seq=5 ttl=62 time=24.3 ms

--- 10.10.30.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 62ms
rtt min/avg/max/mdev = 24.301/30.395/32.869/3.101 ms, pipe 4, ipg/ewma 15.744/30.764 ms

Host-1
HOST-1#ping vrf red ipv6 fc00:20::2
PING fc00:20::2(fc00:20::2) 72 data bytes
80 bytes from fc00:20::2: icmp_seq=1 ttl=62 time=24.6 ms
80 bytes from fc00:20::2: icmp_seq=2 ttl=62 time=24.8 ms
80 bytes from fc00:20::2: icmp_seq=3 ttl=62 time=26.8 ms
80 bytes from fc00:20::2: icmp_seq=4 ttl=62 time=24.6 ms
80 bytes from fc00:20::2: icmp_seq=5 ttl=62 time=25.2 ms

--- fc00:20::2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 72ms
rtt min/avg/max/mdev = 24.623/25.238/26.842/0.857 ms, pipe 3, ipg/ewma 18.070/24.934 ms

HOST-1-12:33:54#ping vrf blue ipv6 fc00:30::2
PING fc00:30::2(fc00:30::2) 72 data bytes
80 bytes from fc00:30::2: icmp_seq=1 ttl=63 time=87.7 ms
80 bytes from fc00:30::2: icmp_seq=2 ttl=63 time=78.0 ms
80 bytes from fc00:30::2: icmp_seq=3 ttl=63 time=69.4 ms
80 bytes from fc00:30::2: icmp_seq=4 ttl=62 time=63.3 ms
80 bytes from fc00:30::2: icmp_seq=5 ttl=62 time=54.8 ms

--- fc00:30::2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 43ms
rtt min/avg/max/mdev = 54.881/70.705/87.765/11.420 ms, pipe 5, ipg/ewma 10.912/78.420 ms
```

EVPN Symmetric IRB - AA multihoming

Deployment Consideration

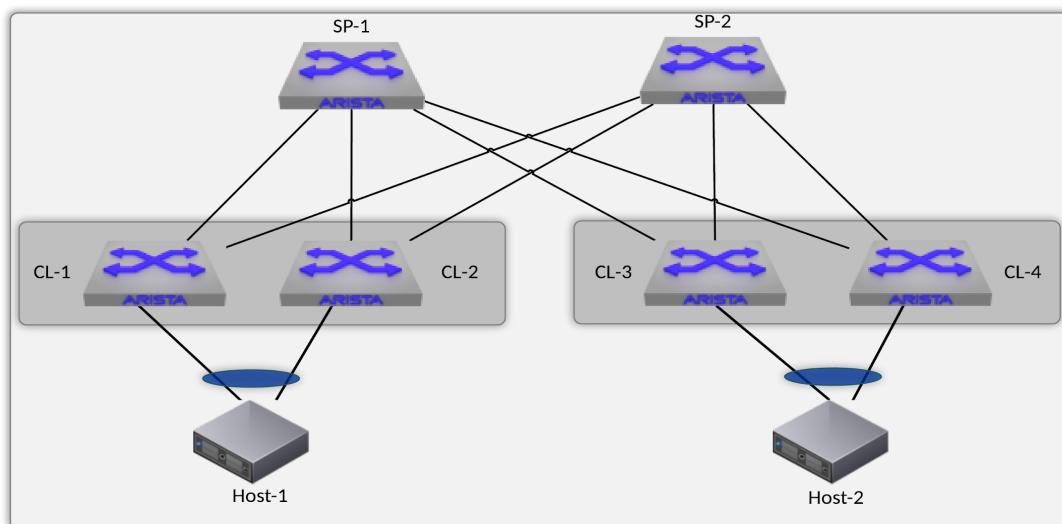
- EVPN multihoming is a multi-vendor standards-based redundancy solution that does not require a dedicated peer link and allows for more flexible configurations than MLAG, supporting peering on a per interface level rather than a per device level.
- Still MLAG is a more mature solution: better convergence and scale.
- IRB is supported with AA multihoming (some TOIs are outdated).
- Multicast EVPN is currently only supported with AA multihoming (multicast solution is not covered here).
- Up to 4-way ECMP support: better fault tolerance and load-balancing.

Current issues:

- [IRB Fast Convergence](#)

Refer to the following documentation for more information: [EVPN VXLAN All-Active Multihoming](#), [4-way L2 ECMP support for EVPN VXLAN All-Active Multihoming](#), [Spanning-tree super root](#), [Multihoming design guide](#).

Topology



Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
SP-1	192.168.100.101	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb1
SP-2	192.168.100.102	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb2
CL-1	192.168.100.1	192.168.200.1	65000.1	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0000.aaa1
CL-2	192.168.100.2	192.168.200.2	65000.2	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0000.aaa2
CL-3	192.168.100.3	192.168.200.3	65000.3	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0000.aaa3
CL-4	192.168.100.4	192.168.200.4	65000.4	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0000.aaa4
Host-1	N/A	N/A	N/A	Red Blue	VLAN10 VLAN40	10.10.10.1/24 10.10.40.1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	Red Blue	VLAN20 VLAN30	10.10.20.2/24 10.10.30.2/24	0000.0000.2222

Important Notes

- No peer link and MLAG related commands must be removed (like mlag shared mac address)
- ASN allocation changes:
 - Individual ASN per leaf.
 - Also loopback1 (vtep address) is unique for all leaves.
- No mac shared (as in MLAG), different next-hops for each Multihoming peer.
- Each ethernet or port-channel interface will need now the following parameters that must match across the VTEPs part of the same domain:

- ES identifier: (takes 9 octets on user input).
 - One scheme is to assign the first 6 octets of the ESI using the system MAC address of the connected CE device and set the rest of 3 octets to zero, but hard to apply in real DC deployments.
- ES Route-target (takes 6 octets on user input).
 - One scheme is to assign the mac address of the CE device connected to this interface, but hard to apply in real DC deployments.
- LACP system ID:
 - One scheme is to select the LACP system-id is to choose the lower system MAC addresses between the multihoming peers, but hard to apply in real DC deployments.
- An alternative notation example used in UBS (converting port-channel IDs to hex):

Item	Format
Ethernet Segment Identifier (ESI)	0000:0000:0000:{ <code>{ site-id }</code> }:{ <code>{ fabric-id }</code> }:{ <code>{ esi-group-id }</code> }:{ <code>{ port-channel-id }</code> }
ES-Import Route Target	00:00:{ <code>{ site-id }</code> }:{ <code>{ fabric-id }</code> }:{ <code>{ esi-group-id }</code> }:{ <code>{ port-channel-id }</code> }
LACP system ID	0000.{ <code>{ site-id }</code> }:{ <code>{ fabric-id }</code> }:{ <code>{ esi-group-id }</code> }:{ <code>{ port-channel-id }</code> }

- Another example used for Cox:

Item	Format
Ethernet Segment Identifier (ESI)	00{{ market/regionID }}:{{ market/regionID }}:{{ESI domain }}:{ <code>{ port-channel-id }</code> }:0000
ES-Import Route Target	{{ market/regionID }}:{{ market/regionID }}:{{ESI domain }}:{{ESI domain }}:{{ESI domain }}:{ <code>{ port-channel-id }</code> }:{ <code>{ port-channel-id }</code> }
LACP system ID	{{ market/regionID }}.{{ESI domain }}:{ <code>{ port-channel-id }</code> }

Ex: identifier 0001:0200:0100:3100:0000
 route-target import 01:02:00:01:00:31
 lacp system-id **0102.0001.0031**

- The feature “Spanning Tree Network Super Root” enables topologies like EVPN All-Active multihoming to use STP and detect Layer-2 loops. When this feature is enabled, it sends STP BPDUs with bridge MAC address and source MAC address as 0000.0000.0001 and priority as 0. Note: feature introduced in 4.25.1F.
- LACP port range:
 - A global configuration command must be used to configure LACP port-id range for all PEs connected to multihomed CE(s). When the port-id range command is configured, it limits the range of allocated port-ids to the one specified.
 - Some server NICs/bonds have issues receiving the same LACP port-id on both member interfaces. This ensures port-id range does not overlap for multihoming peers and prevents against those issues.
- Link tracking group:
 - Configure a “Link Tracking Group” feature which specifies (1) the upstream core interfaces and down stream ES Lag interfaces (2) how long the LAG remains error disabled after core interfaces come up.
 - Similar to MLAG reload delay timer.
 - Also shutdowns downstream ES links automatically when all upstream interfaces are down to prevent blackholing.

Configuration

The following configuration is required for an AA Multihoming (EVPN Symmetric IRB has been used in this example as EVPN model):

- Underlay
 - Multi-agent model (ArBGP)
 - eBGP IPv4 Unicast peering between spines and leaf switches
 - iBGP IPv4 Unicast peering between MLAG pair
 - Multihoming
 - Link tracking group.
 - Super root.
 - LACP port range.
- Overlay
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VXLAN
 - VLAN to VNI mapping (L2VNI)
 - VRF to VNI mapping (L3VNI)
 - BGP/EVPN
 - MAC-VRF
 - IP-VRF

- Tenant
 - VLAN
 - Tenant VRF
 - Anycast Gateway
- Platform specific (See [Appendix A](#))

Note: Configuration lines in red font color are not supported in vEOS.

Compute Leaf

Function	CL-1	CL-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20,30,40 spanning-tree root super	vlan 10,20,30,40 spanning-tree root super
VRF Instance	vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue	vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue
Spines Uplink	interface Ethernet1 no switchport ip address 192.168.1.1/31 link tracking group ESI-LAG upstream interface Ethernet2 no switchport ip address 192.168.2.1/31 link tracking group ESI-LAG upstream	interface Ethernet1 no switchport ip address 192.168.1.3/31 link tracking group ESI-LAG upstream interface Ethernet2 no switchport ip address 192.168.2.3/31 link tracking group ESI-LAG upstream
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID ip address 192.168.100.1/32 ! router general router-id ipv4 192.168.100.1	interface Loopback0 description BGP Router ID ip address 192.168.100.2/32 ! router general router-id ipv4 192.168.100.2
VTI Loopback1 VTEP IP	interface Loopback1 description VTEP IP ip address 192.168.200.1/32	interface Loopback1 description VTEP IP ip address 192.168.200.2/32
VxLAN	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000
Multihoming	lacp port-id range 1 127 link tracking group ESI-LAG recovery delay 300 interface Port-Channel1 switchport mode trunk link tracking group ESI-LAG downstream ! evpn ethernet-segment identifier 0000:0000:0011:1100:0000 route-target import 00:00:00:00:11:11 lacp system-id 0000.0000.aaa1	lacp port-id range 128 255 link tracking group ESI-LAG recovery delay 300 interface Port-Channel1 switchport mode trunk link tracking group ESI-LAG downstream ! evpn ethernet-segment identifier 0000:0000:0011:1100:0000 route-target import 00:00:00:00:11:11 lacp system-id 0000.0000.aaa1
Anycast Gateway Virtual MAC address	interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24	interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99:99

	<pre>! ip virtual-router mac-address 00:1c:73:00:00:99</pre>	
IP-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>
eBGP and iBGP Underlay BGP/EVPN	<pre>router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 192.168.1.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf blue rd 192.168.100.1:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_SPINE_V4 activate</pre>	<pre>router bgp 65000.2 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 192.168.1.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf blue rd 192.168.100.1:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_SPINE_V4 activate</pre>

Function	CL-3	CL-4
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20,30,40 spanning-tree root super	vlan 10,20,30,40 spanning-tree root super
VRF Instance	vrf instance blue	vrf instance blue

	<pre>vrf instance red ! ip routing vrf red ip routing vrf blue</pre>	<pre>vrf instance red ! ip routing vrf red ip routing vrf blue</pre>
Spines Uplink	<pre>interface Ethernet1 no switchport ip address 192.168.1.5/31 link tracking group ESI-LAG upstream ! interface Ethernet2 no switchport ip address 192.168.2.5/31 link tracking group ESI-LAG upstream</pre>	<pre>interface Ethernet1 no switchport ip address 192.168.1.7/31 link tracking group ESI-LAG upstream ! interface Ethernet2 no switchport ip address 192.168.2.7/31 link tracking group ESI-LAG upstream</pre>
BGP Loopback0 Router ID	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.3/32 ! router general router-id ipv4 192.168.100.3</pre>	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.4/32 ! router general router-id ipv4 192.168.100.4</pre>
VTI Loopback1 VTEP IP	<pre>interface Loopback1 description Logical VTEP ip address 192.168.200.3/32</pre>	<pre>interface Loopback1 description Logical VTEP ip address 192.168.200.4/32</pre>
VxLAN	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000</pre>	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000</pre>
Multihoming	<pre>lacp port-id range 1 127 link tracking group ESI-LAG recovery delay 300 ! interface Port-Channel1 switchport mode trunk link tracking group ESI-LAG downstream ! evpn ethernet-segment identifier 0000:0000:0022:2200:0000 route-target import 00:00:00:00:22:22 lacp system-id 0000.0000.aaa3</pre>	<pre>lacp port-id range 1 127 link tracking group ESI-LAG recovery delay 300 ! interface Port-Channel1 switchport mode trunk link tracking group ESI-LAG downstream ! evpn ethernet-segment identifier 0000:0000:0022:2200:0000 route-target import 00:00:00:00:22:22 lacp system-id 0000.0000.aaa3</pre>
Anycast Gateway Virtual MAC address	<pre>interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>	<pre>interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>
IP-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>
eBGP and iBGP Underlay BGP/EVPN	<pre>router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community</pre>	<pre>router bgp 65000.4 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community</pre>

```

neighbor OVERLAY_SPINE_EVPN peer group
neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000
neighbor OVERLAY_SPINE_EVPN update-source Loopback0
neighbor OVERLAY_SPINE_EVPN bfd
neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2
neighbor OVERLAY_SPINE_EVPN maximum-routes 0
neighbor UNDERLAY_SPINE_V4 peer group
neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000
neighbor UNDERLAY_SPINE_V4 maximum-routes 12000
neighbor 192.168.1.4 peer group UNDERLAY_SPINE_V4
neighbor 192.168.2.4 peer group UNDERLAY_SPINE_V4
neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN
neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN
redistribute connected route-map CONNECTED
!
vlan 10
  rd auto
  route-target both 1010:1010
  redistribute learned
!
vlan 20
  rd auto
  route-target both 1020:1020
  redistribute learned
!
vlan 30
  rd auto
  route-target both 1030:1030
  redistribute learned
!
vlan 40
  rd auto
  route-target both 1040:1040
  redistribute learned
!
vrf blue
  rd 192.168.100.1:2001
  route-target import evpn 2001:2001
  route-target export evpn 2001:2001
  redistribute connected
!
vrf red
  rd 192.168.100.1:2000
  route-target import evpn 2000:2000
  route-target export evpn 2000:2000
  redistribute connected
!
address-family evpn
  neighbor OVERLAY_SPINE_EVPN activate
!
address-family ipv4
  neighbor UNDERLAY_SPINE_V4 activate

neighbor OVERLAY_SPINE_EVPN peer group
neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000
neighbor OVERLAY_SPINE_EVPN update-source Loopback0
neighbor OVERLAY_SPINE_EVPN bfd
neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2
neighbor OVERLAY_SPINE_EVPN maximum-routes 0
neighbor UNDERLAY_SPINE_V4 peer group
neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000
neighbor UNDERLAY_SPINE_V4 maximum-routes 12000
neighbor 192.168.1.6 peer group UNDERLAY_SPINE_V4
neighbor 192.168.2.6 peer group UNDERLAY_SPINE_V4
neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN
neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN
redistribute connected route-map CONNECTED
!
vlan 10
  rd auto
  route-target both 1010:1010
  redistribute learned
!
vlan 20
  rd auto
  route-target both 1020:1020
  redistribute learned
!
vlan 30
  rd auto
  route-target both 1030:1030
  redistribute learned
!
vlan 40
  rd auto
  route-target both 1040:1040
  redistribute learned
!
vrf blue
  rd 192.168.100.1:2001
  route-target import evpn 2001:2001
  route-target export evpn 2001:2001
  redistribute connected
!
vrf red
  rd 192.168.100.1:2000
  route-target import evpn 2000:2000
  route-target export evpn 2000:2000
  redistribute connected
!
address-family evpn
  neighbor OVERLAY_SPINE_EVPN activate
!
address-family ipv4
  neighbor UNDERLAY_SPINE_V4 activate

```

Spine

Function	SP-1	SP-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
Leaf Downlinks	<pre> interface Ethernet1 no switchport ip address 192.168.1.0/31 ! interface Ethernet2 no switchport ip address 192.168.1.2/31 ! interface Ethernet3 no switchport ip address 192.168.1.4/31 ! interface Ethernet4 no switchport ip address 192.168.1.6/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.2.0/31 ! interface Ethernet2 no switchport ip address 192.168.2.2/31 ! interface Ethernet3 no switchport ip address 192.168.2.4/31 ! interface Ethernet4 no switchport ip address 192.168.2.6/31 </pre>
BGP Loopback0 (Router ID)	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.101/32 ! router general router-id ipv4 192.168.100.101 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.102/32 ! router general router-id ipv4 192.168.100.102 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P </pre>

	<pre> seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multipath 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.1.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept </pre>	<pre> router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multipath 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.1.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept </pre>

Verification

The verification steps below have been carried out host-1 in the environment as these steps are similar to the remaining hosts.

show bgp evpn summary	
Verify the eBGP IPv4 EVPN peering between spines and leaf switches is established	
CL-1	<pre> CL-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.1, local AS number 65000.1 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.101 4 65000.65000 175 176 0 0 00:08:39 Estab 50 50 192.168.100.102 4 65000.65000 173 163 0 0 00:08:35 Estab 50 50 </pre>
CL-3	<pre> CL-3#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.3, local AS number 65000.3 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.101 4 65000.65000 181 179 0 0 00:08:58 Estab 50 50 192.168.100.102 4 65000.65000 179 170 0 0 00:08:51 Estab 50 50 </pre>
SP-1	<pre> SP-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.101, local AS number 65000.65000 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.1 4 65000.1 171 169 0 0 00:08:15 Estab 18 18 192.168.100.2 4 65000.2 157 166 0 0 00:07:46 Estab 16 16 192.168.100.3 4 65000.3 169 170 0 0 00:08:11 Estab 18 18 192.168.100.4 4 65000.4 163 164 0 0 00:07:35 Estab 16 16 </pre>

show interfaces vxlan 1	
Verify the interface VxLAN 1 is connected on CL-1 Verify EVPN is used for flood list population and remote MAC learning on CL-1 Verify VLANs and VRFs are mapped to the correct VNIs on CL-1	
CL-1	<pre> CL-1#show interfaces vxlan 1 Vxlan1 is up, line protocol is up (connected) </pre>

```

Hardware is Vxlan
Source interface is Loopback1 and is active with 192.168.200.1
Replication/Flood Mode is headend with Flood List Source: EVPN
Remote MAC learning via EVPN
VNI mapping to VLANs
Static VLAN to VNI mapping is
    [10, 1010]      [20, 1020]      [30, 1030]      [40, 1040]

Dynamic VLAN to VNI mapping for 'evpn' is
    [4084, 2001]      [4085, 2000]
Note: All Dynamic VLANs used by VCS are internal VLANs.
      Use 'show vxlan vni' for details.
Static VRF to VNI mapping is
    [blue, 2001]
    [red, 2000]
Headend replication flood vtep list is:
    10 192.168.200.3  192.168.200.4  192.168.200.2
    20 192.168.200.3  192.168.200.4  192.168.200.2
    30 192.168.200.3  192.168.200.4  192.168.200.2
    40 192.168.200.3  192.168.200.4  192.168.200.2
MLAG Shared Router MAC is 0000.0000.0000

```

show bgp evpn route-type imet vni <vni_id> next-hop <vtep_ip> detail

Verify CL-1 and CL-2 advertise the membership of VNI 1010 via EVPN Type-3 IMET routes

```

CL-3#show bgp evpn route-type imet vni 1010 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for imet 192.168.200.1, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
 65000.65000 65000.1
  192.168.200.1 from 192.168.100.102 (192.168.100.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
    Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
    VNI: 1010
    PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
 65000.65000 65000.1
  192.168.200.1 from 192.168.100.101 (192.168.100.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
    VNI: 1010
    PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1

CL-3#show bgp evpn route-type imet vni 1010 next-hop 192.168.200.2 detail
BGP routing table entry for imet 192.168.200.2, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
 65000.65000 65000.2
  192.168.200.2 from 192.168.100.102 (192.168.100.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
    Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
    VNI: 1010
    PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.2
 65000.65000 65000.2
  192.168.200.2 from 192.168.100.101 (192.168.100.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
    VNI: 1010
    PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.2

```

show mac address-table dynamic

Verify Host-1 MAC address has been learned behind Po1 on CL-1.

```

CL-1#show mac address-table dynamic
  Mac Address Table
  -----
  Vlan   Mac Address       Type      Ports      Moves   Last Move
  ---   -----           ----      ----      ----   -----
  10    0000.0000.1111   DYNAMIC   Po1       1      0:03:42 ago
  20    0000.0000.2222   DYNAMIC   Vx1       1      0:02:05 ago
  30    0000.0000.2222   DYNAMIC   Vx1       1      0:02:05 ago
  40    0000.0000.1111   DYNAMIC   Po1       1      0:01:12 ago
  4084  0000.0001.aaa3   DYNAMIC   Vx1       1      8:20:15 ago
  4084  0000.0001.aaa4   DYNAMIC   Vx1       1      8:20:05 ago
  4085  0000.0001.aaa3   DYNAMIC   Vx1       1      8:20:15 ago
  4085  0000.0001.aaa4   DYNAMIC   Vx1       1      8:20:05 ago
Total Mac Addresses for this criterion: 8

  Multicast Mac Address Table
  -----
  Vlan   Mac Address       Type      Ports
  ---   -----           ----      ----

```

Total Mac Addresses for this criterion: 0

show arp vrf <vrf_name>

Verify Host-1 ARP entry is presented on CL-1.

CL-1#show arp vrf red

```
Address      Age (sec)  Hardware Addr  Interface
10.10.10.1      - 0000.0000.1111  Vlan10, Port-Channel
10.10.20.2      - 0000.0000.2222  Vlan20, Vxlan1
```

CL-1#show arp vrf blue

```
Address      Age (sec)  Hardware Addr  Interface
10.10.30.2      - 0000.0000.2222  Vlan30, Vxlan1
10.10.40.1      - 0000.0000.1111  Vlan40, Port-Channel
```

show ip route vrf <vrf_name>

Verify the host routes for Host-1 along with VLAN10 networks are presented in the VRF red routing table on CL-3. These routes must be known via CL-1 VTEP IP + VRF red L3VNI + CL-1 MLAG system ID MAC.

CL-3#show ip route vrf red

```
VRF: red
Codes: C - connected, S - static, K - kernel,
       O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
       R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
       O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
       NG - Nexthop Group Static Route, V - VXLAN Control Service,
       DH - DHCP client installed default route, M - Martian,
       DP - Dynamic Policy Route, L - VRF Leaked,
       RC - Route Cache Route
```

Gateway of last resort is not set

```
B E    10.10.10.1/32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 00:00:00:01:aa:a1
                                via VTEP 192.168.200.2 VNI 2000 router-mac 00:00:00:01:aa:a2
C      10.10.10.0/24 is directly connected, Vlan10
C      10.10.20.0/24 is directly connected, Vlan20
```

CL-3#show ip route vrf blue

```
C      10.10.30.0/24 is directly connected, Vlan30
B E    10.10.40.1/32 [20/0] via VTEP 192.168.200.2 VNI 2001 router-mac 00:00:00:01:aa:a2
                                via VTEP 192.168.200.1 VNI 2001 router-mac 00:00:00:01:aa:a1
C      10.10.40.0/24 is directly connected, Vlan40
```

show bgp evpn route-type mac-ip <mac_address> next-hop <vtep_ip> detail

Verify CL-1 and CL-2 advertise Host-1 MAC address and IP to MAC bindings via EVPN Type-2 MAC-IP routes. EVPN Type-2 MAC-IP routes in Symmetric IRB are dual labeled (L2VNI and L3VNI) as well as they contain the EVPN router MAC of the VTEP that originates the advertisements

CL-3#show bgp evpn route-type mac-ip 0000.0000.1111 next-hop 192.168.200.1 detail

```
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for mac-ip 0000.0000.1111, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
65000.65000 65000.1
  192.168.200.1 from 192.168.100.101 (192.168.100.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
    Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
    VNI: 1010 ESI: 0000:0000:0011:1100:0000
65000.65000 65000.1
  192.168.200.1 from 192.168.100.102 (192.168.100.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
    VNI: 1040 ESI: 0000:0000:0011:1100:0000
BGP routing table entry for mac-ip 0000.0000.1111, Route Distinguisher: 192.168.100.1:40
Paths: 2 available
65000.65000 65000.1
  192.168.200.1 from 192.168.100.101 (192.168.100.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
    Extended Community: Route-Target-AS:1040:1040 TunnelEncap:tunnelTypeVxlan
    VNI: 1040 ESI: 0000:0000:0011:1100:0000
65000.65000 65000.1
  192.168.200.1 from 192.168.100.102 (192.168.100.102)
```

```

Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:1040:1040 TunnelEncap:tunnelTypeVxlan
VNI: 1040 ESI: 0000:0000:0011:1100:0000
BGP routing table entry for mac-ip 0000.0000.1111 10.10.10.1, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
65000.65000 65000.1
192.168.200.1 from 192.168.100.101 (192.168.100.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:00:00:00:01:aa:a1
VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0011:1100:0000
65000.65000 65000.1
192.168.200.1 from 192.168.100.102 (192.168.100.102)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:00:00:00:01:aa:a1
VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0011:1100:0000
BGP routing table entry for mac-ip 0000.0000.1111 10.10.40.1, Route Distinguisher: 192.168.100.1:40
Paths: 2 available
65000.65000 65000.1
192.168.200.1 from 192.168.100.101 (192.168.100.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:1040:1040 Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:00:00:00:01:aa:a1
VNI: 1040 L3 VNI: 2001 ESI: 0000:0000:0011:1100:0000
65000.65000 65000.1
192.168.200.1 from 192.168.100.102 (192.168.100.102)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:1040:1040 Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:00:00:00:01:aa:a1
VNI: 1040 L3 VNI: 2001 ESI: 0000:0000:0011:1100:0000

CL-3#show bgp evpn route-type mac-ip 0000.0000.1111 next-hop 192.168.200.2 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for mac-ip 0000.0000.1111 10.10.10.1, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
65000.65000 65000.2
192.168.200.2 from 192.168.100.101 (192.168.100.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:00:00:00:01:aa:a2 EvpnNdFlags:pflag
VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0011:1100:0000
65000.65000 65000.2
192.168.200.2 from 192.168.100.102 (192.168.100.102)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:00:00:00:01:aa:a2 EvpnNdFlags:pflag
VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0011:1100:0000
BGP routing table entry for mac-ip 0000.0000.1111 10.10.40.1, Route Distinguisher: 192.168.100.2:40
Paths: 2 available
65000.65000 65000.2
192.168.200.2 from 192.168.100.101 (192.168.100.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:1040:1040 Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:00:00:00:01:aa:a2 EvpnNdFlags:pflag
VNI: 1040 L3 VNI: 2001 ESI: 0000:0000:0011:1100:0000
65000.65000 65000.2
192.168.200.2 from 192.168.100.102 (192.168.100.102)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:1040:1040 Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:00:00:00:01:aa:a2 EvpnNdFlags:pflag
VNI: 1040 L3 VNI: 2001 ESI: 0000:0000:0011:1100:0000

```

show bgp evpn route-type ip-prefix <network>next-hop <step_ip> detail

Verify CL-1 and CL-2 advertise VLAN10 network via EVPN Type-5 IP-Prefix routes

```

CL-3#show bgp evpn route-type ip-prefix 10.10.10.0/24 next-hop 192.168.200.1 detail
DC-1-CL-3-15:48:04#show bgp evpn route-type ip-prefix 10.10.10.0/24 next-hop 192.168.200.1 det
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.100.1:2000
Paths: 2 available
65000.65000 65000.1
192.168.200.1 from 192.168.100.101 (192.168.100.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:00:00:00:01:aa:a1
VNI: 2000
65000.65000 65000.1
192.168.200.1 from 192.168.100.102 (192.168.100.102)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:00:00:00:01:aa:a1
VNI: 2000

CL-3#show bgp evpn route-type ip-prefix 10.10.10.0/24 next-hop 192.168.200.2 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003

```

```
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.100.2:2000
Paths: 2 available
 65000.65000 65000.2
    192.168.200.2 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:00:00:00:01:aa:a2
      VNI: 2000
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:00:00:00:01:aa:a2
      VNI: 2000
```

show bgp evpn route-type auto-discovery esi <esi> next-hop <next-hop> detail

Verify CL-1 EVPN Type-1 advertisement routes

```
CL-1#show bgp evpn route-type auto-discovery esi 0000:0000:0011:1100:0000 detail
BGP routing table information for VRF default
Router identifier 192.168.100.1, local AS number 4259840001
BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.1:10
Paths: 1 available
  Local
    - from - (0.0.0.0)
      Origin IGP, metric -, localpref -, weight 0, valid, local, best
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010
BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.1:20
Paths: 1 available
  Local
    - from - (0.0.0.0)
      Origin IGP, metric -, localpref -, weight 0, valid, local, best
      Extended Community: Route-Target-AS:1020:1020 TunnelEncap:tunnelTypeVxlan
      VNI: 1020
BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.1:30
Paths: 1 available
  Local
    - from - (0.0.0.0)
      Origin IGP, metric -, localpref -, weight 0, valid, local, best
      Extended Community: Route-Target-AS:1030:1030 TunnelEncap:tunnelTypeVxlan
      VNI: 1030
BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.1:40
Paths: 1 available
  Local
    - from - (0.0.0.0)
      Origin IGP, metric -, localpref -, weight 0, valid, local, best
      Extended Community: Route-Target-AS:1040:1040 TunnelEncap:tunnelTypeVxlan
      VNI: 1040
BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010
BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.2:20
Paths: 2 available
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1020:1020 TunnelEncap:tunnelTypeVxlan
      VNI: 1020
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1020:1020 TunnelEncap:tunnelTypeVxlan
      VNI: 1020
BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.2:30
Paths: 2 available
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.102 (192.168.100.102)
```

```

Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:1030:1030 TunnelEncap:tunnelTypeVxlan
VNI: 1030
65000.65000 65000.2
192.168.200.2 from 192.168.100.101 (192.168.100.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:1030:1030 TunnelEncap:tunnelTypeVxlan
VNI: 1030
BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.2:40
Paths: 2 available
65000.65000 65000.2
192.168.200.2 from 192.168.100.101 (192.168.100.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:1040:1040 TunnelEncap:tunnelTypeVxlan
VNI: 1040
65000.65000 65000.2
192.168.200.2 from 192.168.100.102 (192.168.100.102)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:1040:1040 TunnelEncap:tunnelTypeVxlan
VNI: 1040
BGP routing table entry for auto-discovery 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.200.1:1
Paths: 1 available
Local
- from - (0.0.0.0)
Origin IGP, metric -, localpref -, weight 0, valid, local, best
Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:1020:1020 Route-Target-AS:1030:1030 Route-Target-AS:1040:1040 TunnelEncap:tunnelTypeVxlan EvpnEsiLabel:0
BGP routing table entry for auto-discovery 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.200.2:1
Paths: 2 available
65000.65000 65000.2
192.168.200.2 from 192.168.100.101 (192.168.100.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:1020:1020 Route-Target-AS:1030:1030 Route-Target-AS:1040:1040 TunnelEncap:tunnelTypeVxlan EvpnEsiLabel:0
VNI: 0
65000.65000 65000.2
192.168.200.2 from 192.168.100.102 (192.168.100.102)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:1020:1020 Route-Target-AS:1030:1030 Route-Target-AS:1040:1040 TunnelEncap:tunnelTypeVxlan EvpnEsiLabel:0
VNI: 0

```

Note: vlans 1,10,20,30,40 are allowed in the port-channel and generate a type-1 route. Local vlans to the ESI (not vxlan extended) are also advertised with VNI 0.

show bgp evpn route-type ethernet-segment esi <es> next-hop <step_ip> detail

Verify CL-1 EVPN Type-4 ethernet-segment routes

```

CL-1#show bgp evpn route-type ethernet-segment esi 0000:0000:0011:1100:0000 detail
BGP routing table information for VRF default
Router identifier 192.168.100.1, local AS number 4259840001
BGP routing table entry for ethernet-segment 0000:0000:0011:1100:0000 192.168.200.1, Route Distinguisher:
192.168.200.1:1
Paths: 1 available
Local
- from - (0.0.0.0)
Origin IGP, metric -, localpref -, weight 0, valid, local, best
Extended Community: TunnelEncap:tunnelTypeVxlan EvpnEsImportRt:00:00:00:00:11:11
BGP routing table entry for ethernet-segment 0000:0000:0011:1100:0000 192.168.200.2, Route Distinguisher:
192.168.200.2:1
Paths: 2 available
65000.65000 65000.2
192.168.200.2 from 192.168.100.101 (192.168.100.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: TunnelEncap:tunnelTypeVxlan EvpnEsImportRt:00:00:00:00:11:11
65000.65000 65000.2
192.168.200.2 from 192.168.100.102 (192.168.100.102)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: TunnelEncap:tunnelTypeVxlan EvpnEsImportRt:00:00:00:00:11:11

```

show link tracking group

Verify link tracking group configuration

CL-1

```
CL-1#show link tracking group detail
Link State Group: ESI-LAG Status: up
Upstream Interfaces : Ethernet2 Etherne1
Downstream Interfaces : Port-Channel1
Number of times disabled : 0
Last disabled never
```

show spanning-tree

Verify super root configuration

CL-1

```
CL-1#show spanning-tree
MST0
  Spanning tree enabled protocol mstp
  Root ID  Priority  0
            Address  0000.0000.0001
            This bridge is the root

  Bridge ID Priority      0 (priority 0 sys-id-ext 0)
            Address  0000.0000.0001
            Hello Time 2.000 sec  Max Age 20 sec  Forward Delay 15 sec

  Interface      Role     State      Cost      Prio.Nbr Type
  -----  -----  -----  -----  -----
  Po1          designated  forwarding  1999      128.100  P2p
```

Host-1

```
HOST-1#show spanning-tree
MST0
  Spanning tree enabled protocol mstp
  Root ID  Priority  0
            Address  0000.0000.0001
            Cost      0 (Ext) 1999 (Int)
            Port      100 (Port-Channel1)show
            Hello Time 2.000 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID Priority      32768 (priority 32768 sys-id-ext 0)
            Address  0000.0000.1111
            Hello Time 2.000 sec  Max Age 20 sec  Forward Delay 15 sec

  Interface      Role     State      Cost      Prio.Nbr Type
  -----  -----  -----  -----  -----
  Po1          root     forwarding  1999      128.100  P2p
```

ping <remote_host_ip>

Verify connectivity between Host-1 and Host-3 and Host-4

Host-1

```
HOST-1#ping vrf red 10.10.20.2
PING 10.10.20.2 (10.10.20.2) 72(100) bytes of data.
80 bytes from 10.10.20.2: icmp_seq=1 ttl=62 time=37.4 ms
80 bytes from 10.10.20.2: icmp_seq=2 ttl=62 time=28.7 ms
80 bytes from 10.10.20.2: icmp_seq=3 ttl=62 time=25.5 ms
80 bytes from 10.10.20.2: icmp_seq=4 ttl=62 time=26.9 ms
80 bytes from 10.10.20.2: icmp_seq=5 ttl=62 time=28.9 ms

--- 10.10.20.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 64ms
rtt min/avg/max/mdev = 25.550/29.523/37.468/4.160 ms, pipe 4, ipg/ewma 16.136/33.377 ms

HOST-1#ping vrf blue 10.10.30.2
PING 10.10.30.2 (10.10.30.2) 72(100) bytes of data.
80 bytes from 10.10.30.2: icmp_seq=1 ttl=62 time=33.7 ms
80 bytes from 10.10.30.2: icmp_seq=2 ttl=62 time=26.7 ms
80 bytes from 10.10.30.2: icmp_seq=3 ttl=62 time=46.8 ms
80 bytes from 10.10.30.2: icmp_seq=4 ttl=62 time=38.7 ms
80 bytes from 10.10.30.2: icmp_seq=5 ttl=62 time=31.1 ms

--- 10.10.30.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 65ms
rtt min/avg/max/mdev = 26.709/35.447/46.885/6.923 ms, pipe 4, ipg/ewma 16.499/34.624 ms
```

EVPN Symmetric IRB - Single Active multihoming

Deployment Consideration

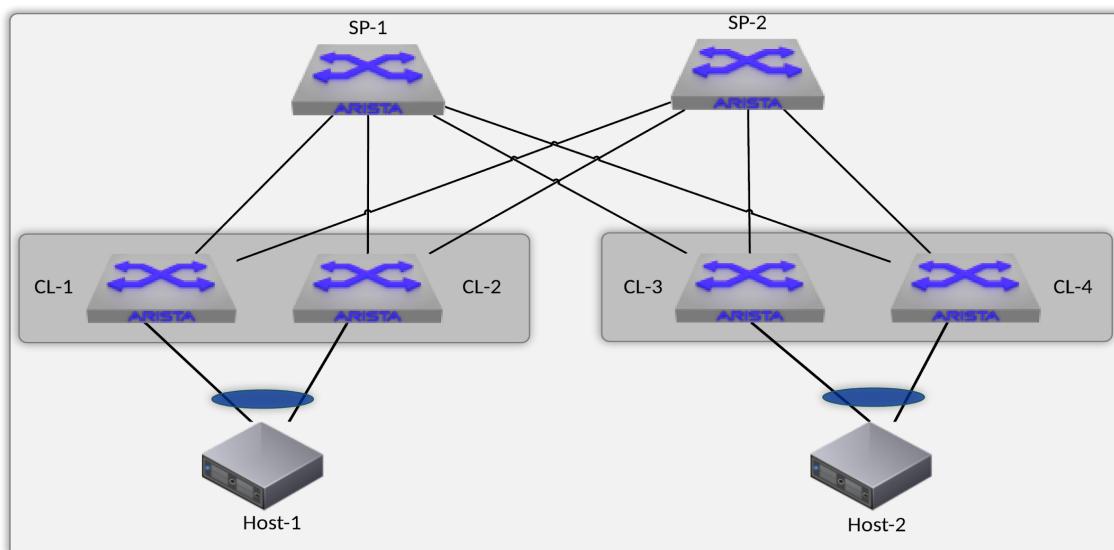
- Check AA multihoming for general information.
- One PE per VLAN per ethernet segment accepts traffic. Any other PE in the ethernet segment will drop all inbound packets, effectively behaving as if it did not have a valid route to the destination. PEs will also not egress any traffic where the destination port/VLAN is inactive.
- Single-active multihoming may be useful for a variety of cases, including:
 - Manually shaping traffic flows
 - Prioritizing certain links over others
 - Connecting separate CE devices to a single ethernet segment
 - Connecting a CE that does not support link aggregation to multiple PEs.
- DF responsible for sending and receiving all traffic. Preferences can be set to select the DF with preemption or not enabled.
- Customer edge:
 - Connections to PE can NOT be an aggregate link with packets load-balanced.
 - Options are:
 - Aggregate link in active/standby (consistent with active PE).
 - Aggregate link in broadcast mode.
 - Separate non-aggregate links.
 - Several connectivity options, failover testing must be done to ensure convergence under failures works as expected.

Current issues:

- [IRB Fast Convergence](#)

Refer to the following documentation for more information: <https://eos.arista.com/eos-4-26-0f/evpn-single-active-multihoming-preference-based-df-election/>

Topology



Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
SP-1	192.168.100.101	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb1
SP-2	192.168.100.102	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb2
CL-1	192.168.100.1	192.168.200.1	65000.1	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0000.aaa1
CL-2	192.168.100.2	192.168.200.2	65000.2	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0000.aaa2
CL-3	192.168.100.3	192.168.200.3	65000.3	Red	VLAN10	10.10.10.254/24	0000.0000.aaa3

				Red Blue Blue	VLAN20 VLAN30 VLAN40	10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	
CL-4	192.168.100.4	192.168.200.4	65000.4	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0000.aaa4
Host-1	N/A	N/A	N/A	Red Blue	VLAN10 VLAN40	10.10.10.1/24 10.10.40.1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	Red Blue	VLAN20 VLAN30	10.10.20.2/24 10.10.30.2/24	0000.0000.2222

Important Notes

- Example configures CL-1 as Active PE and CL-2 as Standby for ESI towards host1. CL-3 and CL-4 run EVPN multihoming Active-Active.
- Non-aggregate links are used in the example, several options are available for connectivity towards the customer.
- Multiple spanning-tree configuration options. In the example super root is used.
- Preference of 100 set to force the DF in CL-1 that and preemption (default) enabled.
- DF is elected using EVPN type 4 Ethernet Segment routes.
- Only active PE will send type-2 mac-ip for the host, resulting in remote vteps only installing the entry pointing to the active VTEP.
- Both active PE and standby PE will advertise the ESI via type-1 routes.

Configuration

The following configuration is required for an AA Multihoming (EVPN Symmetric IRB has been used in this example as EVPN model):

- Underlay
 - Multi-agent model (ArBGP)
 - eBGP IPv4 Unicast peering between spines and leaf switches
 - iBGP IPv4 Unicast peering between MLAG pair
 - Multihoming
 - Link tracking group.
 - Super root.
 - LACP port range.
- Overlay
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VxLAN
 - VLAN to VNI mapping (L2VNI)
 - VRF to VNI mapping (L3VNI)
 - BGP/EVPN
 - MAC-VRF
 - IP-VRF
- Tenant
 - VLAN
 - Tenant VRF
 - Anycast Gateway
- Platform specific (See [Appendix A](#))

Note: Configuration lines in red font color are not supported in vEOS.

Compute Leaf

Function	CL-1	CL-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20,30,40 spanning-tree root super	vlan 10,20,30,40 spanning-tree root super
VRF Instance	vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue	vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue
Spines Uplink	interface Ethernet1 no switchport	interface Ethernet1 no switchport

Arista Internal Use Only

	<pre> ip address 192.168.1.1/31 link tracking group ESI-LAG upstream interface Ethernet2 no switchport ip address 192.168.2.1/31 link tracking group ESI-LAG upstream </pre>	<pre> ip address 192.168.1.3/31 link tracking group ESI-LAG upstream interface Ethernet2 no switchport ip address 192.168.2.3/31 link tracking group ESI-LAG upstream </pre>
BGP Loopback0 Router ID	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.1/32 ! router general router-id ipv4 192.168.100.1 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.2/32 ! router general router-id ipv4 192.168.100.2 </pre>
VTI Loopback1 VTEP IP	<pre> interface Loopback1 description VTEP IP ip address 192.168.200.1/32 </pre>	<pre> interface Loopback1 description VTEP IP ip address 192.168.200.2/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>
Multihoming A/S	<pre> lacp port-id range 1 127 link tracking group ESI-LAG recovery delay 300 interface Ethernet4 switchport mode trunk ! evpn ethernet-segment identifier 0000:0000:0011:1100:0000 redundancy single-active designated-forwarder election algorithm preference 100 route-target import 00:00:00:00:11:11 spanning-tree portfast link tracking group ESI-LAG downstream </pre>	<pre> lacp port-id range 128 255 link tracking group ESI-LAG recovery delay 300 interface Ethernet4 switchport mode trunk ! evpn ethernet-segment identifier 0000:0000:0011:1100:0000 redundancy single-active designated-forwarder election algorithm preference 0 route-target import 00:00:00:00:11:11 spanning-tree portfast link tracking group ESI-LAG downstream </pre>
Anycast Gateway Virtual MAC address	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99:99 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 </pre>	<pre> router bgp 65000.2 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 </pre>

	<pre> neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 192.168.1.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf blue rd 192.168.100.1:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_SPINE_V4 activate </pre>	<pre> neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 192.168.1.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf blue rd 192.168.100.1:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_SPINE_V4 activate </pre>
--	---	---

Function	CL-3	CL-4
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20,30,40 spanning-tree root super	vlan 10,20,30,40 spanning-tree root super
VRF Instance	vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue	vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue
Spines Uplink	interface Ethernet1 no switchport ip address 192.168.1.5/31 link tracking group ESI-LAG upstream ! interface Ethernet2 no switchport ip address 192.168.2.5/31 link tracking group ESI-LAG upstream	interface Ethernet1 no switchport ip address 192.168.1.7/31 link tracking group ESI-LAG upstream ! interface Ethernet2 no switchport ip address 192.168.2.7/31 link tracking group ESI-LAG upstream
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID ip address 192.168.100.3/32 ! router general router-id ipv4 192.168.100.3	interface Loopback0 description BGP Router ID ip address 192.168.100.4/32 ! router general router-id ipv4 192.168.100.4
VTI Loopback1 VTEP IP	interface Loopback1 description Logical VTEP ip address 192.168.200.3/32	interface Loopback1 description Logical VTEP ip address 192.168.200.4/32
VxLAN	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010

	<pre> vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>	<pre> vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>
Multihoming	<pre> lacp port-id range 1 127 link tracking group ESI-LAG recovery delay 300 interface Port-Channel1 switchport mode trunk link tracking group ESI-LAG downstream ! evpn ethernet-segment identifier 0000:0000:0022:2200:0000 route-target import 00:00:00:00:22:22 lacp system-id 0000.0000.aaa3 </pre>	<pre> lacp port-id range 1 127 link tracking group ESI-LAG recovery delay 300 interface Port-Channel1 switchport mode trunk link tracking group ESI-LAG downstream ! evpn ethernet-segment identifier 0000:0000:0022:2200:0000 route-target import 00:00:00:00:22:22 lacp system-id 0000.0000.aaa3 </pre>
Anycast Gateway Virtual MAC address	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99:99 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 192.168.1.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned !</pre>	<pre> router bgp 65000.4 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 192.168.1.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned !</pre>

	<pre>vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf blue rd 192.168.100.1:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_SPINE_V4 activate</pre>	<pre>vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf blue rd 192.168.100.1:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_SPINE_V4 activate</pre>
--	---	---

Verification

The verification steps below have been carried out host-1 in the environment as these steps are similar to the remaining hosts.

	<p>show arp vrf <vrf_name></p> <p>Verify Host-1 ARP entry is presented on CL-1 and CL-2.</p>
CL-1	<pre>CL-1#show arp vrf red Address Age (sec) Hardware Addr Interface 10.10.10.1 2:26:56 501d.003e.5c50 Vlan10, Ethernet4 10.10.20.2 - 501d.008f.1bd3 Vlan20, Vxlan1 CL-2#show arp vrf red Address Age (sec) Hardware Addr Interface Address Age (sec) Hardware Addr Interface 10.10.10.1 - 501d.003e.5c50 Vlan10, Vxlan1 10.10.20.2 - 501d.008f.1bd3 Vlan20, Vxlan1</pre>
CL-3	<p>show ip route vrf <vrf_name></p> <p>Verify the host routes for Host-1 along with VLAN10 networks are presented in the VRF red routing table on CL-3. These routes must be known via CL-1 VTEP IP + VRF red L3VNI + CL-1 MLAG system ID MAC.</p> <pre>CL-3#show ip route vrf red Gateway of last resort is not set B E 10.10.1.32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 50:1d:00:9 2:14:3a local-interface Vxlan1 C 10.10.10.0/24 is directly connected, Vlan10 C 10.10.20.0/24 is directly connected, Vlan20 CL-3#show ip route vrf blue C 10.10.30.0/24 is directly connected, Vlan30 B E 10.10.40.1/32 [20/0] via VTEP 192.168.200.1 VNI 2001 router-mac 50:1d:00:9 2:14:3a local-interface Vxlan1 C 10.10.40.0/24 is directly connected, Vlan40 However on CL-1 we still have ECMP since that ESI is A/A: CL-1#show ip route vrf red C 10.10.10.0/24 is directly connected, Vlan10 B E 10.10.20.2/32 [20/0] via VTEP 192.168.200.3 VNI 2000 router-mac 50:1d:00:d1:02:ce local-interface Vxlan1 via VTEP 192.168.200.4 VNI 2000 router-mac 50:1d:00:77:79:c2 local-interface Vxlan1 C 10.10.20.0/24 is directly connected, Vlan20 CL-1#show ip route vrf blue B E 10.10.30.2/32 [20/0] via VTEP 192.168.200.3 VNI 2001 router-mac 50:1d:00:d1:02:ce local-interface Vxlan1 via VTEP 192.168.200.4 VNI 2001 router-mac 50:1d:00:77:79:c2 local-interface Vxlan1</pre>

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C	10.10.30.0/24 is directly connected, Vlan30
C	10.10.40.0/24 is directly connected, Vlan40

show bgp evpn route-type mac-ip <mac_address> next-hop <vtep_ip> detail

Verify CL-1 and CL-2 advertise Host-1 MAC address and IP to MAC bindings via EVPN Type-2 MAC-IP routes. EVPN Type-2 MAC-IP routes in Symmetric IRB are dual labeled (L2VNI and L3VNI) as well as they contain the EVPN router MAC of the VTEP that originates the advertisements

CL-3

```
CL-3#show bgp evpn route-type mac-ip 10.10.10.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for mac-ip 501d.003e.5c50 10.10.10.1, Route Distinguisher: 1
92.168.100.1:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECM
      P, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 Tunnel
      Encap:tunnelTypeVxlan EvpnRouterMac:50:1d:00:92:14:3a
        VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0011:1100:0000
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP con
      tributor
      Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000 Tunnel
      Encap:tunnelTypeVxlan EvpnRouterMac:50:1d:00:92:14:3a
        VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0011:1100:0000
```

Note: only active PE (CL-1) is sending type2 mac-ip route.

show bgp evpn route-type auto-discovery esi <esi> next-hop <vtep_ip> detail

Verify CL-1 EVPN Type-1 advertisement routes

CL-1

```
CL-1#show bgp evpn route-type auto-discovery esi 0000:0000:0011:1100:0000 detail
BGP routing table information for VRF default
Router identifier 192.168.100.1, local AS number 4259840001
BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.1:10
Paths: 1 available
  Local
    - from - (0.0.0.0)
      Origin IGP, metric -, localpref -, weight 0, valid, local, best
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.1:20
Paths: 1 available
  Local
    - from - (0.0.0.0)
      Origin IGP, metric -, localpref -, weight 0, valid, local, best
      Extended Community: Route-Target-AS:1020:1020 TunnelEncap:tunnelTypeVxlan
        VNI: 1020
BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.1:30
Paths: 1 available
  Local
    - from - (0.0.0.0)
      Origin IGP, metric -, localpref -, weight 0, valid, local, best
      Extended Community: Route-Target-AS:1030:1030 TunnelEncap:tunnelTypeVxlan
        VNI: 1030
BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.1:40
Paths: 1 available
  Local
    - from - (0.0.0.0)
      Origin IGP, metric -, localpref -, weight 0, valid, local, best
      Extended Community: Route-Target-AS:1040:1040 TunnelEncap:tunnelTypeVxlan
        VNI: 1040
BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
  65000.65000 65000.2
```

```

192.168.200.2 from 192.168.100.102 (192.168.100.102)
  Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
  Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
  VNI: 1010

BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.2:20
Paths: 2 available
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1020:1020 TunnelEncap:tunnelTypeVxlan
      VNI: 1020
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1020:1020 TunnelEncap:tunnelTypeVxlan
      VNI: 1020

BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.2:30
Paths: 2 available
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1030:1030 TunnelEncap:tunnelTypeVxlan
      VNI: 1030
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1030:1030 TunnelEncap:tunnelTypeVxlan
      VNI: 1030

BGP routing table entry for auto-discovery 0 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.100.2:40
Paths: 2 available
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1040:1040 TunnelEncap:tunnelTypeVxlan
      VNI: 1040
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1040:1040 TunnelEncap:tunnelTypeVxlan
      VNI: 1040

BGP routing table entry for auto-discovery 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.200.1:1
Paths: 1 available
  Local
    - from - (0.0.0.0)
      Origin IGP, metric -, localpref -, weight 0, valid, local, best
      Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:1020:1020 Route-Target-AS:1030:1030 Route-Target-AS:1040:1040 Tunnel
      Encap:tunnelTypeVxlan EvpnEsiLabel:0:single-active

BGP routing table entry for auto-discovery 0000:0000:0011:1100:0000, Route Distinguisher: 192.168.200.2:1
Paths: 2 available
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:1020:1020 Route-Target-AS:1030:1030 Route-Target-AS:1040:1040 Tunnel
      Encap:tunnelTypeVxlan EvpnEsiLabel:0:single-active
      VNI: 0
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:1020:1020 Route-Target-AS:1030:1030 Route-Target-AS:1040:1040 Tunnel
      Encap:tunnelTypeVxlan EvpnEsiLabel:0:single-active
      VNI: 0

```

Note: vlans 1,10,20,30,40 are allowed in the interface and generate a type-1 route. Local vlans to the ESI (not vxlan extended) are also advertised with VNI 0.

```
show bgp evpn route-type ethernet-segment esi <esi> next-hop <vtep_ip> detail
```

```
Verify CL-1 EVPN Type-4 ethernet-segment routes
```

CL-1

```
CL-1#show bgp evpn route-type ethernet-segment esi 0000:0000:0011:1100:0000 detail
BGP routing table information for VRF default
Router identifier 192.168.100.1, local AS number 4259840001
BGP routing table entry for ethernet-segment 0000:0000:0011:1100:0000 192.168.200.1, Route Distinguisher: 192.168.200.1:1
```

```

Paths: 1 available
Local
- from - (0.0.0.0)
  Origin IGP, metric -, localpref -, weight 0, valid, local, best
  Extended Community: TunnelEncap:tunnelTypeVxlan EvpnEsImportRt:00:00:00:00:11:11 DF
Election: Preference 100
BGP routing table entry for ethernet-segment 0000:0000:0011:1100:0000 192.168.200.2, Route
Distinguisher: 192.168.200.2:1
Paths: 2 available
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP
      contributor
      Extended Community: TunnelEncap:tunnelTypeVxlan EvpnEsImportRt:00:00:00:00:11:11 DF
Election: Preference 0
  65000.65000 65000.2
    192.168.200.2 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: TunnelEncap:tunnelTypeVxlan EvpnEsImportRt:00:00:00:00:11:11 DF
Election: Preference 0

```

show spanning-tree

Verify super root configuration and active links on CL-1 and CL-2

CL-1	CL-1#show spanning-tree
	MST0
	Spanning tree enabled protocol mstp
	Root ID Priority 8192
	Address 501d.0092.143a
	This bridge is the root
	Bridge ID Priority 8192 (priority 8192 sys-id-ext 0)
	Address 501d.0092.143a
	Hello Time 2.000 sec Max Age 20 sec Forward Delay 15 sec
	Interface Role State Cost Prio.Nbr Type
Et4 designated forwarding 2000 128.4 P2p	
CL-1#show int trunk	
Port Mode Status Native vlan	
Et4 trunk trunking 1	
Port Vlans allowed	
Et4 All	
Port Vlans allowed and active in management domain	
Et4 1,10,20,30,40	
Port Vlans in spanning tree forwarding state	
Et4 1,10,20,30,40	
CL-1#show vlan configured	
VLAN Name Status Ports	
1 default active Et3, Et4, Et5, Et6, Et7, Et8	
10 VLAN0010 active Et4, Vx1	
20 VLAN0020 active Et4, Vx1	
30 VLAN0030 active Et4, Vx1	
40 VLAN0040 active Et4, Vx1	
3984* VLAN3984 active Et4, Vx1	
3985* VLAN3985 active Et4, Vx1	
4094 172.16.0.0/30-mlag-peer-link active Et4	
* indicates a Dynamic VLAN	
HOST-1#show spanning-tree	
MST0	
Spanning tree enabled protocol mstp	
Root ID Priority 8192	
Address 501d.0092.143a	
Cost 0 (Ext) 2000 (Int)	
Port 4 (Ethernet4)	
Hello Time 2.000 sec Max Age 20 sec Forward Delay 15 sec	

```

Bridge ID Priority    16384 (priority 16384 sys-id-ext 0)
Address      501d.00c4.11ce
Hello Time   2.000 sec Max Age 20 sec Forward Delay 15 sec

Interface     Role      State       Cost      Prio.Nbr Type
-----        -----      -----      -----      -----
Et4          root      forwarding 2000      128.4    P2p

CL-2#show int trunk

Port          Mode      Status      Native vlan
Et4          trunk     trunking     1

Port          Vlans allowed
Et4          All

Port          Vlans allowed and active in management domain
Et4          1

Port          Vlans in spanning tree forwarding state
Et4          None

CL-2#show vlan configured-ports
VLAN Name           Status Ports
-----  -----
1   default          active Et3, Et4, Et5, Et6, Et7, Et8
10  VLAN0010         active Et4#, Vx1
20  VLAN0020         active Et4#, Vx1
30  VLAN0030         active Et4#, Vx1
40  VLAN0040         active Et4#, Vx1
3988* VLAN3988      active Et4, Vx1
3989* VLAN3989      active Et4, Vx1

```

ping <remote_host_ip>

Verify connectivity between Host-1 and Host-3 and Host-4

Host-1

```

HOST-1#ping vrf red 10.10.20.2
PING 10.10.20.2 (10.10.20.2) 72(100) bytes of data.
80 bytes from 10.10.20.2: icmp_seq=1 ttl=62 time=37.4 ms
80 bytes from 10.10.20.2: icmp_seq=2 ttl=62 time=28.7 ms
80 bytes from 10.10.20.2: icmp_seq=3 ttl=62 time=25.5 ms
80 bytes from 10.10.20.2: icmp_seq=4 ttl=62 time=26.9 ms
80 bytes from 10.10.20.2: icmp_seq=5 ttl=62 time=28.9 ms

--- 10.10.20.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 64ms
rtt min/avg/max/mdev = 25.550/29.523/37.468/4.160 ms, pipe 4, ipg/ewma 16.136/33.377 ms

HOST-1#ping vrf blue 10.10.30.2
PING 10.10.30.2 (10.10.30.2) 72(100) bytes of data.
80 bytes from 10.10.30.2: icmp_seq=1 ttl=62 time=33.7 ms
80 bytes from 10.10.30.2: icmp_seq=2 ttl=62 time=26.7 ms
80 bytes from 10.10.30.2: icmp_seq=3 ttl=62 time=46.8 ms
80 bytes from 10.10.30.2: icmp_seq=4 ttl=62 time=38.7 ms
80 bytes from 10.10.30.2: icmp_seq=5 ttl=62 time=31.1 ms

--- 10.10.30.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 65ms
rtt min/avg/max/mdev = 26.709/35.447/46.885/6.923 ms, pipe 4, ipg/ewma 16.499/34.624 ms

```

EVPN Symmetric IRB - BGP unnumbered underlay (IPv6 Fabric using RFC5549)

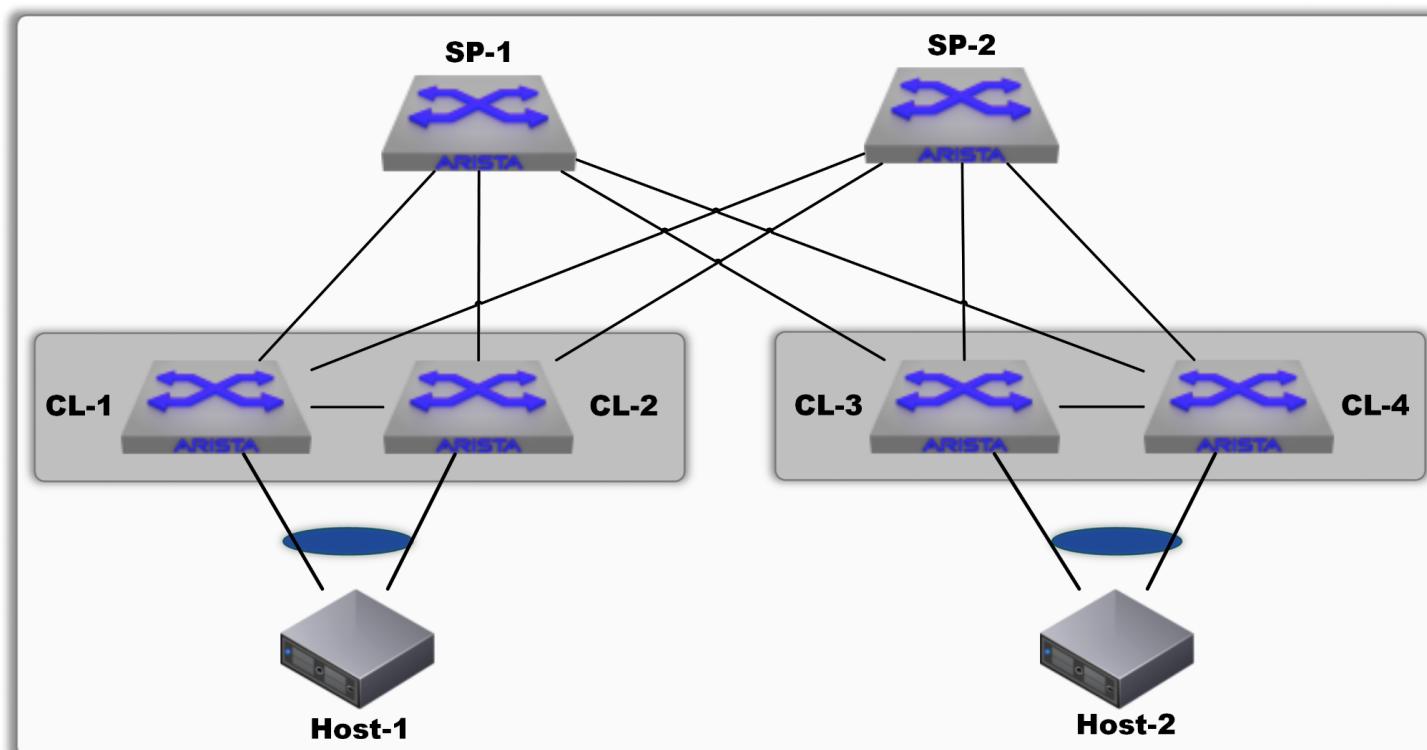
Deployment Consideration

- Alternative solution for the IPv4 underlay in all the EVPN models.
- Easier to automate as it eliminates the need for P2P link addressing. IPv6 link-local addresses are used to automatically establish underlay BGP sessions between spines and leaf switches.
- Day 1 - IPv6 Unicast support both in the Underlay and Overlay.
- Particularly relevant when deploying EVPN over an IPv6 Fabric with legacy switches or routers which do not support IPv6 VXLAN Tunnels
- More difficult to troubleshoot when compared to IPv4 underlay. The operations team must consider some additional complexity when supporting an IPv6 fabric.

Refer to the [Deploying EVPN with IPv6 fabric using RFC5549](#) for more information.

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Topology



Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
SP-1	192.168.100.101	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb1
SP-2	192.168.100.102	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb2
CL-1	192.168.100.1	192.168.200.1	65000.1	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0000.aaa1
CL-2	192.168.100.2	192.168.200.1	65000.1	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0000.aaa2
CL-3	192.168.100.3	192.168.200.3	65000.3	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0000.aaa3
CL-4	192.168.100.4	192.168.200.3	65000.3	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0000.aaa4
Host-1	N/A	N/A	N/A	Red Blue	VLAN10 VLAN40	10.10.10.1/24 10.10.40.1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	Red Blue	VLAN20 VLAN30	10.10.20.2/24 10.10.30.2/24	0000.0000.2222

Important Notes

- iBGP sessions between MLAG peers can also be established via IPv6 link-local address.
- MLAG peer address must still be IPv4.
- IPv4 Loopbacks and EVPN configuration remain the same.

Configuration

The following configuration is required for an BGP unnumbered underlay (EVPN Symmetric IRB has been used in this example as EVPN model):

- Underlay
 - Multi-agent model (ArBGP)
 - eBGP IPv6 BGP unnumbered peering between spines and leaf switches
 - iBGP IPv6 BGP unnumbered between MLAG pair
 - MLAG
- Overlay
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VxLAN
 - MLAG Shared Router MAC Address
 - VLAN to VNI mapping (L2VNI)
 - VRF to VNI mapping (L3VNI)
 - BGP/EVPN
 - MAC-VRF
 - IP-VRF
- Tenant
 - VLAN
 - Tenant VRF
 - Anycast Gateway
- Platform specific (See [Appendix A](#))

Note: Configuration lines in red font color are not supported in vEOS.

Compute Leaf

Function	CL-1	CL-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20,30,40	vlan 10,20,30,40
VRF Instance	vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue	vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue
Spines Uplink	interface Ethernet1 no switchport ipv6 enable ! interface Ethernet2 no switchport ipv6 enable	interface Ethernet1 no switchport ipv6 enable ! interface Ethernet2 no switchport ipv6 enable
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID ip address 192.168.100.1/32 ! router general router-id ipv4 192.168.100.1	interface Loopback0 description BGP Router ID ip address 192.168.100.2/32 ! router general router-id ipv4 192.168.100.2
VTI Loopback1 VTEP IP	interface Loopback1 description VTEP IP ip address 192.168.200.1/32	interface Loopback1 description VTEP IP ip address 192.168.200.1/32
VxLAN	interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000	interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000
MLAG Config	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate

	<pre> ipv6 enable ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> ipv6 enable ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
Anycast Gateway Virtual MAC address	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99:99 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK </pre>
eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V6 peer group neighbor UNDERLAY_MLAG_PEER_V6 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V6 next-hop-self neighbor UNDERLAY_MLAG_PEER_V6 maximum-routes 12000 neighbor UNDERLAY_SPINE_V6 peer group neighbor UNDERLAY_SPINE_V6 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V6 maximum-routes 12000 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN neighbor interface Et1,2 peer-group UNDERLAY_SPINE_V6 remote-as 65000.65000 neighbor interface Vl4094 peer-group UNDERLAY_MLAG_PEER_V6 remote-as 65000.1 redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf blue rd 192.168.100.1:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red </pre>	<pre> router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V6 peer group neighbor UNDERLAY_MLAG_PEER_V6 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V6 next-hop-self neighbor UNDERLAY_MLAG_PEER_V6 maximum-routes 12000 neighbor UNDERLAY_SPINE_V6 peer group neighbor UNDERLAY_SPINE_V6 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V6 maximum-routes 12000 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN neighbor interface Et1,2 peer-group UNDERLAY_SPINE_V6 remote-as 65000.65000 neighbor interface Vl4094 peer-group UNDERLAY_MLAG_PEER_V6 remote-as 65000.1 redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf blue rd 192.168.100.1:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red </pre>

	<pre> rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V6 activate neighbor UNDERLAY_SPINE_V6 activate neighbor UNDERLAY_MLAG_PEER_V6 next-hop address-family ipv6 originate neighbor UNDERLAY_SPINE_V6 next-hop address-family ipv6 originate </pre>	<pre> rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V6 activate neighbor UNDERLAY_SPINE_V6 activate neighbor UNDERLAY_MLAG_PEER_V6 next-hop address-family ipv6 originate neighbor UNDERLAY_SPINE_V6 next-hop address-family ipv6 originate </pre>
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Function	CL-3	CL-4
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20,30,40	vlan 10,20,30,40
VRF Instance	vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue	vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue
Spines Uplink	interface Ethernet1 no switchport ipv6 enable ! interface Ethernet2 no switchport ipv6 enable	interface Ethernet1 no switchport ipv6 enable ! interface Ethernet2 no switchport ipv6 enable
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID ip address 192.168.100.3/32 ! router general router-id ipv4 192.168.100.3	interface Loopback0 description BGP Router ID ip address 192.168.100.4/32 ! router general router-id ipv4 192.168.100.4
VTI Loopback1 VTEP IP	interface Loopback1 description Logical VTEP ip address 192.168.200.3/32	interface Loopback1 description Logical VTEP ip address 192.168.200.3/32
VxLAN	interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000	interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000
MLAG Config	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ipv6 enable ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ipv6 enable ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000
Anycast Gateway Virtual MAC address	interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red	interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red

	<pre> ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>	<pre> ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99:99 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK </pre>
eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V6 peer group neighbor UNDERLAY_MLAG_PEER_V6 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V6 next-hop-self neighbor UNDERLAY_MLAG_PEER_V6 maximum-routes 12000 neighbor UNDERLAY_SPINE_V6 peer group neighbor UNDERLAY_SPINE_V6 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V6 maximum-routes 12000 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN neighbor interface Et1,2 peer-group UNDERLAY_SPINE_V6 remote-as 65000.65000 neighbor interface Vl4094 peer-group UNDERLAY_MLAG_PEER_V6 redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf blue rd 192.168.100.1:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V6 activate neighbor UNDERLAY_SPINE_V6 activate neighbor UNDERLAY_MLAG_PEER_V6 next-hop address-family ipv6 originate </pre>	<pre> router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V6 peer group neighbor UNDERLAY_MLAG_PEER_V6 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V6 next-hop-self neighbor UNDERLAY_MLAG_PEER_V6 maximum-routes 12000 neighbor UNDERLAY_SPINE_V6 peer group neighbor UNDERLAY_SPINE_V6 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V6 maximum-routes 12000 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN neighbor interface Et1,2 peer-group UNDERLAY_SPINE_V6 remote-as 65000.65000 neighbor interface Vl4094 peer-group UNDERLAY_MLAG_PEER_V6 redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf blue rd 192.168.100.1:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V6 activate neighbor UNDERLAY_SPINE_V6 activate neighbor UNDERLAY_MLAG_PEER_V6 next-hop address-family ipv6 originate </pre>

	neighbor UNDERLAY_SPINE_V6 next-hop address-family ipv6 originate	neighbor UNDERLAY_SPINE_V6 next-hop address-family ipv6 originate
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Spine

Function	SP-1	SP-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
Leaf Downlinks	<pre>interface Ethernet1 no switchport ipv6 enable ! interface Ethernet2 no switchport ipv6 enable ! interface Ethernet3 no switchport ipv6 enable ! interface Ethernet4 no switchport ipv6 enable</pre>	<pre>interface Ethernet1 no switchport ipv6 enable ! interface Ethernet2 no switchport ipv6 enable ! interface Ethernet3 no switchport ipv6 enable ! interface Ethernet4 no switchport ipv6 enable</pre>
BGP Loopback0 (Router ID)	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.101/32 ! router general router-id ipv4 192.168.100.101</pre>	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.102/32 ! router general router-id ipv4 192.168.100.102</pre>
IP-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK</pre>
eBGP and iBGP Underlay BGP/EVPN	<pre>router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.1.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multipath 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V6 peer group neighbor UNDERLAY_LEAF_V6 maximum-routes 12000 bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE neighbor interface Eti-4 peer-group UNDERLAY_LEAF_V6 peer- filter LEAF-AS-RANGE redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept</pre>	<pre>router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.2.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multipath 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V6 peer group neighbor UNDERLAY_LEAF_V6 maximum-routes 12000 bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE neighbor interface Eti-4 peer-group UNDERLAY_LEAF_V6 peer- filter LEAF-AS-RANGE redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept</pre>

Verification

EVPN/VxLAN outputs are not included as they are exactly the same, only underlay changes.

show ip route	
Verify the IPv4 routing table	
CL-1	<pre>CL-1#show ip route C 172.16.0.0/30 [0/0] via Vlan4094, directly connected C 192.168.100.1/32 [0/0]</pre>

Arista Internal Use Only

	<pre> via Loopback0, directly connected B I 192.168.100.2/32 [200/0] via fe80::200:ff:fe01:aaa2, Vlan4094 B E 192.168.100.3/32 [20/0] via fe80::200:ff:fe01:bbb1, Ethernet1 via fe80::200:ff:fe01:bbb2, Ethernet2 B E 192.168.100.4/32 [20/0] via fe80::200:ff:fe01:bbb1, Ethernet1 via fe80::200:ff:fe01:bbb2, Ethernet2 B E 192.168.100.101/32 [20/0] via fe80::200:ff:fe01:bbb1, Ethernet1 B E 192.168.100.102/32 [20/0] via fe80::200:ff:fe01:bbb2, Ethernet2 C 192.168.200.1/32 [0/0] via Loopback1, directly connected B E 192.168.200.3/32 [20/0] via fe80::200:ff:fe01:bbb1, Ethernet1 via fe80::200:ff:fe01:bbb2, Ethernet2 </pre>
CL-3	<pre> CL-3#show ip route C 172.16.0.0/30 [0/0] via Vlan4094, directly connected B E 192.168.100.1/32 [20/0] via fe80::200:ff:fe01:bbb1, Ethernet1 via fe80::200:ff:fe01:bbb2, Ethernet2 B E 192.168.100.2/32 [20/0] via fe80::200:ff:fe01:bbb1, Ethernent1 via fe80::200:ff:fe01:bbb2, Ethernent2 C 192.168.100.3/32 [0/0] via Loopback0, directly connected B I 192.168.100.4/32 [200/0] via fe80::200:ff:fe01:aaa4, Vlan4094 B E 192.168.100.101/32 [20/0] via fe80::200:ff:fe01:bbb1, Ethernent1 B E 192.168.100.102/32 [20/0] via fe80::200:ff:fe01:bbb2, Ethernent2 B E 192.168.200.1/32 [20/0] via fe80::200:ff:fe01:bbb1, Ethernent1 via fe80::200:ff:fe01:bbb2, Ethernent2 C 192.168.200.3/32 [0/0] via Loopback1, directly connected </pre>
SP-1	<pre> SP-1#show ip route B E 192.168.100.1/32 [20/0] via fe80::200:ff:fe01:aaa1, Ethernet1 via fe80::200:ff:fe01:aaa2, Ethernet2 B E 192.168.100.2/32 [20/0] via fe80::200:ff:fe01:aaa1, Ethernet1 via fe80::200:ff:fe01:aaa2, Ethernet2 B E 192.168.100.3/32 [20/0] via fe80::200:ff:fe01:aaa3, Ethernet3 B E 192.168.100.4/32 [20/0] via fe80::200:ff:fe01:aaa4, Ethernet4 C 192.168.100.101/32 [0/0] via Loopback0, directly connected B E 192.168.200.1/32 [20/0] via fe80::200:ff:fe01:aaa1, Ethernet1 via fe80::200:ff:fe01:aaa2, Ethernet2 B E 192.168.200.3/32 [20/0] via fe80::200:ff:fe01:aaa3, Ethernet3 via fe80::200:ff:fe01:aaa4, Ethernet4 </pre>

show ip bgp summary

Verify the eBGP IPv4 peering between spines and leaf switches is established

CL-1	<pre> CL-1#show ip bgp summary BGP summary information for VRF default Router identifier 192.168.100.1, local AS number 65000.1 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc fe80::200:ff:fe01:aaa2%Vl4094 4 65000.1 16305 16310 0 0 19:16:52 Estab 7 7 fe80::200:ff:fe01:bbb1%Et1 4 65000.65000 16312 16303 0 0 19:17:07 Estab 4 4 fe80::200:ff:fe01:bbb2%Et2 4 65000.65000 16314 16315 0 0 19:17:07 Estab 4 4 </pre>
CL-3	<pre> CL-3#show ip bgp summary BGP summary information for VRF default Router identifier 192.168.100.3, local AS number 65000.3 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc fe80::200:ff:fe01:aaa3%Vl4094 4 65000.3 463 900 0 0 00:00:33 Estab 7 7 fe80::200:ff:fe01:bbb1%Et1 4 65000.65000 16468 16462 0 0 00:02:08 Estab 4 4 fe80::200:ff:fe01:bbb2%Et2 4 65000.65000 16458 16470 0 0 00:02:08 Estab 4 4 </pre>

SP-1	<pre>SP-1#show ip bgp summary DC-1-SP-1-07:16:50#show ip bgp summ BGP summary information for VRF default Router identifier 192.168.100.101, local AS number 65000.65000 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc fe80::200:ff:fe01:aaa1%Et1 4 65000.1 16453 16461 0 0 19:27:37 Estab 3 3 fe80::200:ff:fe01:aaa2%Et2 4 65000.1 16444 16463 0 0 19:27:15 Estab 3 3 fe80::200:ff:fe01:aaa3%Et3 4 65000.3 16441 16473 0 0 19:27:29 Estab 3 3 fe80::200:ff:fe01:aaa4%Et4 4 65000.3 16469 16479 0 0 00:02:54 Estab 3 3</pre>
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show bgp evpn summary

Verify the eBGP IPv4 EVPN peering between spines and leaf switches is established

CL-1	<pre>CL-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.1, local AS number 65000.1 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.101 4 65000.65000 96959 92634 0 0 00:16:38 Estab 16 16 192.168.100.102 4 65000.65000 95912 91860 0 0 00:16:39 Estab 16 16</pre>
CL-3	<pre>CL-3#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.3, local AS number 65000.3 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.101 4 65000.65000 63573 61703 0 0 00:17:22 Estab 16 16 192.168.100.102 4 65000.65000 62669 61009 0 0 00:17:23 Estab 16 16</pre>
SP-1	<pre>SP-1#show bgp evpn summary BGP summary information for VRF default Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.1 4 65000.1 388 387 0 0 00:18:02 Estab 8 8 192.168.100.2 4 65000.1 376 389 0 0 00:18:02 Estab 8 8 192.168.100.3 4 65000.3 356 393 0 0 00:18:02 Estab 8 8 192.168.100.4 4 65000.3 81 82 0 0 00:04:41 Estab 8 8</pre>

ping ipv6 <remote_host_ipv6> interface <outbound_interfaces>

Verify connectivity between CL-1 and Spines and MLAG peer

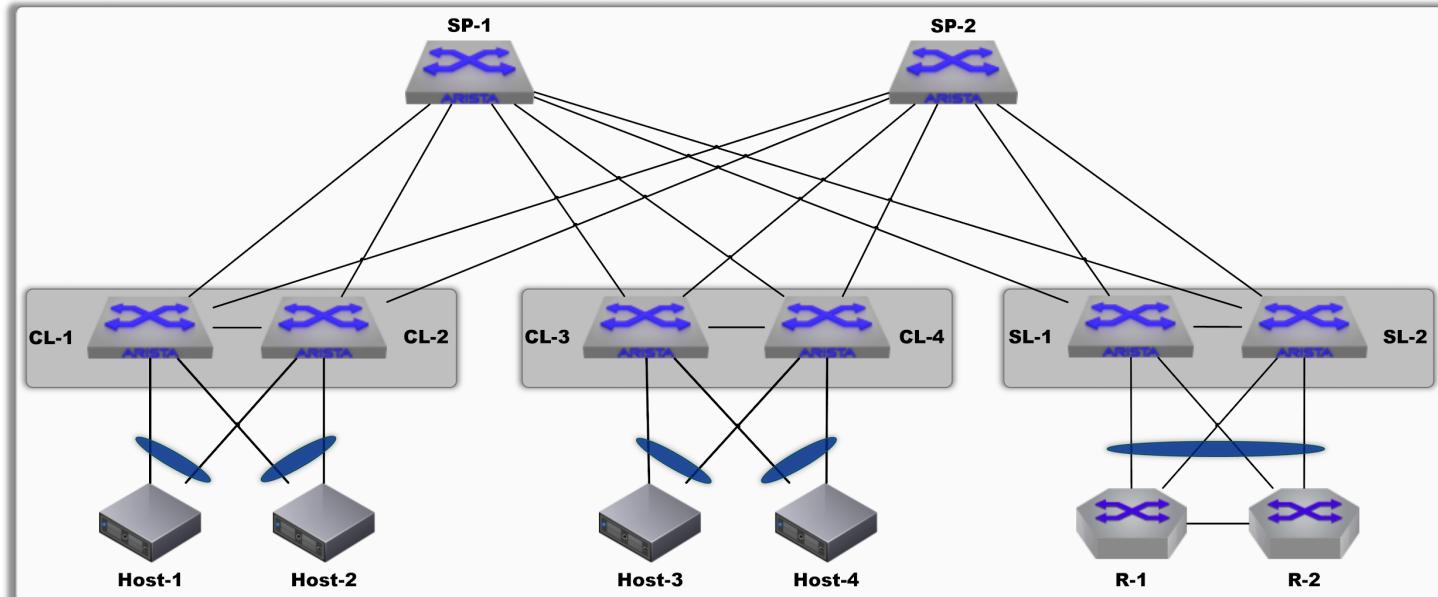
CL-1	<pre>CL-1#ping ipv6 fe80::200:ff:fe01:bbb1 interface et1 PING fe80::200:ff:fe01:bbb1(fe80::200:ff:fe01:bbb1) from fe80::200:ff:fe01:aaa1%et1 et1: 72 data bytes 80 bytes from fe80::200:ff:fe01:bbb1%et1: icmp_seq=1 ttl=64 time=4.32 ms 80 bytes from fe80::200:ff:fe01:bbb1%et1: icmp_seq=2 ttl=64 time=3.02 ms 80 bytes from fe80::200:ff:fe01:bbb1%et1: icmp_seq=3 ttl=64 time=2.57 ms 80 bytes from fe80::200:ff:fe01:bbb1%et1: icmp_seq=4 ttl=64 time=4.16 ms 80 bytes from fe80::200:ff:fe01:bbb1%et1: icmp_seq=5 ttl=64 time=3.04 ms --- fe80::200:ff:fe01:bbb1 ping statistics --- 5 packets transmitted, 5 received, 0% packet loss, time 17ms rtt min/avg/max/mdev = 2.579/3.426/4.325/0.691 ms, ipg/ewma 4.288/3.870 ms CL-1#ping ipv6 fe80::200:ff:fe01:bbb2 interface et2 PING fe80::200:ff:fe01:bbb2(fe80::200:ff:fe01:bbb2) from fe80::200:ff:fe01:aaa1%et2 et2: 72 data bytes 80 bytes from fe80::200:ff:fe01:bbb2%et2: icmp_seq=1 ttl=64 time=6.27 ms 80 bytes from fe80::200:ff:fe01:bbb2%et2: icmp_seq=2 ttl=64 time=4.84 ms 80 bytes from fe80::200:ff:fe01:bbb2%et2: icmp_seq=3 ttl=64 time=3.62 ms 80 bytes from fe80::200:ff:fe01:bbb2%et2: icmp_seq=4 ttl=64 time=3.54 ms 80 bytes from fe80::200:ff:fe01:bbb2%et2: icmp_seq=5 ttl=64 time=3.58 ms --- fe80::200:ff:fe01:bbb2 ping statistics --- 5 packets transmitted, 5 received, 0% packet loss, time 24ms rtt min/avg/max/mdev = 3.542/4.373/6.278/1.072 ms, ipg/ewma 6.106/5.267 ms CL-1#ping ipv6 fe80::200:ff:fe01:aaa2 interface vlan4094 PING fe80::200:ff:fe01:aaa2(fe80::200:ff:fe01:aaa2) from fe80::200:ff:fe01:aaa1%vlan4094 vlan4094: 72 data bytes 80 bytes from fe80::200:ff:fe01:aaa2%vlan4094: icmp_seq=1 ttl=64 time=5.76 ms 80 bytes from fe80::200:ff:fe01:aaa2%vlan4094: icmp_seq=2 ttl=64 time=5.54 ms 80 bytes from fe80::200:ff:fe01:aaa2%vlan4094: icmp_seq=3 ttl=64 time=4.81 ms 80 bytes from fe80::200:ff:fe01:aaa2%vlan4094: icmp_seq=4 ttl=64 time=5.85 ms 80 bytes from fe80::200:ff:fe01:aaa2%vlan4094: icmp_seq=5 ttl=64 time=6.70 ms --- fe80::200:ff:fe01:aaa2 ping statistics --- 5 packets transmitted, 5 received, 0% packet loss, time 24ms rtt min/avg/max/mdev = 4.811/5.738/6.708/0.610 ms, ipg/ewma 6.001/5.785 ms</pre>
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L2 EVPN

Deployment Consideration

- Ideal deployment model to use when only L2VPN service is required
- Default gateway for hosts in the EVPN domain are placed outside the EVPN domain
- Most the traffic in the EVPN domain is north-south instead of east-west
- Support for high scale deployments (<=25K MAC address). The limiting factors to consider are the size of the MAC address table and flood set limitation of the low end devices in the EVPN domain
- Support for multi-tenancy at layer 2
- Easy to troubleshoot
- More difficult to automate when compared with A-IRB when no logical or tenant grouping are properly defined.

Topology



Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
SP-1	192.168.100.101	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb1
SP-2	192.168.100.102	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb2
CL-1	192.168.100.1	192.168.200.1	65000.1	N/A	VLAN10 VLAN20	N/A	0000.0000.aaa1
CL-2	192.168.100.2	192.168.200.1	65000.1	N/A	VLAN10 VLAN20	N/A	0000.0000.aaa2
CL-3	192.168.100.3	192.168.200.3	65000.3	N/A	VLAN10 VLAN20	N/A	0000.0000.aaa3
CL-4	192.168.100.4	192.168.200.3	65000.3	N/A	VLAN10 VLAN20	N/A	0000.0000.aaa4
SL-1	192.168.100.5	192.168.200.5	65000.5	N/A	VLAN10 VLAN20	N/A	0000.0000.ddd1
SL-2	192.168.100.6	192.168.200.5	65000.5	N/A	VLAN10 VLAN20	N/A	0000.0000.ddd2
R-1	N/A	N/A	N/A	N/A	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.ccc1
R-2	N/A	N/A	N/A	N/A	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.ccc2
Host-1	N/A	N/A	N/A	N/A	VLAN10	10.10.10.1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	N/A	VLAN20	10.10.20.2/24	0000.0000.2222
Host-3	N/A	N/A	N/A	N/A	VLAN10	10.10.10.3/24	0000.0000.3333
Host-4	N/A	N/A	N/A	N/A	VLAN20	10.10.20.4/24	0000.0000.4444

Configuration

The following configuration is required for L2 EVPN:

- Underlay
 - Multi-agent model (ArBGP)
 - eBGP IPv4 Unicast peering between spines and leaf switches
 - iBGP IPv4 Unicast peering between MLAG pair
 - MLAG
- Overlay
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VxLAN
 - VLAN to VNI mapping (L2VNI)
 - BGP/EVPN
 - MAC-VRF

Note: Configuration lines in red font color are not supported in vEOS.

Compute Leaf

Function	CL-1	CL-2
BGP	service routing protocols model multi-agent	service routing protocols model multi-agent
LAN	vlan 10,20	vlan 10,20
Spines Uplink	<pre>interface Ethernet1 no switchport ip address 192.168.1.1/31 ! interface Ethernet2 no switchport ip address 192.168.2.1/31</pre>	<pre>interface Ethernet1 no switchport ip address 192.168.1.3/31 ! interface Ethernet2 no switchport ip address 192.168.2.3/31</pre>
BGP Loopback0 outer ID	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.1/32 ! router general router-id ipv4 192.168.100.1</pre>	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.2/32 ! router general router-id ipv4 192.168.100.2</pre>
VTEP IP	<pre>interface Loopback1 description VTEP IP ip address 192.168.200.1/32</pre>	<pre>interface Loopback1 description VTEP IP ip address 192.168.200.1/32</pre>
VxLAN	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020</pre>	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020</pre>
LAG Config	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000</pre>	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000</pre>
Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20</pre>

	match ip address prefix-list P2P	match ip address prefix-list P2P
BGP and iBGP Underlay GP/EVPN	<pre> router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>	<pre> router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>

Function	CL-3	CL-4
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20	vlan 10,20
Spines Uplink	<pre> interface Ethernet1 no switchport ip address 192.168.1.5/31 ! interface Ethernet2 no switchport ip address 192.168.2.5/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.1.7/31 ! interface Ethernet2 no switchport ip address 192.168.2.7/31 </pre>
BGP Loopback0 Router ID	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.3/32 ! router general router-id ipv4 192.168.100.3 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.4/32 ! router general router-id ipv4 192.168.100.4 </pre>
VTI Loopback1 VTEP IP	<pre> interface Loopback1 description Logical VTEP ip address 192.168.200.3/32 </pre>	<pre> interface Loopback1 description Logical VTEP ip address 192.168.200.3/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 </pre>
MLAG Config	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active </pre>	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active </pre>

	<pre> ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> ! interface vlan 4094 ip address 172.16.0.2/3 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>	<pre> router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>

Service Leaf

Function	SL-1	SL-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20	vlan 10,20
Spines Uplink	<pre> interface Ethernet1 no switchport ip address 192.168.1.9/31 ! interface Ethernet2 no switchport ip address 192.168.2.9/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.1.11/31 ! interface Ethernet2 no switchport ip address 192.168.2.11/31 </pre>
Router Downlink	<pre> interface port-channel1 switchport mode trunk mlag 1 </pre>	<pre> interface port-channel1 switchport mode trunk mlag 1 </pre>

	<pre> ! interface Ethernet4 channel-group 1 mode active ! ! interface Ethernet5 channel-group 1 mode active </pre>	<pre> ! interface Ethernet4 channel-group 1 mode active ! ! interface Ethernet5 channel-group 1 mode active </pre>
BGP Loopback0 Router ID	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.5/32 ! router general router-id ipv4 192.168.100.5 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.6/32 ! router general router-id ipv4 192.168.100.6 </pre>
VTI Loopback1 VTEP IP	<pre> interface Loopback1 description VTEP IP ip address 192.168.200.5/32 </pre>	<pre> interface Loopback1 description VTEP IP ip address 192.168.200.5/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 </pre>
MLAG Config	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65000.5 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.8 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.8 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto </pre>	<pre> router bgp 65000.5 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.10 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.10 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto </pre>

	<pre> route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>	<pre> route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>
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Spine

Function	SP-1	SP-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
Leaf Downlinks	<pre> interface Ethernet1 no switchport ip address 192.168.1.0/31 ! interface Ethernet2 no switchport ip address 192.168.1.2/31 ! interface Ethernet3 no switchport ip address 192.168.1.4/31 ! interface Ethernet4 no switchport ip address 192.168.1.6/31 ! interface Ethernet5 no switchport ip address 192.168.1.8/31 ! interface Ethernet6 no switchport ip address 192.168.1.10/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.2.0/31 ! interface Ethernet2 no switchport ip address 192.168.2.2/31 ! interface Ethernet3 no switchport ip address 192.168.2.4/31 ! interface Ethernet4 no switchport ip address 192.168.2.6/31 ! interface Ethernet5 no switchport ip address 192.168.2.8/31 ! interface Ethernet6 no switchport ip address 192.168.2.10/31 </pre>
BGP Loopback0 (Router ID)	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.101/32 ! router general router-id ipv4 192.168.100.101 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.102/32 ! router general router-id ipv4 192.168.100.102 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.1.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multihop 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate </pre>	<pre> router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.2.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multihop 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate </pre>

<pre> ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept </pre>	<pre> ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept </pre>
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Router

Function	R-1	R-2
VLAN	vlan 10,20	vlan 10,20
Service Leaf Downlink	<pre> interface port-channel1 switchport mode trunk mlag 1 ! interface Ethernet1 channel-group 1 mode active ! interface Ethernet2 channel-group 1 mode active </pre>	<pre> interface port-channel1 switchport mode trunk mlag 1 ! interface Ethernet1 channel-group 1 mode active ! interface Ethernet2 channel-group 1 mode active </pre>
Anycast Gateway Virtual MAC address	<pre> interface Vlan10 ip address 10.10.10.253/24 ip virtual-router address 10.10.10.254 ! interface Vlan20 ip address 10.10.20.253/24 ip virtual-router address 10.10.20.254 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>	<pre> interface Vlan10 ip address 10.10.10.252/24 ip virtual-router address 10.10.10.254 ! interface Vlan20 ip address 10.10.20.252/24 ip virtual-router address 10.10.20.254 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>

Verification

The verification steps below that have been carried out host-1 in the environment as these steps are similar to the remaining hosts.

show bgp evpn summary	
Verify the eBGP IPv4 EVPN peering between spines and leaf switches is established	
CL-1	<pre> CL-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.1, local AS number 65000.1 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.101 4 65000.65000 53647 53617 0 0 2d15h Estab 20 20 192.168.100.102 4 65000.65000 53623 53657 0 0 1d13h Estab 20 20 </pre>
SL-1	<pre> SL-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.5, local AS number 65000.5 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.101 4 65000.65000 16852 16827 0 0 19:52:30 Estab 16 16 192.168.100.102 4 65000.65000 16847 16843 0 0 19:52:30 Estab 16 16 </pre>
SP-1	<pre> SP-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.101, local AS number 65000.65000 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.1 4 65000.1 53643 53672 0 0 2d15h Estab 4 4 192.168.100.2 4 65000.1 53653 53697 0 0 2d15h Estab 4 4 192.168.100.3 4 65000.3 53620 53663 0 0 2d15h Estab 4 4 192.168.100.4 4 65000.3 53675 53652 0 0 2d15h Estab 4 4 192.168.100.5 4 65000.5 16841 16867 0 0 19:53:34 Estab 6 6 192.168.100.6 4 65000.5 16867 16864 0 0 19:53:34 Estab 6 6 </pre>

show interfaces vxlan 1

Verify the interface VxLAN 1 is connected on CL-1
 Verify EVPN is used for flood list population and remote MAC learning on CL-1
 Verify VLAN10 and VLAN20 are mapped to the correct VNIs on CL-1
 Verify CL-3, CL-4, SL-1 and SL-2 VTEP IP are under the flood VTEP list for VLAN10 and VLAN20 on CL-1

CL-1

```
CL-1#show interfaces vxlan 1
Vxlan1 is up, line protocol is up (connected)
  Hardware is Vxlan
  Source interface is Loopback1 and is active with 192.168.200.1
  Replication/Flood Mode is headend with Flood List Source: EVPN
  Remote MAC learning via EVPN
  VNI mapping to VLANs
  Static VLAN to VNI mapping is
    [10, 1010]      [20, 1020]
  Note: All Dynamic VLANs used by VCS are internal VLANs.
        Use 'show vxlan vni' for details.
  Static VRF to VNI mapping is not configured
  Headend replication flood vtep list is:
    10 192.168.200.3  192.168.200.5
    20 192.168.200.3  192.168.200.5
  MLAG Shared Router MAC is 0000.0000.0000
```

show bgp evpn route-type imet vni <vni_id>next-hop <vtep_ip> detail

Verify CL-1 and CL-2 advertise the membership of VNI 1010 via EVPN Type-3 IMET routes

SL-1

```
SL-1#show bgp evpn route-type imet vni 1010 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.5, local AS number 4259840005
BGP routing table entry for imet 192.168.200.1, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
 65000.65000 65000.1
  192.168.200.1 from 192.168.100.102 (192.168.100.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
    Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
    VNI: 1010
    PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
  65000.65000 65000.1
  192.168.200.1 from 192.168.100.101 (192.168.100.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
    VNI: 1010
    PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
BGP routing table entry for imet 192.168.200.1, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
 65000.65000 65000.1
  192.168.200.1 from 192.168.100.102 (192.168.100.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
    Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
    VNI: 1010
    PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
  65000.65000 65000.1
  192.168.200.1 from 192.168.100.101 (192.168.100.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
    VNI: 1010
    PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
```

show mac address-table dynamic

Verify Host-1 MAC address has been learned behind Po1 and R-1 MAC address has been learned behind Vx1 on CL-1

CL-1

```
CL-1#show mac address-table dynamic
  Mac Address Table
  -----
  Vlan   Mac Address       Type      Ports      Moves   Last Move
  ----  -----
  10    0000.0000.1111   DYNAMIC   Po1       1       2 days, 19:07:37 ago
  10    0000.0000.3333   DYNAMIC   Vx1       1       2 days, 15:15:15 ago
  10    0000.0000.ccc1   DYNAMIC   Vx1       1       13:24:47 ago
  10    001c.7300.0099   DYNAMIC   Vx1       1       13:24:42 ago
  20    0000.0000.2222   DYNAMIC   Po2       1       2 days, 19:07:34 ago
  20    0000.0000.4444   DYNAMIC   Vx1       1       2 days, 15:15:15 ago
  20    0000.0000.ccc1   DYNAMIC   Vx1       1       13:24:44 ago
  20    001c.7300.0099   DYNAMIC   Vx1       1       13:24:29 ago
Total Mac Addresses for this criterion: 8

  Multicast Mac Address Table
  -----
```

Vlan	Mac Address	Type	Ports
Total Mac Addresses for this criterion: 0			

```
show bgp evpn route-type mac-ip <mac_address> next-hop <vtep_ip> detail
```

Verify CL-1 and CL-2 advertise Host-1 MAC address via EVPN Type-2 MAC-IP routes

```
SL-1#show bgp evpn route-type mac-ip 0000.0000.1111 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.5, local AS number 4259840005
BGP routing table entry for mac-ip 0000.0000.1111, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan EvpnMacMobility:1
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan EvpnMacMobility:1
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan EvpnMacMobility:1
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan EvpnMacMobility:1
        VNI: 1010 ESI: 0000:0000:0000:0000:0000
```

```
ping <remote_host_ip>
```

Verify connectivity between Host-1 and Host-3 and Host-4

```
HOST-1#ping 10.10.10.3
PING 10.10.10.3 (10.10.10.3) 72(100) bytes of data.
80 bytes from 10.10.10.3: icmp_seq=1 ttl=64 time=21.3 ms
80 bytes from 10.10.10.3: icmp_seq=2 ttl=64 time=17.1 ms
80 bytes from 10.10.10.3: icmp_seq=3 ttl=64 time=19.2 ms
80 bytes from 10.10.10.3: icmp_seq=4 ttl=64 time=24.7 ms
80 bytes from 10.10.10.3: icmp_seq=5 ttl=64 time=20.1 ms

--- 10.10.10.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 73ms
rtt min/avg/max/mdev = 17.151/20.549/24.762/2.524 ms, pipe 2, ipg/ewma 18.440/21.045 ms

HOST-1#ping 10.10.20.4
PING 10.10.20.4 (10.10.20.4) 72(100) bytes of data.
80 bytes from 10.10.20.4: icmp_seq=1 ttl=63 time=62.0 ms
80 bytes from 10.10.20.4: icmp_seq=2 ttl=63 time=57.1 ms
80 bytes from 10.10.20.4: icmp_seq=3 ttl=63 time=72.0 ms
80 bytes from 10.10.20.4: icmp_seq=4 ttl=63 time=67.5 ms
80 bytes from 10.10.20.4: icmp_seq=5 ttl=63 time=60.4 ms

--- 10.10.20.4 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 42ms
rtt min/avg/max/mdev = 57.166/63.850/72.047/5.298 ms, pipe 5, ipg/ewma 10.656/62.997 ms
```

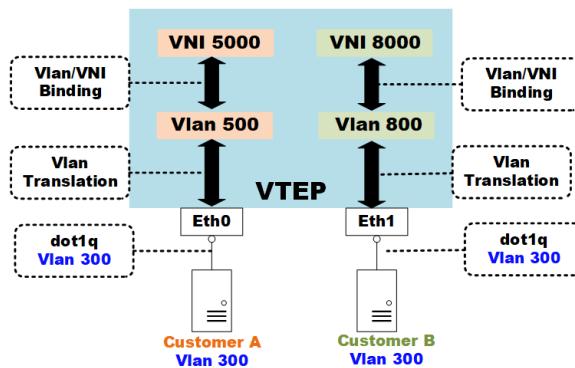
L2 EVPN + VLAN translation

Deployment Consideration

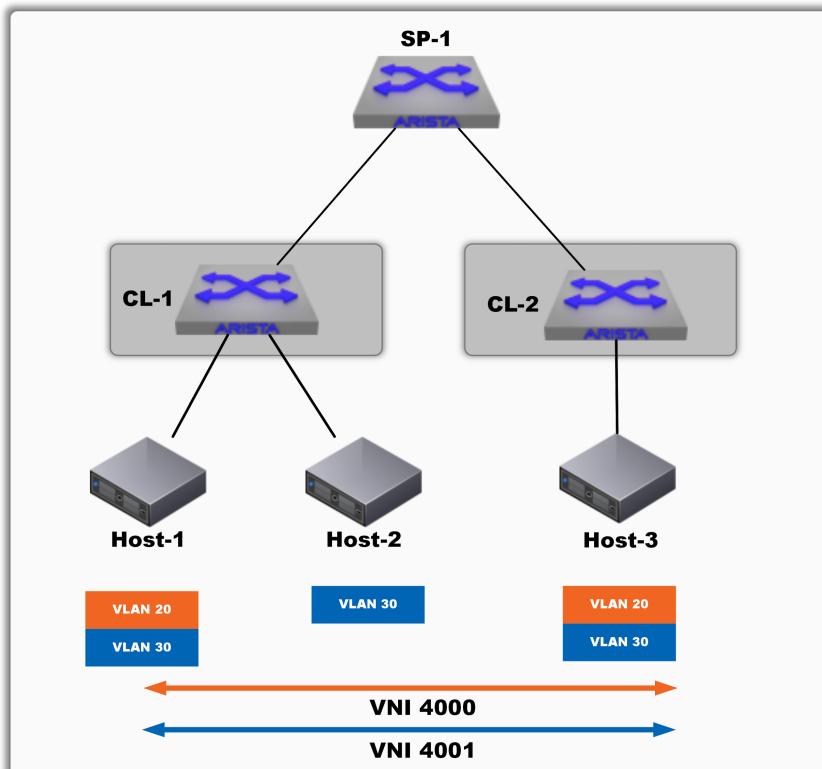
- See general L2 EVPN section considerations.
- VLAN translation gives the user the ability to map packets from one VLAN to another internal VLAN (only for tagged frames) by rewriting the VID field. This internal VLAN can be mapped to a VXLAN Virtual Network Identified (VXLAN) enabling overlapping of customer VLANs to participate in different VXLAN segments.
- Typical scenario with multi-tenant environments.
- By default, the translation is bidirectional. The packets ingressing an interface tagged with VLAN A are internally mapped to VLAN B; packets tagged with VLAN B egressing the same interface are mapped to VLAN A. Additionally, this feature supports translating a particular VLAN X to VLAN Y in a remote VTEP. This would not be possible using dot1q tunnels (QinQ), so that option has not been considered for this design.
- Customer VLANs do not need to exist in the leaf switches, MAC addresses are learned using an internal VLAN.
- Troubleshooting gets complex with a large number of vlan translations.

Limitations

- Each VLAN translation will consume an internal VLAN, so that is still limited to 4K in the same TOR. Check also hardware limits on the number of translation rules per platform.
- This configuration is only supported on trunk ports. VLAN translation is only 1:1 per port.
- Switchport VLAN translation is not supported in vEOS.



Topology



Note: VLAN 30 overlaps in CL-1 in two separate interfaces, but it is mapped to two separate internal VLANs.

Setup Details

	Loopback0	Loopback1	BGP AS	VLAN	IP Address	C-VLAN - Internal VLAN - Interface - VNI mapping	System MAC
SP-1	192.168.253.1	N/A	65000.10000	N/A	N/A		
CL-1	10.100.253.3	10.100.252.3	65000.10001	N/A	N/A	vlan20 vlan 4000 et20/1 vni 4000 vlan30 vlan 4000 et20/1 vni 4000 vlan30 vlan 4001 et3/1 vni 4001	
CL-2	10.100.253.5	10.100.252.5	65000.10050	N/A	N/A	vlan30 VLAN 4000 et6/1 vni 4000 vlan20 VLAN 4001 et6/1 vni 4001	
Host-1	N/A	N/A	N/A	VLAN20 VLAN30	10.10.20.1/24 10.10.30.1/24	N/A	001c.7314.f054
Host-2	N/A	N/A	N/A	VLAN30	10.10.20.2/24	N/A	7483.ef25.aeb2
Host-3	N/A	N/A	N/A	VLAN20 VLAN30	10.10.20.3/24 10.10.30.3/24	N/A	2899.3aae.011d

Configuration

The following configuration is required for L2 EVPN:

- Underlay
 - Multi-agent model (ArBGP)
 - eBGP IPv4 Unicast peering between spines and leaf switches
 - iBGP IPv4 Unicast peering between MLAG pair
 - MLAG
- Overlay
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VXLAN
 - **Internal VLAN to VNI mapping (L2VNI)**
 - **VLAN to internal VLAN translations**
 - BGP/EVPN
 - MAC-VRF

Note: Configuration lines in red font color are not supported in vEOS.

Compute Leaf

Function	CL-1	CL-2
VxLAN	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 4000 vni 4000 vxlan vlan 4001 vni 4001</pre>	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 4000 vni 4000 vxlan vlan 4001 vni 4001</pre>
eBGP and iBGP Underlay BGP/EVPN	<pre>router bgp 65000.10001 bgp asn notation asdot router-id 10.100.253.3 timers bgp 5 15 distance bgp 20 200 200 maximum-paths 4 ecmp 4 no bgp default ipv4-unicast update wait-install neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.10000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.10000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 10.100.253.1 peer group OVERLAY_SPINE_EVPN neighbor 10.100.254.0 peer group UNDERLAY_SPINE_V4 redistribute connected route-map CONNECTED ! vlan 4000 rd auto route-target both 4000:4000 redistribute learned ! vlan 4001 rd auto route-target both 4001:4001 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_SPINE_V4 activate</pre>	<pre>router bgp 65000.10002 bgp asn notation asdot router-id 10.100.253.5 timers bgp 5 15 distance bgp 20 200 200 maximum-paths 4 ecmp 4 no bgp default ipv4-unicast update wait-install neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN remote-as 65000.10000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.10000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 10.100.253.1 peer group OVERLAY_SPINE_EVPN neighbor 10.100.254.4 peer group UNDERLAY_SPINE_V4 redistribute connected route-map CONNECTED ! vlan 4000 rd auto route-target both 4000:4000 redistribute learned ! vlan 4001 rd auto route-target both 4001:4001 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_SPINE_V4 activate</pre>
L2 VLANs	Vlan 4000-4001 // customer vlans are not required	Vlan 4000-4001 // customer vlans are not required
SVI (optional)	<pre>interface Vlan4001 ip address 10.10.20.254/24 ip virtual-router address 10.10.20.252</pre>	<pre>interface Vlan4001 ip address 10.10.20.254/24 ip virtual-router address 10.10.20.253</pre>
Downstream ports	<pre>interface Ethernet20/1 switchport mode trunk switchport trunk allowed vlan 4000,4001 // customer vlans are not required switchport vlan translation 30 4000 switchport vlan translation 20 4001 interface Ethernet3/1</pre>	<pre>interface Ethernet6/1 switchport mode trunk switchport trunk allowed vlan 4000,4001 // customer vlans are not required switchport vlan translation 30 4000 switchport vlan translation 20 4001</pre>

```
switchport mode trunk
Switchport trunk allowed vlan 4001 // customer vlans are not
required
switchport vlan translation 30 4001
```

Verification

show vxlan vni

Verify 802.1 tag (C-tag) is mapped to the correct internal vlan and to the correct VNI mapping

```
CL-1#show vxlan vni
VNI to VLAN Mapping for Vxlan1
VNI     VLAN      Source      Interface      802.1Q Tag
-----+-----+-----+-----+-----+
4000    4000      static     Ethernet20/1   30
          |           |           |           |
          |           |           |           Ethernet3/1   4000
          |           |           |           |
          |           |           |           Vxlan1       4000
          |           |           |           |
          4001    4001      static     Ethernet20/1   20
          |           |           |           |
          |           |           |           |           |
          |           |           |           |           Ethernet3/1   30
          |           |           |           |
          |           |           |           Vxlan1       4001

VNI to dynamic VLAN Mapping for Vxlan1
VNI     VLAN      VRF      Source
-----+-----+-----+-----+
```

show interfaces switchport vlan mapping

Verify 802.1 tag (C-tag) is mapped to the correct internal vlan and port

```
CL-1#show interfaces switchport vlan mapping
-----
Ethernet3/1
Outer Tag    Inner Tag    VLAN ID    Status    Direction Configured    Direction Active    Dot1qTunnel
-----+-----+-----+-----+-----+-----+-----+-----+
30          -            4001        Active    In/Out      In/Out      -          -
-----+-----+-----+-----+-----+-----+-----+-----+
Ethernet20/1
Outer Tag    Inner Tag    VLAN ID    Status    Direction Configured    Direction Active    Dot1qTunnel
-----+-----+-----+-----+-----+-----+-----+-----+
20          -            4001        Active    In/Out      In/Out      -          -
30          -            4000        Active    In/Out      In/Out      -          -
-----+-----+-----+-----+-----+-----+-----+-----+
Port-Channel10 (Ingress VLAN Mapping Required)
Outer Tag    Inner Tag    VLAN ID    Status    Direction Configured    Direction Active    Dot1qTunnel
-----+-----+-----+-----+-----+-----+-----+-----+
-----+-----+-----+-----+-----+-----+-----+-----+
Port-Channel100 (Ingress VLAN Mapping Required)
Outer Tag    Inner Tag    VLAN ID    Status    Direction Configured    Direction Active    Dot1qTunnel
-----+-----+-----+-----+-----+-----+-----+-----+
```

show mac address-table

Verify host mac addresses are learnt locally in the internal vlan and remote host macs are learned via vxlan.

```
CL-1#show mac address-table
Mac Address Table
-----
Vlan    Mac Address      Type      Ports      Moves      Last Move
----+-----+-----+-----+-----+-----+-----+
4000    001c.7314.f054  DYNAMIC  Et20/1    1          0:00:10 ago
4000    2899.3aae.011d  DYNAMIC  Vx1       1          0:19:01 ago
4001    001c.7314.f054  DYNAMIC  Et20/1    1          0:00:01 ago
4001    2899.3aae.011d  DYNAMIC  Vx1       1          0:09:16 ago
4001    7483.ef25.aeb2  DYNAMIC  Et3/1    1          2:13:25 ago
Total Mac Addresses for this criterion: 7

Multicast Mac Address Table
-----
```

```
Vlan      Mac Address      Type      Ports
-----  -----
Total Mac Addresses for this criterion: 0

Note: MAC addresses from hosts are learnt in the internal VLAN (translated VLAN), not in
the original customer VLAN received.
```

show bgp evpn route-type mac-ip detail**Verify hosts advertise MAC address via EVPN Type-2 MAC-IP routes****CL-1**

```
CL-1#show bgp evpn route-type mac-ip detail
BGP routing table information for VRF default
Router identifier 10.100.253.3, local AS number 4259850001
BGP routing table entry for mac-ip 001c.7314.f054, Route Distinguisher: 10.100.253.3:4000
Paths: 1 available
Local
- from - (0.0.0.0)
  Origin IGP, metric -, localpref -, weight 0, valid, local, best
  Extended Community: Route-Target-AS:4000:4000 TunnelEncap:tunnelTypeVxlan
  VNI: 4000 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 001c.7314.f054, Route Distinguisher: 10.100.253.3:4001
Paths: 1 available
Local
- from - (0.0.0.0)
  Origin IGP, metric -, localpref -, weight 0, valid, local, best
  Extended Community: Route-Target-AS:4001:4001 TunnelEncap:tunnelTypeVxlan
  VNI: 4001 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 2899.3aae.011d, Route Distinguisher: 10.100.253.2:4000
Paths: 1 available
65000.10000 65000.10050
  10.100.252.5 from 10.100.253.1 (10.100.253.1)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, best
    Extended Community: Route-Target-AS:4000:4000 TunnelEncap:tunnelTypeVxlan
    VNI: 4000 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 2899.3aae.011d, Route Distinguisher: 10.100.253.2:4001
Paths: 1 available
65000.10000 65000.10050
  10.100.252.5 from 10.100.253.1 (10.100.253.1)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, best
    Extended Community: Route-Target-AS:4001:4001 TunnelEncap:tunnelTypeVxlan
    VNI: 4001 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 7483.ef25.aeb2, Route Distinguisher: 10.100.253.3:4001
Paths: 1 available
Local
- from - (0.0.0.0)
  Origin IGP, metric -, localpref -, weight 0, valid, local, best
  Extended Community: Route-Target-AS:4001:4001 TunnelEncap:tunnelTypeVxlan
  VNI: 4001 ESI: 0000:0000:0000:0000:0000
```

ping <remote_host_ip>**Verify connectivity between Host-1 and Host-2/Host-3/Host-4****Host-1**

```
Host-1#ping 10.10.30.3
PING 10.10.30.3 (10.10.30.3) 72(100) bytes of data.
80 bytes from 10.10.30.3: icmp_req=1 ttl=64 time=0.239 ms
80 bytes from 10.10.30.3: icmp_req=2 ttl=64 time=0.140 ms
80 bytes from 10.10.30.3: icmp_req=3 ttl=64 time=0.133 ms
80 bytes from 10.10.30.3: icmp_req=4 ttl=64 time=0.147 ms
80 bytes from 10.10.30.3: icmp_req=5 ttl=64 time=0.120 ms

--- 10.10.30.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 1ms
rtt min/avg/max/mdev = 0.120/0.155/0.239/0.045 ms, ipg/ewma 0.408/0.195 ms

Host-1#ping 10.10.20.2 //host-2
PING 10.10.20.2 (10.10.20.2) 72(100) bytes of data.
80 bytes from 10.10.20.2: icmp_req=1 ttl=64 time=0.216 ms
80 bytes from 10.10.20.2: icmp_req=2 ttl=64 time=0.103 ms
80 bytes from 10.10.20.2: icmp_req=3 ttl=64 time=0.110 ms
80 bytes from 10.10.20.2: icmp_req=4 ttl=64 time=0.097 ms
80 bytes from 10.10.20.2: icmp_req=5 ttl=64 time=0.085 ms

--- 10.10.20.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 0.085/0.122/0.216/0.048 ms, ipg/ewma 0.192/0.167 ms

Host-1#ping 10.10.20.3 //host-3
PING 10.10.20.3 (10.10.20.3) 72(100) bytes of data.
80 bytes from 10.10.20.3: icmp_req=1 ttl=64 time=0.236 ms
80 bytes from 10.10.20.3: icmp_req=2 ttl=64 time=0.128 ms
80 bytes from 10.10.20.3: icmp_req=3 ttl=64 time=0.120 ms
80 bytes from 10.10.20.3: icmp_req=4 ttl=64 time=0.119 ms
```

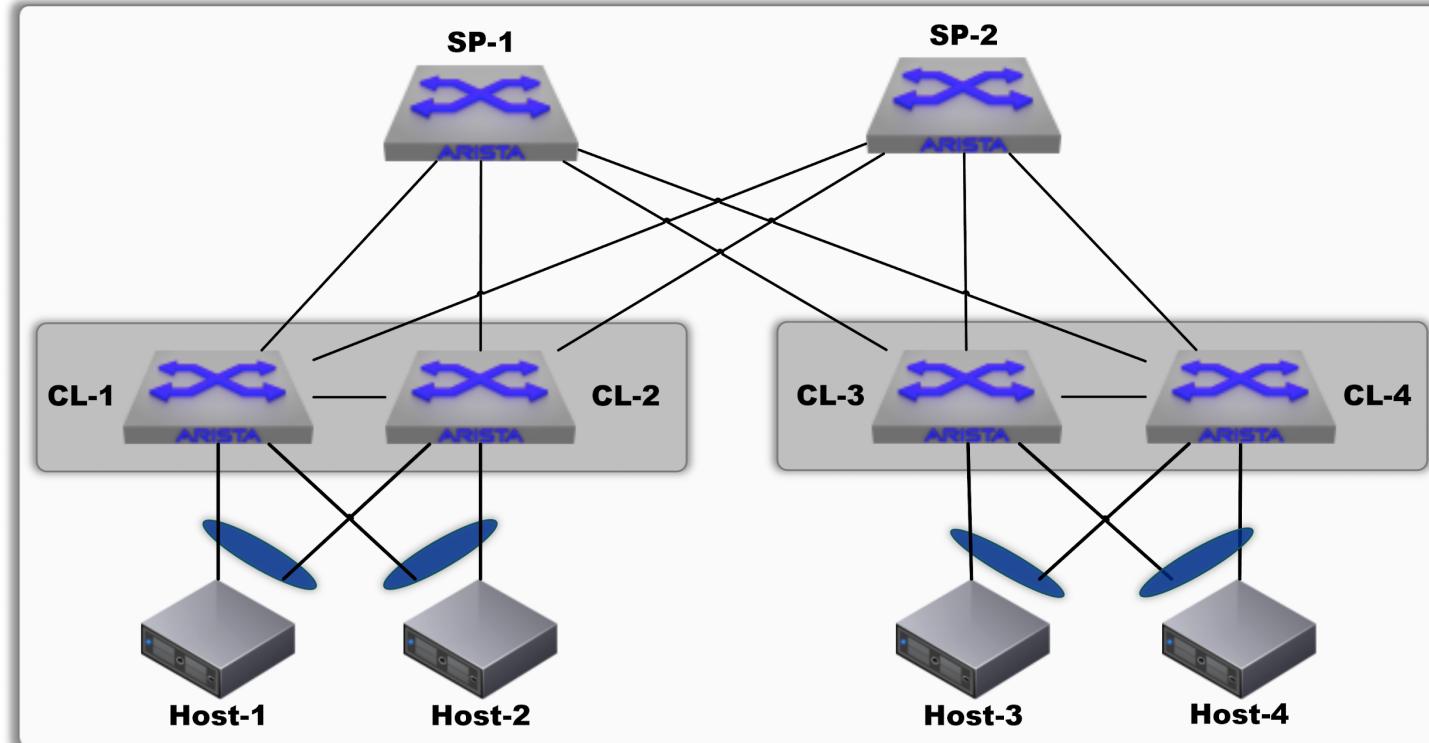
```
80 bytes from 10.10.20.3: icmp_req=5 ttl=64 time=0.128 ms
--- 10.10.20.3 ping statistics ---
```

L3 EVPN

Deployment Consideration

- Ideal deployment model to use when only L3VPN service is required
- Support for high scale deployments (<=25K MAC address). The limiting factors to consider are the size of the routing table and the number of VRF of the low end devices in the EVPN domain
- Support for multi-tenancy (Use cases such as intranet/extranet/shared common VRF)
- Easy to troubleshoot
- More difficult to automate when compared with A-IRB

Topology



Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
SP-1	192.168.100.101	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb1
SP-2	192.168.100.102	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb2
CL-1	192.168.100.1	192.168.200.1	65000.1	Red Red	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa1
CL-2	192.168.100.2	192.168.200.1	65000.1	Red Red	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa2
CL-3	192.168.100.3	192.168.200.3	65000.3	Red Red	VLAN30 VLAN40	10.10.30.254/24 10.10.40.254/24	0000.0000.aaa3
CL-4	192.168.100.4	192.168.200.3	65000.3	Red Red	VLAN30 VLAN40	10.10.30.254/24 10.10.40.254/24	0000.0000.aaa4
Host-1	N/A	N/A	N/A	N/A	VLAN10	10.10.10.1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	N/A	VLAN20	10.10.20.2/24	0000.0000.2222
Host-3	N/A	N/A	N/A	N/A	VLAN30	10.10.30.3/24	0000.0000.3333
Host-4	N/A	N/A	N/A	N/A	VLAN40	10.10.40.4/24	0000.0000.4444

Configuration

The following configuration is required for L3 EVPN:

- Underlay
 - Multi-agent model (ArBGP)
 - eBGP IPv4 Unicast peering between spines and leaf switches
 - iBGP IPv4 Unicast peering between MLAG pair
 - MLAG
- Overlay
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - Tenant VRF
 - Anycast Gateway
 - VxLAN
 - MLAG Shared Router MAC Address
 - VRF to VNI mapping (L3VNI)
 - BGP/EVPN
 - IP-VRF
- Tenant
 - VLAN
 - Tenant VRF
 - Anycast Gateway
- Platform specific (See [Appendix A](#))

Note: Configuration lines in red font color are not supported in vEOS.

Compute Leaf

Function	CL-1	CL-2
BGP	service routing protocols model multi-agent	service routing protocols model multi-agent
LAN	vlan 10,20	vlan 10,20
VRF Instance	vrf instance red ! ip routing vrf red	vrf instance red ! ip routing vrf red
Spines Uplink	interface Ethernet1 no switchport ip address 192.168.1.1/31 ! interface Ethernet2 no switchport ip address 192.168.2.1/31	interface Ethernet1 no switchport ip address 192.168.1.3/31 ! interface Ethernet2 no switchport ip address 192.168.2.3/31
BGP Loopback0 outer ID	interface Loopback0 description BGP Router ID ip address 192.168.100.1/32 ! router general router-id ipv4 192.168.100.1	interface Loopback0 description BGP Router ID ip address 192.168.100.2/32 ! router general router-id ipv4 192.168.100.2
TI Loopback1 VTEP IP	interface Loopback1 description VTEP IP ip address 192.168.200.1/32	interface Loopback1 description VTEP IP ip address 192.168.200.1/32
VxLAN	interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vrf red vni 2000	interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vrf red vni 2000
LAG Config	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN

	<pre>local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000</pre>	<pre>local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000</pre>
Unicast Gateway Virtual MAC address	<pre>interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>	<pre>interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>
-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>
BGP and iBGP Underlay GP/EVPN	<pre>router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vrf red rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate</pre>	<pre>router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vrf red rd 192.168.100.2:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate</pre>

Function	CL-3	CL-4
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 30,40	vlan 30,40
VRF Instance	vrf instance red ! ip routing vrf red	vrf instance red ! ip routing vrf red
Spines Uplink	<pre>interface Ethernet1 no switchport ip address 192.168.1.5/31 ! interface Ethernet2 no switchport ip address 192.168.2.5/31</pre>	<pre>interface Ethernet1 no switchport ip address 192.168.1.7/31 ! interface Ethernet2 no switchport ip address 192.168.2.7/31</pre>
BGP Loopback0	interface Loopback0	interface Loopback0

Router ID	<pre>description BGP Router ID ip address 192.168.100.3/32 ! router general router-id ipv4 192.168.100.3</pre>	<pre>description BGP Router ID ip address 192.168.100.4/32 ! router general router-id ipv4 192.168.100.4</pre>
VTI Loopback1 VTEP IP	<pre>interface Loopback1 description Logical VTEP ip address 192.168.200.3/32</pre>	<pre>interface Loopback1 description Logical VTEP ip address 192.168.200.3/32</pre>
VxLAN	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vrf red vni 2000</pre>	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vrf red vni 2000</pre>
MLAG Config	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000</pre>	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000</pre>
Anycast Gateway Virtual MAC address	<pre>interface Vlan30 vrf red ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf red ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>	<pre>interface Vlan30 vrf red ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf red ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>
IP-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>
eBGP and iBGP Underlay BGP/EVPN	<pre>router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED !</pre>	<pre>router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED !</pre>

	<pre>vrf red rd 192.168.100.3:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate</pre>	<pre>vrf red rd 192.168.100.4:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate</pre>
--	--	--

Spine

Function	SP-1	SP-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
Leaf Downlinks	<pre>interface Ethernet1 no switchport ip address 192.168.1.0/31 ! interface Ethernet2 no switchport ip address 192.168.1.2/31 ! interface Ethernet3 no switchport ip address 192.168.1.4/31 ! interface Ethernet4 no switchport ip address 192.168.1.6/31</pre>	<pre>interface Ethernet1 no switchport ip address 192.168.2.0/31 ! interface Ethernet2 no switchport ip address 192.168.2.2/31 ! interface Ethernet3 no switchport ip address 192.168.2.4/31 ! interface Ethernet4 no switchport ip address 192.168.2.6/31</pre>
BGP Loopback0 (Router ID)	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.101/32 ! router general router-id ipv4 192.168.100.101</pre>	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.102/32 ! router general router-id ipv4 192.168.100.102</pre>
IP-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>
eBGP and iBGP Underlay BGP/EVPN	<pre>router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.1.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multipath 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept</pre>	<pre>router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.2.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multipath 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept</pre>

Verification

The verification steps below have been carried out host-1 in the environment as these steps are similar to the remaining hosts.

show bgp evpn summary

Verify the eBGP IPv4 EVPN peering between spines and leaf switches is established

CL-1	CL-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.1, local AS number 65000.1 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.101 4 65000.65000 56247 56219 0 0 01:00:21 Estab 4 4 192.168.100.102 4 65000.65000 56218 56259 0 0 01:00:21 Estab 4 4
CL-3	CL-3#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.3, local AS number 65000.3 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.101 4 65000.65000 56253 56205 0 0 01:00:51 Estab 4 4 192.168.100.102 4 65000.65000 56203 56260 0 0 2d18h Estab 4 4
SP-1	SP-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.101, local AS number 65000.65000 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.100.1 4 65000.1 876 877 0 0 01:01:14 Estab 2 2 192.168.100.2 4 65000.1 56232 56281 0 0 2d18h Estab 2 2 192.168.100.3 4 65000.3 876 883 0 0 01:01:14 Estab 2 2 192.168.100.4 4 65000.3 879 880 0 0 01:01:14 Estab 2 2

show interfaces vxlan 1

Verify the interface VxLAN 1 is connected on CL-1
Verify VRF red are mapped to the correct VNIs on CL-1
Verify MLAG share router MAC is set to the MLAG system ID on CL-1

CL-1	CL-1#show interfaces vxlan 1 Vxlan1 is up, line protocol is up (connected) Hardware is Vxlan Source interface is Loopback1 and is active with 192.168.200.1 Replication/Flood Mode is headend with Flood List Source: CLI Remote MAC learning is disabled VNI mapping to VLANs Static VLAN to VNI mapping is Dynamic VLAN to VNI mapping for 'evpn' is [4092, 2000] Note: All Dynamic VLANs used by VCS are internal VLANs. Use 'show vxlan vni' for details. Static VRF to VNI mapping is [red, 2000] MLAG Shared Router MAC is 0200.0000.aaa1
-------------	--

show mac address-table dynamic

Verify Host-1 MAC address has been learned behind Po1 on CL-1.

CL-1	CL-1#show mac address-table dynamic Mac Address Table ----- Vlan Mac Address Type Ports Moves Last Move ---- ----- ----- ----- ----- ----- 10 0000.0000.1111 DYNAMIC Po1 1 2 days, 21:37:58 ago 20 0000.0000.2222 DYNAMIC Po2 1 2 days, 21:37:55 ago 4092 0200.0000.aaa3 DYNAMIC Vx1 1 0:22:18 ago Total Mac Addresses for this criterion: 3 Multicast Mac Address Table ----- Vlan Mac Address Type Ports ---- ----- ----- ----- Total Mac Addresses for this criterion: 0
-------------	---

show arp vrf <vrf_name>

Verify Host-1 ARP entry is presented on CL-1.

CL-1

```
CL-1#show arp vrf red
Address      Age (sec)  Hardware Addr  Interface
10.10.10.1    N/A  0000.0000.1111  Vlan10, Port-Channel1
10.10.20.2    N/A  0000.0000.2222  Vlan20, Port-Channel2
```

show ip route vrf <vrf_name>

Verify VLAN10 networks are presented in the VRF red routing table on CL-3. These routes must be known via CL-1 VTEP IP + VRF red L3VNI + CL-1 MLAG system ID MAC.

CL-3

```
CL-3#show ip route vrf red
```

```
VRF: red
Codes: C - connected, S - static, K - kernel,
       O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
       R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
       O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
       NG - Nexthop Group Static Route, V - VXLAN Control Service,
       DH - DHCP client installed default route, M - Martian,
       DP - Dynamic Policy Route, L - VRF Leaked,
       RC - Route Cache Route
```

Gateway of last resort is not set

```
B E      10.10.10.0/24 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
B E      10.10.20.0/24 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
C      10.10.30.0/24 is directly connected, Vlan30
C      10.10.40.0/24 is directly connected, Vlan40
```

show bgp evpn route-type ip-prefix <network> next-hop <vtep_ip> detail

Verify CL-1 and CL-2 advertise VLAN10 network via EVPN Type-5 IP-Prefix routes

CL-3

```
CL-3#show bgp evpn route-type ip-prefix 10.10.10.0/24 next-hop 192.168.200.1 detail vxlan virtual-router encapsulation
mac-address mlag-system-id
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.100.1:2000
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:aa:a1
        VNI: 2000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:aa:a1
        VNI: 2000
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.100.2:2000
Paths: 2 available
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:aa:a1
        VNI: 2000
 65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:aa:a1
        VNI: 2000
```

ping <remote_host_ip>

Verify connectivity between Host-1 and Host-3 and Host-4

Host-1

```
HOST-1#ping 10.10.30.3
PING 10.10.30.3 (10.10.30.3) 72(100) bytes of data.
80 bytes from 10.10.30.3: icmp_seq=1 ttl=62 time=22.3 ms
80 bytes from 10.10.30.3: icmp_seq=2 ttl=62 time=21.2 ms
80 bytes from 10.10.30.3: icmp_seq=3 ttl=62 time=22.3 ms
80 bytes from 10.10.30.3: icmp_seq=4 ttl=62 time=21.7 ms
80 bytes from 10.10.30.3: icmp_seq=5 ttl=62 time=22.4 ms

--- 10.10.30.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 77ms
rtt min/avg/max/mdev = 21.200/22.019/22.483/0.512 ms, pipe 2, ipg/ewma 19.473/22.200 ms
```

```

HOST-1#ping 10.10.40.4
PING 10.10.40.4 (10.10.40.4) 72(100) bytes of data.
80 bytes from 10.10.40.4: icmp_seq=1 ttl=62 time=25.2 ms
80 bytes from 10.10.40.4: icmp_seq=2 ttl=62 time=26.8 ms
80 bytes from 10.10.40.4: icmp_seq=3 ttl=62 time=25.7 ms
80 bytes from 10.10.40.4: icmp_seq=4 ttl=62 time=21.5 ms
80 bytes from 10.10.40.4: icmp_seq=5 ttl=62 time=23.1 ms

--- 10.10.40.4 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 74ms
rtt min/avg/max/mdev = 21.587/24.501/26.812/1.898 ms, pipe 3, ipg/ewma 18.598/24.780 ms

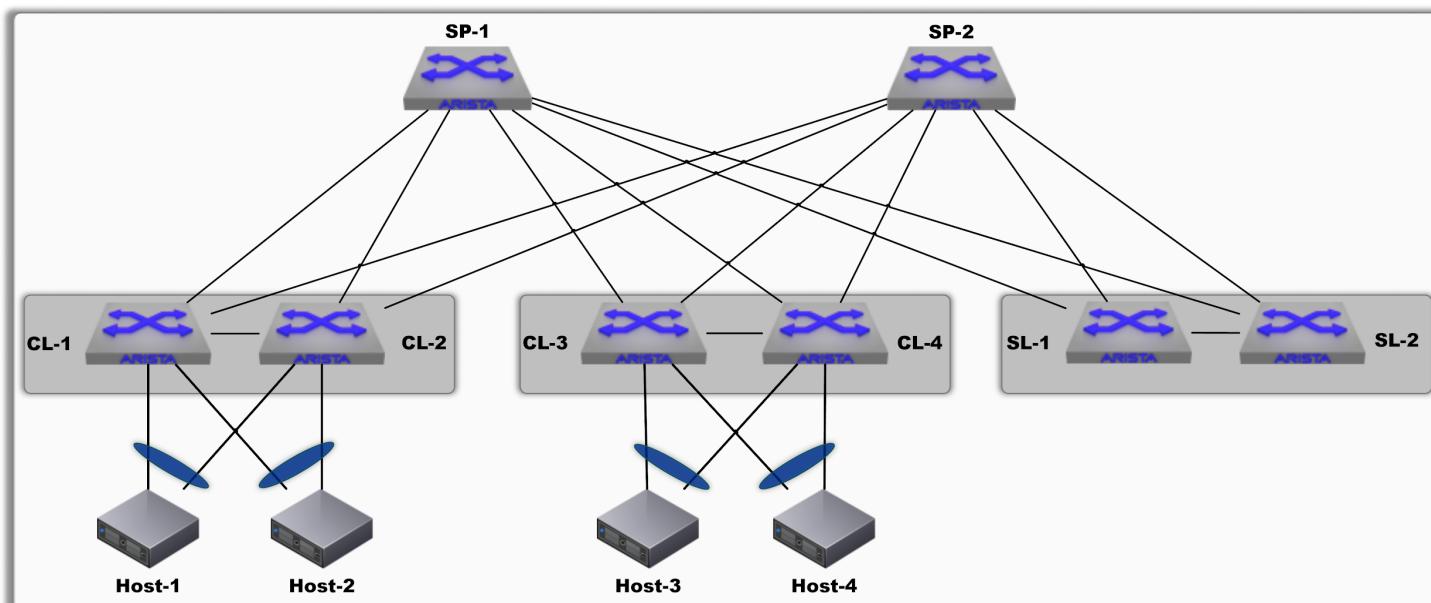
```

EVPN Centralized Anycast Gateway (SL)

Deployment Consideration

- Ideal deployment model to use when most of the traffic in the EVPN domain is north-south instead east-west or low end devices do not support A-IRB or S-IRB.
- Support for high scale deployments (<=25K MAC address).
- Support for multi-tenancy
- Easy to troubleshoot
- Easy to automate
- East-West (Intra-VLAN and Inter-VLAN) vs North-South needs to be considered to properly dimension of the uplink capacity on the L3 VTEP
- This model permits to allocate the L3 routing functionality on a high end device while keeping the low end devices as L2 VTEPs

Topology



Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
SP-1	192.168.100.101	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb1
SP-2	192.168.100.102	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb2
CL-1	192.168.100.1	192.168.200.1	65000.1	N/A	VLAN10 VLAN20	N/A	0000.0000.aaa1
CL-2	192.168.100.2	192.168.200.1	65000.1	N/A	VLAN10 VLAN20	N/A	0000.0000.aaa2
CL-3	192.168.100.3	192.168.200.3	65000.3	N/A	VLAN10 VLAN20	N/A	0000.0000.aaa3
CL-4	192.168.100.4	192.168.200.3	65000.3	N/A	VLAN10 VLAN20	N/A	0000.0000.aaa4
SL-1	192.168.100.5	192.168.200.5	65000.5	N/A	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.ddd1
SL-2	192.168.100.6	192.168.200.5	65000.5	N/A	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.ddd2
Host-1	N/A	N/A	N/A	N/A	VLAN10	10.10.10.1/24	0000.0000.1111

Host-2	N/A	N/A	N/A	N/A	VLAN20	10.10.20.2/24	0000.0000.2222
Host-3	N/A	N/A	N/A	N/A	VLAN10	10.10.10.3/24	0000.0000.3333
Host-4	N/A	N/A	N/A	N/A	VLAN20	10.10.20.4/24	0000.0000.4444

Important Notes

- It is preferred to assign the routing function or L3 VTEP role to the BL or SL instead of the SP
- vVTEP and vMAC MUST be only configured on the L3 VTEP performing the routing function
- The L3 VTEP will announce the vMAC via EVPN type 2 MAC-only routes with the sticky bit set under the extended community EvpnMacMobility.
- On L3 VTEP MAC address learning occurs via EVPN type 2 MAC-IP (MAC-only) routes while IP to MAC binding (ARP entries) learning happens using data-plane mechanism (BUM traffic will traverse the VxLAN fabric), and not via the BGP EVPN control plane

Configuration

The following configuration is required for EVPN Centralized Anycast Gateway:

- Underlay
 - Multi-agent model (ArBGP)
 - eBGP IPv4 Unicast peering between spines and leaf switches
 - iBGP IPv4 Unicast peering between MLAG pair
 - MLAG
- Overlay CL (L2 VTEP)
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VxLAN
 - VLAN to VNI mapping (L2VNI)
 - BGP/EVPN
 - MAC-VRF
- Overlay SL (L3 VTEP)
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VxLAN
 - VLAN to VNI mapping (L2VNI)
 - BGP/EVPN
 - MAC-VRF
 - IP-VRF (Optional: Only needed when using a routing protocol to exchange IPv4/IPv6 tenant networks with 3rd party devices such as firewalls or routers for north-south connectivity)
- Tenant SL (L3 VTEP)
 - VLAN
 - Tenant VRF
 - Anycast Gateway
- Tenant CL (L2 VTEP)
 - VLAN
- Platform specific (See [Appendix B](#))

Note: Configuration lines in red font color are not supported in vEOS.

Compute Leaf

Function	CL-1	CL-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20	vlan 10,20
Spines Uplink	interface Ethernet1 no switchport ip address 192.168.1.1/31 ! interface Ethernet2 no switchport ip address 192.168.2.1/31	interface Ethernet1 no switchport ip address 192.168.1.3/31 ! interface Ethernet2 no switchport ip address 192.168.2.3/31
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID ip address 192.168.100.1/32 ! router general router-id ipv4 192.168.100.1	interface Loopback0 description BGP Router ID ip address 192.168.100.2/32 ! router general router-id ipv4 192.168.100.2
VTI Loopback1 VTEP IP	interface Loopback1 description VTEP IP	interface Loopback1 description VTEP IP

Arista Internal Use Only

	ip address 192.168.200.1/32	ip address 192.168.200.1/32
VxLAN	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020</pre>	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020</pre>
MLAG Config	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000</pre>	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000</pre>
IP-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>
eBGP and iBGP Underlay BGP/EVPN	<pre>router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate</pre>	<pre>router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate</pre>

Function	CL-3	CL-4
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20	vlan 10,20
Spines Uplink	interface Ethernet1 no switchport ip address 192.168.1.5/31 ! interface Ethernet2 no switchport ip address 192.168.2.5/31	interface Ethernet1 no switchport ip address 192.168.1.7/31 ! interface Ethernet2 no switchport ip address 192.168.2.7/31
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID ip address 192.168.100.3/32 ! router general router-id ipv4 192.168.100.3	interface Loopback0 description BGP Router ID ip address 192.168.100.4/32 ! router general router-id ipv4 192.168.100.4
VTI Loopback1 VTEP IP	interface Loopback1 description Logical VTEP ip address 192.168.200.3/32	interface Loopback1 description Logical VTEP ip address 192.168.200.3/32
VxLAN	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020
MLAG Config	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000
IP-Prefix Route-map	ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P	ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P
eBGP and iBGP Underlay BGP/EVPN	router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.4 peer group UNDERLAY_SPINE_V4	router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.6 peer group UNDERLAY_SPINE_V4

<pre> neighbor 192.168.2.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>	<pre> neighbor 192.168.2.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>
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Service Leaf

Function	SL-1	SL-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20	vlan 10,20
VRF Instance	vrf instance red ! ip routing vrf red	vrf instance red ! ip routing vrf red
Spines Uplink	interface Ethernet1 no switchport ip address 192.168.1.9/31 ! interface Ethernet2 no switchport ip address 192.168.2.9/31	interface Ethernet1 no switchport ip address 192.168.1.11/31 ! interface Ethernet2 no switchport ip address 192.168.2.11/31
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID ip address 192.168.100.5/32 ! router general router-id ipv4 192.168.100.5	interface Loopback0 description BGP Router ID ip address 192.168.100.6/32 ! router general router-id ipv4 192.168.100.6
VTI Loopback1 VTEP IP	interface Loopback1 description VTEP IP ip address 192.168.200.5/32 ip address 192.168.200.254/32 secondary	interface Loopback1 description VTEP IP ip address 192.168.200.5/32 ip address 192.168.200.254/32 secondary
VxLAN	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020
MLAG Config	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000
Anycast Gateway Virtual MAC address	interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24	interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24

	<pre> ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>	<pre> ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
eBGP and IBGP Underlay BGP/EVPN	<pre> router bgp 65000.5 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.8 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.8 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>	<pre> router bgp 65000.5 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.10 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.10 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>

Spine

Function	SP-1	SP-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
Leaf Downlinks	<pre> interface Ethernet1 no switchport ip address 192.168.1.0/31 ! interface Ethernet2 no switchport ip address 192.168.1.2/31 ! interface Ethernet3 no switchport ip address 192.168.1.4/31 ! interface Ethernet4 no switchport ip address 192.168.1.6/31 ! interface Ethernet5 no switchport ip address 192.168.1.8/31 ! interface Ethernet6 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.2.0/31 ! interface Ethernet2 no switchport ip address 192.168.2.2/31 ! interface Ethernet3 no switchport ip address 192.168.2.4/31 ! interface Ethernet4 no switchport ip address 192.168.2.6/31 ! interface Ethernet5 no switchport ip address 192.168.2.8/31 ! interface Ethernet6 </pre>

	no switchport ip address 192.168.1.10/31	no switchport ip address 192.168.2.10/31
BGP Loopback0 (Router ID)	interface Loopback0 description BGP Router ID ip address 192.168.100.101/32 ! router general router-id ipv4 192.168.100.101	interface Loopback0 description BGP Router ID ip address 192.168.100.102/32 ! router general router-id ipv4 192.168.100.102
IP-Prefix Route-map	ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P	ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P
eBGP and iBGP Underlay BGP/EVPN	router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.1.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_EVPN ebgp-multihop 2 neighbor OVERLAY_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept	router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.2.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_EVPN ebgp-multihop 2 neighbor OVERLAY_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept

Verification

The verification steps below that have been carried out host-1 in the environment as these steps are similar to the remaining hosts.

show bgp evpn summary																																													
Verify the eBGP IPv4 EVPN peering between spines and leaf switches is established																																													
CL-1	CL-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.1, local AS number 65000.1 Neighbor Status Codes: m - Under maintenance <table border="1"> <thead> <tr> <th>Neighbor</th><th>V</th><th>AS</th><th>MsgRcvd</th><th>MsgSent</th><th>InQ</th><th>OutQ</th><th>Up/Down</th><th>State</th><th>PfxRcd</th><th>PfxAcc</th></tr> </thead> <tbody> <tr> <td>192.168.100.101</td><td>4</td><td>65000.65000</td><td>195662</td><td>195592</td><td>0</td><td>0</td><td>6d21h</td><td>Estab</td><td>20</td><td>20</td></tr> <tr> <td>192.168.100.102</td><td>4</td><td>65000.65000</td><td>195642</td><td>195625</td><td>0</td><td>0</td><td>5d22h</td><td>Estab</td><td>20</td><td>20</td></tr> </tbody> </table>	Neighbor	V	AS	MsgRcvd	MsgSent	InQ	OutQ	Up/Down	State	PfxRcd	PfxAcc	192.168.100.101	4	65000.65000	195662	195592	0	0	6d21h	Estab	20	20	192.168.100.102	4	65000.65000	195642	195625	0	0	5d22h	Estab	20	20											
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SP-1	SP-1#show bgp evpn summary BGP summary information for VRF default Router identifier 192.168.100.101, local AS number 65000.65000 Neighbor Status Codes: m - Under maintenance <table border="1"> <thead> <tr> <th>Neighbor</th><th>V</th><th>AS</th><th>MsgRcvd</th><th>MsgSent</th><th>InQ</th><th>OutQ</th><th>Up/Down</th><th>State</th><th>PfxRcd</th><th>PfxAcc</th></tr> </thead> <tbody> <tr> <td>192.168.100.1</td><td>4</td><td>65000.1</td><td>140259</td><td>140301</td><td>0</td><td>0</td><td>6d21h</td><td>Estab</td><td>4</td><td>4</td></tr> <tr> <td>192.168.100.2</td><td>4</td><td>65000.1</td><td>195641</td><td>195681</td><td>0</td><td>0</td><td>9d14h</td><td>Estab</td><td>4</td><td>4</td></tr> <tr> <td>192.168.100.3</td><td>4</td><td>65000.3</td><td>6136</td><td>6167</td><td>0</td><td>0</td><td>07:15:47</td><td>Estab</td><td>4</td><td>4</td></tr> </tbody> </table>	Neighbor	V	AS	MsgRcvd	MsgSent	InQ	OutQ	Up/Down	State	PfxRcd	PfxAcc	192.168.100.1	4	65000.1	140259	140301	0	0	6d21h	Estab	4	4	192.168.100.2	4	65000.1	195641	195681	0	0	9d14h	Estab	4	4	192.168.100.3	4	65000.3	6136	6167	0	0	07:15:47	Estab	4	4
Neighbor	V	AS	MsgRcvd	MsgSent	InQ	OutQ	Up/Down	State	PfxRcd	PfxAcc																																			
192.168.100.1	4	65000.1	140259	140301	0	0	6d21h	Estab	4	4																																			
192.168.100.2	4	65000.1	195641	195681	0	0	9d14h	Estab	4	4																																			
192.168.100.3	4	65000.3	6136	6167	0	0	07:15:47	Estab	4	4																																			

Arista Internal Use Only

	192.168.100.4	4	65000.3	6149	6147	0	0	07:15:48	Estab	4	4
	192.168.100.5	4	65000.5	11549	11567	0	0	13:37:56	Estab	6	6
	192.168.100.6	4	65000.5	11554	11556	0	0	13:37:56	Estab	6	6

show interfaces vxlan 1

Verify the interface VxLAN 1 is connected on CL-1
 Verify EVPN is used for flood list population and remote MAC learning on CL-1
 Verify VLAN10, VLAN20 and VRF red are mapped to the correct VNIs on CL-1
 Verify MLAG share router MAC is set to the MLAG system ID on CL-1

```
CL-1#show interfaces vxlan 1
Vxlan1 is up, line protocol is up (connected)
  Hardware is Vxlan
  Source interface is Loopback1 and is active with 192.168.200.1
  Replication/Flood Mode is headend with Flood List Source: EVPN
  Remote MAC learning via EVPN
  VNI mapping to VLANs
  Static VLAN to VNI mapping is
    [10, 1010]      [20, 1020]
  Note: All Dynamic VLANs used by VCS are internal VLANs.
        Use 'show vxlan vni' for details.
  Static VRF to VNI mapping is not configured
  Headend replication flood vtep list is:
    10 192.168.200.3  192.168.200.254 192.168.200.5
    20 192.168.200.3  192.168.200.254 192.168.200.5
  MLAG Shared Router MAC is 0000.0000.0000
```

show bgp evpn route-type imet vni <vni_id>next-hop <vtep_ip>detail

Verify CL-1 and CL-2 advertise the membership of VNI 1010 via EVPN Type-3 IMET routes

```
SL-1#show bgp evpn route-type imet vni 1010 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.5, local AS number 4259840005
BGP routing table entry for imet 192.168.200.1, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
BGP routing table entry for imet 192.168.200.1, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.102 (192.168.100.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
  65000.65000 65000.1
    192.168.200.1 from 192.168.100.101 (192.168.100.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
      VNI: 1010
      PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.200.1
```

show mac address-table dynamic

Verify Host-1 MAC address has been learned behind Po1 and default gateway address behind Vx1 on CL-1

```
CL-1#show mac address-table
  Mac Address Table
  -----
  Vlan   Mac Address     Type      Ports      Moves   Last Move
  ----  -----
  10    0000.0000.1111  DYNAMIC   Po1       1       6 days, 20:39:26 ago
  10    0000.0000.3333  DYNAMIC   Vx1       1       7:18:15 ago
  10    001c.7300.0099  STATIC    Vx1
  20    0000.0000.2222  DYNAMIC   Po2       1       6 days, 20:39:23 ago
  20    0000.0000.4444  DYNAMIC   Vx1       1       7:18:15 ago
  20    001c.7300.0099  STATIC    Vx1
  4094  0000.0000.aaa2  STATIC    Po1000
Total Mac Addresses for this criterion: 7
```

Multicast Mac Address Table

Vlan	Mac Address	Type	Ports
Total Mac Addresses for this criterion: 0			

show vxlan address-table

Verify Host-1 MAC address has been learned behind Po1 and default gateway address behind Vx1 on CL-1

CL-1#show vxlan address-table
Vxlan Mac Address Table

VLAN	Mac Address	Type	Prt	VTEP	Moves	Last Move
10	0000.0000.3333	EVPN	Vx1	192.168.200.3	1	13:36:44 ago
10	001c.7300.0099	STATIC	Vx1	192.168.200.254		
20	0000.0000.4444	EVPN	Vx1	192.168.200.3	1	13:36:44 ago
20	001c.7300.0099	STATIC	Vx1	192.168.200.254		
Total Remote Mac Addresses for this criterion: 4						

show arp vrf <vrf_name>

Verify Host-1 ARP entry is presented on SL-1.

SL-1#show arp vrf red
Address Age (sec) Hardware Addr Interface

10.10.10.1	N/A	0000.0000.1111	Vlan10, Vxlan1
10.10.10.3	N/A	0000.0000.3333	Vlan10, Vxlan1
10.10.20.2	N/A	0000.0000.2222	Vlan20, Vxlan1
10.10.20.4	N/A	0000.0000.4444	Vlan20, Vxlan1

show bgp evpn route-type mac-ip <mac_address> next-hop <vtep_ip> detail

Verify CL-1 and CL-2 advertise Host-1 MAC address via EVPN Type-2 MAC-IP routes.

Verify SL-1 and SL-2 advertise default gateway MAC address with the next hop as the Virtual VTEP IP via EVPN Type-2 MAC-IP routes.

SL-1#show bgp evpn route-type mac-ip 0000.0000.1111 next-hop 192.168.200.1 detail
BGP routing table information for VRF default
Router identifier 192.168.100.5, local AS number 4259840005
BGP routing table entry for mac-ip 0000.0000.1111, Route Distinguisher: 192.168.100.1:10
Paths: 2 available
65000.65000 65000.1
192.168.200.1 from 192.168.100.102 (192.168.100.102)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
VNI: 1010 ESI: 0000:0000:0000:0000:0000
65000.65000 65000.1
192.168.200.1 from 192.168.100.101 (192.168.100.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
VNI: 1010 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 0000.0000.1111, Route Distinguisher: 192.168.100.2:10
Paths: 2 available
65000.65000 65000.1
192.168.200.1 from 192.168.100.102 (192.168.100.102)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
VNI: 1010 ESI: 0000:0000:0000:0000:0000
65000.65000 65000.1
192.168.200.1 from 192.168.100.101 (192.168.100.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
VNI: 1010 ESI: 0000:0000:0000:0000:0000

CL-1#show bgp evpn route-type mac-ip vni 1010 next-hop 192.168.200.254 detail
BGP routing table information for VRF default
Router identifier 192.168.100.1, local AS number 4259840001
BGP routing table entry for mac-ip 001c.7300.0099, Route Distinguisher: 192.168.100.5:10
Paths: 2 available
65000.65000 65000.5
192.168.200.254 from 192.168.100.101 (192.168.100.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan EvpnMacMobility:sticky
VNI: 1010 ESI: 0000:0000:0000:0000:0000

```

65000.65000 65000.5
 192.168.200.254 from 192.168.100.102 (192.168.100.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan EvpnMacMobility:sticky
      VNI: 1010 ESI: 0000:0000:0000:0000:0000
BGP routing table entry for mac-ip 001c.7300.0099, Route Distinguisher: 192.168.100.6:10
Paths: 2 available
 65000.65000 65000.5
  192.168.200.254 from 192.168.100.101 (192.168.100.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
    Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan EvpnMacMobility:sticky
      VNI: 1010 ESI: 0000:0000:0000:0000:0000
 65000.65000 65000.5
  192.168.200.254 from 192.168.100.102 (192.168.100.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan EvpnMacMobility:sticky
      VNI: 1010 ESI: 0000:0000:0000:0000:0000

```

show ip route vrf <vrf_name>

Verify the VLAN10 and VLAN20 networks are presented in the VRF red routing table on SL-1.

SL-1#show ip route vrf red

```

VRF: red
Codes: C - connected, S - static, K - kernel,
        O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
        E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
        N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
        R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
        O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
        NG - Nexthop Group Static Route, V - VXLAN Control Service,
        DH - DHCP client installed default route, M - Martian,
        DP - Dynamic Policy Route, L - VRF Leaked,
        RC - Route Cache Route

Gateway of last resort is not set

```

```

C       10.10.10.0/24 is directly connected, Vlan10
C       10.10.20.0/24 is directly connected, Vlan20

```

ping <remote_host_ip>

Verify connectivity between Host-1 and Host-3 and Host-4

```

HOST-1#ping 10.10.10.3
PING 10.10.10.3 (10.10.10.3) 72(100) bytes of data.
80 bytes from 10.10.10.3: icmp_seq=1 ttl=64 time=24.7 ms
80 bytes from 10.10.10.3: icmp_seq=2 ttl=64 time=22.1 ms
80 bytes from 10.10.10.3: icmp_seq=3 ttl=64 time=29.1 ms
80 bytes from 10.10.10.3: icmp_seq=4 ttl=64 time=34.5 ms
80 bytes from 10.10.10.3: icmp_seq=5 ttl=64 time=22.2 ms

--- 10.10.10.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 70ms
rtt min/avg/max/mdev = 22.108/26.538/34.512/4.730 ms, pipe 3, ipg/ewma 17.655/25.689 ms

```

HOST-1#ping 10.10.20.4

```

PING 10.10.20.4 (10.10.20.4) 72(100) bytes of data.
80 bytes from 10.10.20.4: icmp_seq=1 ttl=63 time=67.4 ms
80 bytes from 10.10.20.4: icmp_seq=2 ttl=63 time=58.6 ms
80 bytes from 10.10.20.4: icmp_seq=3 ttl=63 time=58.2 ms
80 bytes from 10.10.20.4: icmp_seq=4 ttl=63 time=63.0 ms
80 bytes from 10.10.20.4: icmp_seq=5 ttl=63 time=54.3 ms

--- 10.10.20.4 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 46ms
rtt min/avg/max/mdev = 54.316/60.352/67.484/4.518 ms, pipe 5, ipg/ewma 11.599/63.731 ms

```

Host-1

EVPN Symmetric IRB - EVPN L3 Gateway

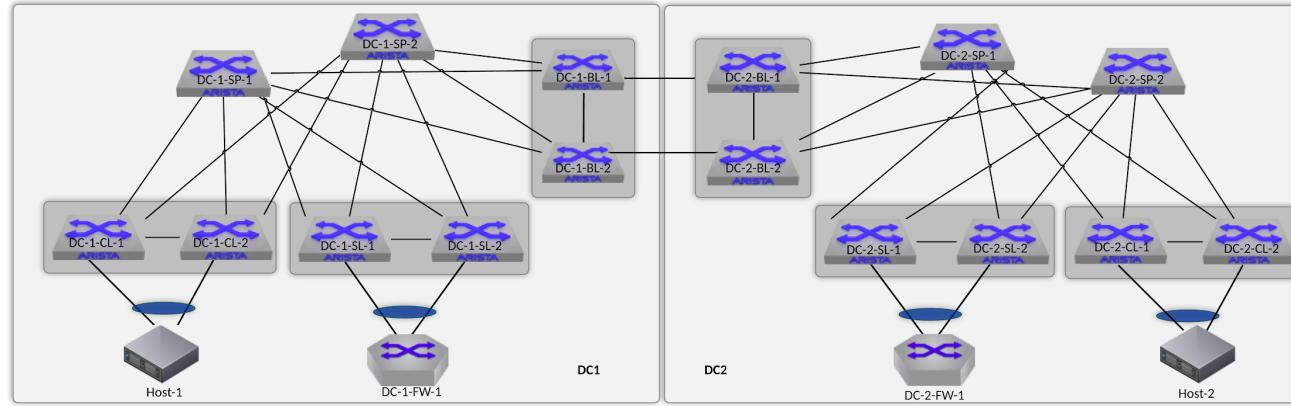
Deployment Consideration

- Support for inter-subnet forwarding between EVPN domains.
- EVPN L3 Gateway only supports EVPN Type-5 routes with the next-hop-self (EVPN type-2 routes are not forwarded between EVPN domains, i.e no layer 2 extension across DCs).
- VXLAN and MPLS encapsulation are supported:
 - EVPN VXLAN Gateway (example below).
 - EVPN MPLS Gateway.

- EVPN VXLAN to EVPN MPLS Gateway.
- Check specific platform support and tcam profile. Support introduced in 4.25.0F.

Refer to the following documentation for more information: [EVPN L3 Gateway](#)

Topology



Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
DC-1-SP-1	192.168.101.101	N/A	65001.65000	N/A	N/A	N/A	0000.0001.bbb1
DC-1-SP-2	192.168.101.102	N/A	65001.65000	N/A	N/A	N/A	0000.0001.bbb2
DC-2-SP-1	192.168.102.101	N/A	65001.65000	N/A	N/A	N/A	0000.0002.bbb1
DC-2-SP-2	192.168.102.102	N/A	65001.65000	N/A	N/A	N/A	0000.0002.bbb2
DC-1-CL-1	192.168.101.1	192.168.201.1	65001.1	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0001.aaa1
DC-1-CL-2	192.168.101.2	192.168.201.1	65001.1	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0001.aaa2
DC-1-SL-1	192.168.101.5	192.168.201.5	65001.5	Red Red Red Blue Blue Blue	VLAN10 VLAN20 VLAN50 VLAN30 VLAN40 VLAN60	10.10.10.254/24 10.10.20.254/24 10.10.50.254/24 10.10.30.254/24 10.10.40.254/24 10.10.60.254/24	0000.0001.ddd1
DC-1-SL-2	192.168.101.5	192.168.201.5	65001.5	Red Red Red Blue Blue Blue	VLAN10 VLAN20 VLAN50 VLAN30 VLAN40 VLAN60	10.10.10.254/24 10.10.20.254/24 10.10.50.254/24 10.10.30.254/24 10.10.40.254/24 10.10.60.254/24	0000.0001.ddd2
DC-2-SL-1	192.168.102.5	192.168.202.5	65002.5	Red Red Blue Blue	VLAN70 VLAN90 VLAN80 VLAN100	10.10.70.254/24 10.10.90.254/24 10.10.80.254/24 10.10.100.254/24	0000.0002.ddd1
DC-2-SL-2	192.168.102.6	192.168.202.5	65002.5	Red Red Blue Blue	VLAN70 VLAN90 VLAN80 VLAN100	10.10.70.254/24 10.10.90.254/24 10.10.80.254/24 10.10.100.254/24	0000.0002.ddd2
DC-2-CL-1	192.168.102.1	192.168.202.1	65002.1	Red Blue	VLAN90 VLAN100	10.10.90.254/24 10.10.100.254/24	0000.0002.aaa1
DC-2-CL-2	192.168.102.2	192.168.202.2	65002.1	Red Blue	VLAN90 VLAN100	10.10.90.254/24 10.10.100.254/24	0000.0002.aaa2
DC-1-BL-1	192.168.101.7	192.168.201.7	65001.7	Red	Red	VLAN10	0000.0001.eee1

Arista Internal Use Only

				Blue	Red Blue Blue	VLAN20 VLAN30 VLAN40	
DC-1-BL-2	192.168.101.8	192.168.201.7	65001.7	Red Blue	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	0000.0001.eee2
DC-2-BL-1	192.168.102.7	192.168.202.7	65002.7	Red Blue	VLAN90 VLAN100	10.10.90.254/24 10.10.100.254/24	0000.0002.eee1
DC-2-BL-2	192.168.102.8	192.168.202.7	65002.7	Red Blue	VLAN90 VLAN100	10.10.90.254/24 10.10.100.254/24	0000.0002.eee2
Host-1	N/A	N/A	N/A	Red Blue	VLAN10 VLAN40	10.10.10.1/24 10.10.40.1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	Red Blue	VLAN20 VLAN30	10.10.20.2/24 10.10.30.2/24	0000.0000.2222
Host-3	N/A	N/A	N/A	Red Blue	VLAN90 VLAN100	10.10.90.3/24 10.10.100.3/24	0000.0000.3333
DC-1-FW-1	N/A	N/A	65001.100	Red Blue	VLAN50 VLAN60	10.10.50.10/24 10.10.60.10/24	0000.0000.1111
DC-1-FW-2	N/A	N/A	65002.100	Red Blue	VLAN70 VLAN80	10.1070.10/24 10.10.80.10/24	0000.0000.2222

Important Notes

- Border Gateway leaves provide connectivity to remote subnets:
 - DC1 hosts can reach subnets vlangs 90,100 in DC2.
 - DC2 hosts can reach subnets 10,20,30,40 in DC1.
 - Default gateway also received from remote DC as a backup for the locally generated one by the Service Leaves.
- EVPN L3 Gateway
 - IP-VRF configuration on the EVPN L3 Gateway is required to exchange EVPN type-5 routes with the remote EVPN L3 Gateway.
 - Additional peer group for the eBGP IPv4 and eBGP EVPN sessions between EVPN L3 Gateways.
 - Configuring local SVIs and MAC-VRFs is not strictly required.
 - Next-hop of the received remote type-5 routes is updated to the shared mlag address of the BGW leaf pair.
- Service leafs:
 - Inter-VRF routing provided by the FW/Router using local VLANs with VARP (50,60 on DC1, 70,80 on DC2). Static default route in the services leaves to the FW/Router to ensure inter-VRF leaking occurs regardless of external connectivity problems.
 - Service leafs learning routes from FW/Router via eBGP on each IP VRF:
 - Default routes advertised as a EVPN type-5 from the service leaves to all TORs. Less preferred default route from remote sites learned as a backup path (due to longer AS-Path).
 - BGP listen range configured within the IP VRFs for BGP peerings with the FW/Router.
- FW/Router:
 - VRF leaking used for inter-VRF routing.
 - Loopbacks redistributed into BGP to test end-to-end connectivity across the sites.

Configuration

The following configuration is required for Symmetric IRB:

- Underlay
 - Multi-agent model (ArBGP)
 - eBGP IPv4 Unicast peering between spines and leaf switches
 - iBGP IPv4 Unicast peering between MLAG pair
 - MLAG
- Border Gateways:
 - eBGP underlay session to remote Border Gateway (any protocol can be used for this).
 - eBGP EVPN session to remote Border Gateway.
 - Encapsulation and next-hop configuration.
 - IP vrf configuration.
- Service leaves:

- Transit VLANs for inter-vrf routing.
- eBGP peering to FW/Router.
- Overlay
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VxLAN
 - MLAG Shared Router MAC Address
 - VLAN to VNI mapping (L2VNI)
 - VRF to VNI mapping (L3VNI)
 - BGP/EVPN
 - MAC-VRF
 - IP-VRF
- Tenant
 - VLAN
 - Tenant VRF
 - Anycast Gateway
- Platform specific (See [Appendix A](#))

Note: Configuration lines in red font color are not supported in vEOS. Some configs not relevant are omitted.

Border Gateways

Function	DC-1-BL-1	DC-1-BL-2
rBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
LAN	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 </pre>	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 </pre>
VRF Instance	<pre> vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue </pre>	<pre> vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue </pre>
Spines Uplink	<pre> interface Ethernet1 no switchport ip address 192.168.1.13/31 ! interface Ethernet2 no switchport ip address 192.168.2.13/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.1.15/31 ! interface Ethernet2 no switchport ip address 192.168.2.15/31 </pre>
BGP Loopback0 outer ID	<pre> interface Loopback0 description BGP Router ID ip address 192.168.101.7/32 ! router general router-id ipv4 192.168.101.7 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.101.8/32 ! router general router-id ipv4 192.168.101.8 </pre>
TI Loopback1 TEP IP	<pre> interface Loopback1 description VTEP IP ip address 192.168.201.7/32 </pre>	<pre> interface Loopback1 description VTEP IP ip address 192.168.201.7/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>
MLAG Config	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 !</pre>	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 !</pre>

	<pre> interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
unicast Gateway Virtual MAC address	ip virtual-router mac-address 00:1c:73:00:00:99	ip virtual-router mac-address 00:1c:73:00:00:99
Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
BGP and iBGP Underlay GP/EVPN	<pre> router bgp 65001.7 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_L3GW_EVPN peer group neighbor OVERLAY_L3GW_EVPN remote-as 65002.7 neighbor OVERLAY_L3GW_EVPN update-source Loopback0 neighbor OVERLAY_L3GW_EVPN bfd neighbor OVERLAY_L3GW_EVPN ebgp-multihop 2 neighbor OVERLAY_L3GW_EVPN maximum-routes 0 neighbor UNDERLAY_L3GW_V4 peer group neighbor UNDERLAY_L3GW_V4 remote-as 65002.7 neighbor UNDERLAY_L3GW_V4 maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN remote-as 65001.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65001.7 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65001.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.12 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.12 peer group UNDERLAY_SPINE_V4 neighbor 192.168.101.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.101.102 peer group OVERLAY_SPINE_EVPN neighbor 192.168.102.7 peer group OVERLAY_L3GW_EVPN neighbor 10.99.0.1 peer group UNDERLAY_L3GW_V4 redistribute connected route-map CONNECTED ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate neighbor OVERLAY_L3GW_EVPN activate neighbor OVERLAY_L3GW_EVPN encapsulation vxlan neighbor default next-hop-self received-evpn-routes route-type ip-prefix ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate neighbor UNDERLAY_L3GW_V4 activate ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto </pre>	<pre> router bgp 65001.7 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_L3GW_EVPN peer group neighbor OVERLAY_L3GW_EVPN remote-as 65002.7 neighbor OVERLAY_L3GW_EVPN update-source Loopback0 neighbor OVERLAY_L3GW_EVPN bfd neighbor OVERLAY_L3GW_EVPN ebgp-multihop 2 neighbor OVERLAY_L3GW_EVPN maximum-routes 0 neighbor UNDERLAY_L3GW_V4 peer group neighbor UNDERLAY_L3GW_V4 remote-as 65002.7 neighbor UNDERLAY_L3GW_V4 maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN remote-as 65001.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65001.7 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65001.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.14 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.14 peer group UNDERLAY_SPINE_V4 neighbor 192.168.101.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.101.102 peer group OVERLAY_SPINE_EVPN neighbor 10.99.0.3 peer group UNDERLAY_L3GW_V4 neighbor 192.168.102.8 peer group OVERLAY_L3GW_EVPN redistribute connected route-map CONNECTED ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate neighbor OVERLAY_L3GW_EVPN activate neighbor OVERLAY_L3GW_EVPN encapsulation vxlan neighbor default next-hop-self received-evpn-routes route-type ip-prefix ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate neighbor UNDERLAY_L3GW_V4 activate ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto </pre>

<pre> route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned vrf blue rd 192.168.101.7:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.101.7:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected </pre>	<pre> route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned vrf blue rd 192.168.101.8:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.101.8:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected </pre>
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Function	DC-2-BL-1	DC-2-BL-2
Service BGP	service routing protocols model multi-agent	service routing protocols model multi-agent
LAN	<pre> interface Vlan90 vrf red ip address 10.10.90.254/24 ! interface Vlan100 vrf blue ip address 10.10.100.254/24 </pre>	<pre> interface Vlan90 vrf red ip address 10.10.90.254/24 ! interface Vlan100 vrf blue ip address 10.10.100.254/24 </pre>
RF Instance	<pre> vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue </pre>	<pre> vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue </pre>
VxLAN Uplink	<pre> interface Ethernet1 no switchport ip address 192.168.3.5/31 ! interface Ethernet2 no switchport ip address 192.168.4.5/31 !</pre>	<pre> interface Ethernet1 no switchport ip address 192.168.3.7/31 ! interface Ethernet2 no switchport ip address 192.168.4.7/31 </pre>
GP Loopback0 outer ID	<pre> interface Loopback0 description BGP Router ID ip address 192.168.102.7/32 ! router general router-id ipv4 192.168.102.7 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.102.8/32 ! router general router-id ipv4 192.168.102.8 </pre>
TI Loopback1 TEP IP	<pre> interface Loopback1 description VTEP IP ip address 192.168.202.7/32 </pre>	<pre> interface Loopback1 description VTEP IP ip address 192.168.202.7/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 90 vni 1090 vxlan vlan 100 vni 10100 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 90 vni 1090 vxlan vlan 100 vni 10100 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>
LAG Config	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active </pre>	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active </pre>

	<pre> ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
unicast Gateway virtual MAC address	ip virtual-router mac-address 00:1c:73:00:00:99	ip virtual-router mac-address 00:1c:73:00:00:99
P-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
BGP and iBGP Underlay GP/EVPN	<pre> router bgp 65002.7 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_L3GW_EVPN peer group neighbor OVERLAY_L3GW_EVPN remote-as 65001.7 neighbor OVERLAY_L3GW_EVPN update-source Loopback0 neighbor OVERLAY_L3GW_EVPN bfd neighbor OVERLAY_L3GW_EVPN ebgp-multihop 2 neighbor OVERLAY_L3GW_EVPN maximum-routes 0 neighbor UNDERLAY_L3GW_V4 peer group neighbor UNDERLAY_L3GW_V4 remote-as 65001.7 neighbor UNDERLAY_L3GW_V4 maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65002.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65002.7 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65002.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.3.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.4.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.102.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.102.102 peer group OVERLAY_SPINE_EVPN neighbor 192.168.101.7 peer group OVERLAY_L3GW_EVPN neighbor 10.99.0.0 peer group UNDERLAY_L3GW_V4 redistribute connected route-map CONNECTED ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate neighbor OVERLAY_L3GW_EVPN activate neighbor OVERLAY_L3GW_EVPN encapsulation vxlan neighbor default next-hop-self received-evpn-routes route-type ip-prefix ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate neighbor UNDERLAY_L3GW_V4 activate ! vlan 100 rd auto route-target both 10100:10100 redistribute learned ! vlan 90 rd auto route-target both 1090:1090 redistribute learned vrf blue </pre>	<pre> router bgp 65002.7 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_L3GW_EVPN peer group neighbor OVERLAY_L3GW_EVPN remote-as 65001.7 neighbor OVERLAY_L3GW_EVPN update-source Loopback0 neighbor OVERLAY_L3GW_EVPN bfd neighbor OVERLAY_L3GW_EVPN ebgp-multihop 2 neighbor OVERLAY_L3GW_EVPN maximum-routes 0 neighbor UNDERLAY_L3GW_V4 peer group neighbor UNDERLAY_L3GW_V4 remote-as 65001.7 neighbor UNDERLAY_L3GW_V4 maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65002.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65002.7 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65002.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.3.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.4.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.102.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.102.102 peer group OVERLAY_SPINE_EVPN neighbor 10.99.0.2 peer group UNDERLAY_L3GW_V4 neighbor 192.168.101.8 peer group OVERLAY_L3GW_EVPN redistribute connected route-map CONNECTED ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate neighbor OVERLAY_L3GW_EVPN activate neighbor OVERLAY_L3GW_EVPN encapsulation vxlan neighbor default next-hop-self received-evpn-routes route-type ip-prefix ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate neighbor UNDERLAY_L3GW_V4 activate ! vlan 100 rd auto route-target both 10100:10100 redistribute learned ! vlan 90 rd auto route-target both 1090:1090 redistribute learned vrf blue </pre>

	<pre> rd 192.168.102.7:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.102.7:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected </pre>	<pre> rd 192.168.102.8:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.102.8:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected </pre>
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Service Leaves

Function	DC-1-SL-1	DC1-SL-2
rBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
LAN	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! interface Vlan50 vrf red ip address 10.10.50.252/24 ip virtual-router address 10.10.50.254 ! interface Vlan60 vrf blue ip address 10.10.60.252/24 ip virtual-router address 10.10.60.254 </pre>	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! interface Vlan50 vrf red ip address 10.10.50.253/24 ip virtual-router address 10.10.50.254 ! interface Vlan60 vrf blue ip address 10.10.60.253/24 ip virtual-router address 10.10.60.254 </pre>
RF Instance	<pre> vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue ! ip route vrf blue 0.0.0.0/0 10.10.60.10 ip route vrf red 0.0.0.0/0 10.10.50.10 </pre>	<pre> vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue ! ip route vrf blue 0.0.0.0/0 10.10.60.10 ip route vrf red 0.0.0.0/0 10.10.50.10 </pre>
pines Uplink	<pre> interface Ethernet1 no switchport ip address 192.168.1.9/31 ! interface Ethernet2 no switchport ip address 192.168.2.9/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.1.11/31 ! interface Ethernet2 no switchport ip address 192.168.2.11/31 </pre>
GP Loopback0 outer ID	<pre> interface Loopback0 description BGP Router ID ip address 192.168.101.5/32 ! router general router-id ipv4 192.168.101.5 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.101.6/32 ! router general router-id ipv4 192.168.101.6 </pre>
TI Loopback1 TEP IP	<pre> interface Loopback1 description VTEP IP ip address 192.168.201.5/32 </pre>	<pre> interface Loopback1 description VTEP IP ip address 192.168.201.5/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>

MLAG Config	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 mtu 9214 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000</pre>	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 mtu 9214 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000</pre>
Unicast Gateway Virtual MAC address	ip virtual-router mac-address 00:1c:73:00:00:99	ip virtual-router mac-address 00:1c:73:00:00:99
P-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>
BGP and iBGP Underlay EVPN	<pre>router bgp 65001.5 bgp asn notation asdot router-id 192.168.101.5 no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor CORE peer group neighbor CORE maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65001.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65001.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65001.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.8 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.8 peer group UNDERLAY_SPINE_V4 neighbor 192.168.101.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.101.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned</pre>	<pre>router bgp 65001.5 bgp asn notation asdot router-id 192.168.101.6 no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor CORE peer group neighbor CORE maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65001.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65001.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65001.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.10 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.10 peer group UNDERLAY_SPINE_V4 neighbor 192.168.101.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.101.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned</pre>

<pre> ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor CORE activate neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate ! vrf blue rd 192.168.101.5:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 bgp listen range 10.10.60.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static ! vrf red rd 192.168.101.5:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 bgp listen range 10.10.50.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static </pre>	<pre> ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor CORE activate neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate ! vrf blue rd 192.168.101.6:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 bgp listen range 10.10.60.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static ! vrf red rd 192.168.101.6:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 bgp listen range 10.10.50.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static </pre>
---	---

Function	DC-2-SL-1	DC2-SL-2
IBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
LAN	<pre> interface Vlan70 vrf red ip address 10.10.70.252/24 ip virtual-router address 10.10.70.254 ! interface Vlan80 vrf blue ip address 10.10.80.252/24 ip virtual-router address 10.10.80.254 </pre>	<pre> interface Vlan70 vrf red ip address 10.10.70.253/24 ip virtual-router address 10.10.70.254 ! interface Vlan80 vrf blue ip address 10.10.80.253/24 ip virtual-router address 10.10.80.254 </pre>
RF Instance	<pre> vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue ! ip route vrf blue 0.0.0.0/0 10.10.80.10 ip route vrf red 0.0.0.0/0 10.10.70.10 </pre>	<pre> vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue ! ip route vrf blue 0.0.0.0/0 10.10.80.10 ip route vrf red 0.0.0.0/0 10.10.70.10 </pre>
Vlans Uplink	<pre> interface Ethernet1 no switchport ip address 192.168.3.1/31 ! interface Ethernet2 no switchport ip address 192.168.4.1/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.3.3/31 ! interface Ethernet2 no switchport ip address 192.168.4.3/31 </pre>
GP Loopback0 outer ID	<pre> interface Loopback0 description BGP Router ID ip address 192.168.102.5/32 ! router general router-id ipv4 192.168.102.5 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.102.6/32 ! router general router-id ipv4 192.168.102.5 </pre>
TI Loopback1 TEP IP	<pre> interface Loopback1 description VTEP IP ip address 192.168.202.5/32 </pre>	<pre> interface Loopback1 description VTEP IP ip address 192.168.202.5/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 90 vni 1090 vxlan vlan 1000 vni 10100 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 90 vni 1090 vxlan vlan 1000 vni 10100 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>
MLAG Config	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag </pre>	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag </pre>

	<pre> ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
unicast Gateway Virtual MAC address	ip virtual-router mac-address 00:1c:73:00:00:99	ip virtual-router mac-address 00:1c:73:00:00:99
P-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
BGP and iBGP Underlay GP/EVPN	<pre> router bgp 65002.5 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor CORE peer group neighbor CORE maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65002.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65002.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65002.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.3.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.4.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.102.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.102.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 100 rd auto route-target both 10100:10100 redistribute learned ! vlan 90 rd auto route-target both 1090:1090 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor CORE activate neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate ! vrf blue rd 192.168.102.5:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 bgp listen range 10.10.80.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static ! vrf red rd 192.168.102.5:2000 route-target import evpn 2000:2000 </pre>	<pre> router bgp 65002.5 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor CORE peer group neighbor CORE maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65002.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65002.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65002.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.3.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.4.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.102.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.102.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 100 rd auto route-target both 10100:10100 redistribute learned ! vlan 90 rd auto route-target both 1090:1090 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor CORE activate neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate ! vrf blue rd 192.168.102.6:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 bgp listen range 10.10.80.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static ! vrf red rd 192.168.102.6:2000 route-target import evpn 2000:2000 </pre>

	<pre>route-target export evpn 2000:2000 bgp listen range 10.10.70.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static</pre>	<pre>route-target export evpn 2000:2000 bgp listen range 10.10.70.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static</pre>
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FW/Router

Function	DC-1-FW-1	DC-2-FW-1
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
Uplink connectivity	<pre>interface Vlan50 vrf red ip address 10.10.50.10/24 ! interface Vlan60 vrf blue ip address 10.10.60.10/24</pre>	<pre>interface Vlan70 vrf red ip address 10.10.70.10/24 ! interface Vlan80 vrf blue ip address 10.10.80.10/24</pre>
Route-leaking	<pre>route-map RM-ALL permit 10 ! router general vrf blue leak routes source-vrf red subscribe-policy RM-ALL ! vrf red leak routes source-vrf blue subscribe-policy RM-ALL</pre>	<pre>route-map RM-ALL permit 10 ! router general vrf blue leak routes source-vrf red subscribe-policy RM-ALL ! vrf red leak routes source-vrf blue subscribe-policy RM-ALL</pre>
eBGP and iBGP Underlay BGP/EVPN	<pre>router bgp 65001.100 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 ! vrf blue rd 192.168.101.100:2001 neighbor 10.10.50.252 maximum-routes 12000 neighbor 10.10.50.253 maximum-routes 12000 neighbor 10.10.60.252 remote-as 65001.5 neighbor 10.10.60.253 remote-as 65001.5 redistribute connected ! address-family ipv4 neighbor 10.10.60.252 activate neighbor 10.10.60.253 activate ! vrf red rd 192.168.101.100:2000 neighbor 10.10.50.252 remote-as 65001.5 neighbor 10.10.50.252 maximum-routes 12000 neighbor 10.10.50.253 remote-as 65001.5 neighbor 10.10.50.253 maximum-routes 12000 redistribute connected ! address-family ipv4 neighbor 10.10.50.252 activate neighbor 10.10.50.253 activate</pre>	<pre>router bgp 65002.100 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 ! vrf blue rd 192.168.102.100:2001 neighbor 10.10.80.252 maximum-routes 12000 neighbor 10.10.80.253 maximum-routes 12000 neighbor 10.10.80.252 remote-as 65002.5 neighbor 10.10.80.253 remote-as 65002.5 redistribute connected ! address-family ipv4 neighbor 10.10.80.252 activate neighbor 10.10.80.253 activate ! vrf red rd 192.168.102.100:2000 neighbor 10.10.70.252 remote-as 65002.5 neighbor 10.10.70.252 maximum-routes 12000 neighbor 10.10.70.253 remote-as 65002.5 neighbor 10.10.70.253 maximum-routes 12000 redistribute connected ! address-family ipv4 neighbor 10.10.70.252 activate neighbor 10.10.70.253 activate</pre>

Verification

Verification steps specific to L3 Border Gateway Feature:

Show ip bgp summary	
Verify the peerings with local Spines, MLAG peer and remote site	
DC-1-BL-1	<pre>DC-1-BL-1#show ip bgp summ BGP summary information for VRF default Router identifier 192.168.101.7, local AS number 65001.7 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 10.99.0.1 4 65002.7 221476 221505 0 0 6d23h Estab 20 20 172.16.0.2 4 65001.7 143883 143844 0 0 6d23h Estab 32 32 192.168.1.12 4 65001.65000 221407 221483 0 0 10d22h Estab 8 8 192.168.2.12 4 65001.65000 221431 221455 0 0 10d22h Estab 8 8</pre>
DC-2-BL-1	<pre>DC-2-BL-1#show ip bgp summ BGP summary information for VRF default Router identifier 192.168.102.7, local AS number 65002.7 Neighbor Status Codes: m - Under maintenance</pre>

	Neighbor	V	AS	MsgRcvd	MsgSent	InQ	OutQ	Up/Down	State	PfxRcd	PfxAcc
10.99.0.0	4	65001.7		221527	221498	0	0	6d23h	Estab	16	16
172.16.0.2	4	65002.7		222710	222786	0	0	10d23h	Estab	32	32
192.168.3.4	4	65002.65000		222612	222681	0	0	10d23h	Estab	12	12
192.168.4.4	4	65002.65000		222569	222674	0	0	10d23h	Estab	14	14

show bgp evpn summary

Verify the eBGP IPv4 EVPN peering with local Spines and remote BGW leaves

DC-1-BL-1	DC-1-BL-1#show bgp evpn summ BGP summary information for VRF default Router identifier 192.168.101.7, local AS number 65001.7 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.101.101 4 65001.65000 339127 292555 0 0 00:07:29 Estab 44 44 192.168.101.102 4 65001.65000 346584 294989 0 0 00:07:29 Estab 44 44 192.168.102.7 4 65002.7 261552 272489 0 0 00:08:40 Estab 20 20
DC-2-BL-1	DC-2-BL-1#show bgp evpn summ BGP summary information for VRF default Router identifier 192.168.102.7, local AS number 65002.7 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 192.168.101.7 4 65001.7 270470 263865 0 0 00:08:17 Estab 32 32 192.168.102.101 4 65002.65000 304771 298750 0 0 00:04:08 Estab 30 30 192.168.102.102 4 65002.65000 294881 291671 0 0 00:08:54 Estab 30 30

show interfaces vxlan 1Verify the interface VxLAN 1 is connected
Verify EVPN is used for flood list population and remote MAC learning
Verify VRFs are mapped to the correct VNIs

DC-1-BL-1	DC-1-BL-1#show int vxlan 1 Vxlan1 is up, line protocol is up (connected) Hardware is Vxlan Source interface is Loopback1 and is active with 192.168.201.7 Replication/Flood Mode is headend with Flood List Source: EVPN Remote MAC learning via EVPN VNI mapping to VLANs Static VLAN to VNI mapping is [10, 1010] [20, 1020] [30, 1030] [40, 1040] Dynamic VLAN to VNI mapping for 'evpn' is [3214, 2000] [3215, 2001] Note: All Dynamic VLANs used by VCS are internal VLANs. Use 'show vxlan vni' for details. Static VRF to VNI mapping is [blue, 2001] [red, 2000] Headend replication flood vtep list is: 10 192.168.201.1 192.168.201.5 20 192.168.201.1 192.168.201.5 30 192.168.201.1 192.168.201.5 40 192.168.201.1 192.168.201.5 MLAG Shared Router MAC is 0200.0001.eee1
DC-2-BL-1	DC-2-BL-1#show int vxlan 1 Vxlan1 is up, line protocol is up (connected) Hardware is Vxlan Source interface is Loopback1 and is active with 192.168.202.7 Replication/Flood Mode is headend with Flood List Source: EVPN Remote MAC learning via EVPN VNI mapping to VLANs Static VLAN to VNI mapping is [90, 1090] [100, 10100] Dynamic VLAN to VNI mapping for 'evpn' is [4091, 2000] [4092, 2001] Note: All Dynamic VLANs used by VCS are internal VLANs. Use 'show vxlan vni' for details. Static VRF to VNI mapping is [blue, 2001] [red, 2000] Headend replication flood vtep list is: 90 192.168.202.5 192.168.202.1 100 192.168.202.5 192.168.202.1 MLAG Shared Router MAC is 0200.0002.eee1

show bgp evpn route-type ip-prefix ipv4 vni <vnid> next-hop <vtep_ip> detail

Verify received routes in VNI 2000 via EVPN Type-5 routes from remote BWG leaf.

```
DC-1-BL-1#show bgp evpn route-type ip-prefix 10.10.90.0/24 det
BGP routing table information for VRF default
Router identifier 192.168.101.7, local AS number 4259905543
BGP routing table entry for ip-prefix 10.10.90.0/24, Route Distinguisher: 192.168.102.1:2000
Paths: 1 available
  65002.7 65002.65000 65002.1
    192.168.202.7 from 192.168.102.7 (192.168.102.7)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, best
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:02:ee:e1
      VNI: 2000
BGP routing table entry for ip-prefix 10.10.90.0/24, Route Distinguisher: 192.168.102.2:2000
Paths: 1 available
  65002.7 65002.65000 65002.1
    192.168.202.7 from 192.168.102.7 (192.168.102.7)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, best
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:02:ee:e1
      VNI: 2000
BGP routing table entry for ip-prefix 10.10.90.0/24, Route Distinguisher: 192.168.102.5:2000
Paths: 1 available
  65002.7 65002.65000 65002.5
    192.168.202.7 from 192.168.102.7 (192.168.102.7)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, best
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:02:ee:e1
      VNI: 2000
BGP routing table entry for ip-prefix 10.10.90.0/24, Route Distinguisher: 192.168.102.6:2000
Paths: 1 available
  65002.7 65002.65000 65002.5
    192.168.202.7 from 192.168.102.7 (192.168.102.7)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, best
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:02:ee:e1
      VNI: 2000
BGP routing table entry for ip-prefix 10.10.90.0/24, Route Distinguisher: 192.168.102.7:2000
Paths: 1 available
  65002.7
    192.168.202.7 from 192.168.102.7 (192.168.102.7)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, best
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:02:ee:e1
      VNI: 2000
```

DC-1-BL-1

show bgp evpn route-type ip-prefix ipv4 vni <vnId> next-hop <vtep_ip> detail

Verify received routes in VNI 2000 via EVPN Type-5 routes from the local BGW leaf.

```
DC-1-SL-1#show bgp evpn route-type ip-prefix 10.10.90.0/24
BGP routing table information for VRF default
Router identifier 192.168.101.5, local AS number 4259905541
BGP routing table entry for ip-prefix 10.10.90.0/24, Route Distinguisher: 192.168.102.1:2000
Paths: 2 available
  65001.65000 65001.7 65002.65000 65002.1
    192.168.201.7 from 192.168.101.101 (192.168.101.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
      VNI: 2000
  65001.65000 65001.7 65002.65000 65002.1
    192.168.201.7 from 192.168.101.102 (192.168.101.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
      VNI: 2000
BGP routing table entry for ip-prefix 10.10.90.0/24, Route Distinguisher: 192.168.102.2:2000
Paths: 2 available
  65001.65000 65001.7 65002.65000 65002.1
    192.168.201.7 from 192.168.101.101 (192.168.101.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
      VNI: 2000
  65001.65000 65001.7 65002.65000 65002.1
    192.168.201.7 from 192.168.101.102 (192.168.101.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
      VNI: 2000
BGP routing table entry for ip-prefix 10.10.90.0/24, Route Distinguisher: 192.168.102.5:2000
Paths: 2 available
  65001.65000 65001.7 65002.65000 65002.5
    192.168.201.7 from 192.168.101.101 (192.168.101.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
      VNI: 2000
  65001.65000 65001.7 65002.65000 65002.5
    192.168.201.7 from 192.168.101.102 (192.168.101.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
      VNI: 2000
BGP routing table entry for ip-prefix 10.10.90.0/24, Route Distinguisher: 192.168.102.6:2000
Paths: 2 available
  65001.65000 65001.7 65002.65000 65002.5
```

DC-1-SL-1

```

192.168.201.7 from 192.168.101.101 (192.168.101.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
VNI: 2000
65001.65000 65001.7 65002.7 65002.65000 65002.5
192.168.201.7 from 192.168.101.102 (192.168.101.102)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
VNI: 2000
BGP routing table entry for ip-prefix 10.10.90.0/24, Route Distinguisher: 192.168.102.7:2000
Paths: 2 available
65001.65000 65001.7 65002.7
  192.168.201.7 from 192.168.101.101 (192.168.101.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
    VNI: 2000
65001.65000 65001.7 65002.7
  192.168.201.7 from 192.168.101.102 (192.168.101.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
    VNI: 2000
BGP routing table entry for ip-prefix 10.10.90.0/24, Route Distinguisher: 192.168.102.8:2000
Paths: 2 available
65001.65000 65001.7 65002.7
  192.168.201.7 from 192.168.101.101 (192.168.101.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
    VNI: 2000
65001.65000 65001.7 65002.7
  192.168.201.7 from 192.168.101.102 (192.168.101.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
    VNI: 2000

```

Note: Remote routes have the next-hop rewritten to the local Border Gateway Leaf.

show ip route vrf <vrf_name>

Verify the remote EVPN type-5 routes are received.

```

DC-1-SL-1-14:57:15#show ip route vrf red

VRF: red
Codes: C - connected, S - static, K - kernel,
        O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
        E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
        N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
        R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
        O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
        NG - Nexthop Group Static Route, V - VXLAN Control Service,
        DH - DHCP client installed default route, M - Martian,
        DP - Dynamic Policy Route, L - VRF Leaked,
        RC - Route Cache Route

Gateway of last resort:
S      0.0.0.0/0 [1/0] via 10.10.50.10, Vlan50

C      10.10.10.0/24 is directly connected, Vlan10
C      10.10.20.0/24 is directly connected, Vlan20
C      10.10.50.0/24 is directly connected, Vlan50
B E    10.10.70.0/24 [20/0] via VTEP 192.168.201.7 VNI 2000 router-mac 02:00:00:01:ee:e1
B E    10.10.90.0/24 [20/0] via VTEP 192.168.201.7 VNI 2000 router-mac 02:00:00:01:ee:e1

```

DC-1-SL-1

```
DC-1-SL-1-14:57:19#show ip route vrf blue
```

```

VRF: blue
Codes: C - connected, S - static, K - kernel,
        O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
        E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
        N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
        R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
        O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
        NG - Nexthop Group Static Route, V - VXLAN Control Service,
        DH - DHCP client installed default route, M - Martian,
        DP - Dynamic Policy Route, L - VRF Leaked,
        RC - Route Cache Route

Gateway of last resort:
S      0.0.0.0/0 [1/0] via 10.10.60.10, Vlan60

C      10.10.30.0/24 is directly connected, Vlan30
C      10.10.40.0/24 is directly connected, Vlan40
C      10.10.60.0/24 is directly connected, Vlan60
B E    10.10.80.0/24 [20/0] via VTEP 192.168.201.7 VNI 2001 router-mac 02:00:00:01:ee:e1
B E    10.10.100.0/24 [20/0] via VTEP 192.168.201.7 VNI 2001 router-mac 02:00:00:01:ee:e1

```

ping <remote_host_ip>

Verify connectivity between Host-1 and Host-3

```

HOST-1#ping vrf red 10.10.90.3
PING 10.10.90.3 (10.10.90.3) 72(100) bytes of data.
80 bytes from 10.10.90.3: icmp_seq=1 ttl=61 time=132 ms
80 bytes from 10.10.90.3: icmp_seq=2 ttl=61 time=115 ms
80 bytes fromss.90.3: icmp_seq=3 ttl=61 time=195 ms
80 bytes from 10.10.90.3: icmp_seq=4 ttl=61 time=360 ms
80 bytes from 10.10.90.3: icmp_seq=5 ttl=61 time=386 ms

--- 10.10.90.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 52ms
rtt min/avg/max/mdev = 115.993/238.070/386.190/113.779 ms, pipe 5, ipg/ewma 13.162/193.617 ms

HOST-1#ping vrf red 10.10.100.3
PING 10.10.100.3 (10.10.100.3) 72(100) bytes of data.
80 bytes from 10.10.100.3: icmp_seq=1 ttl=57 time=116 ms
80 bytes from 10.10.100.3: icmp_seq=2 ttl=57 time=116 ms
80 bytes from 10.10.100.3: icmp_seq=3 ttl=57 time=137 ms
80 bytes from 10.10.100.3: icmp_seq=4 ttl=57 time=185 ms
80 bytes from 10.10.100.3: icmp_seq=5 ttl=57 time=176 ms

--- 10.10.100.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 43ms
rtt min/avg/max/mdev = 116.200/146.484/185.209/29.326 ms, pipe 5, ipg/ewma 10.831/133.403 ms

Host-3
HOST-1#ping vrf blue 10.10.90.3
PING 10.10.90.3 (10.10.90.3) 72(100) bytes of data.
80 bytes from 10.10.90.3: icmp_seq=1 ttl=57 time=117 ms
80 bytes from 10.10.90.3: icmp_seq=2 ttl=57 time=117 ms
80 bytes from 10.10.90.3: icmp_seq=3 ttl=57 time=137 ms
80 bytes from 10.10.90.3: icmp_seq=4 ttl=57 time=135 ms
80 bytes from 10.10.90.3: icmp_seq=5 ttl=57 time=136 ms

--- 10.10.90.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 47ms
rtt min/avg/max/mdev = 117.381/128.912/137.185/9.283 ms, pipe 5, ipg/ewma 11.764/123.710 ms

HOST-1#ping vrf blue 10.10.100.3
PING 10.10.100.3 (10.10.100.3) 72(100) bytes of data.
80 bytes from 10.10.100.3: icmp_seq=1 ttl=61 time=73.0 ms
80 bytes from 10.10.100.3: icmp_seq=2 ttl=61 time=81.6 ms
80 bytes from 10.10.100.3: icmp_seq=3 ttl=61 time=73.0 ms
80 bytes from 10.10.100.3: icmp_seq=4 ttl=61 time=77.7 ms
80 bytes from 10.10.100.3: icmp_seq=5 ttl=61 time=69.9 ms

--- 10.10.100.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 42ms
rtt min/avg/max/mdev = 69.946/75.085/81.641/4.116 ms, pipe 5, ipg/ewma 10.663/73.887 ms

```

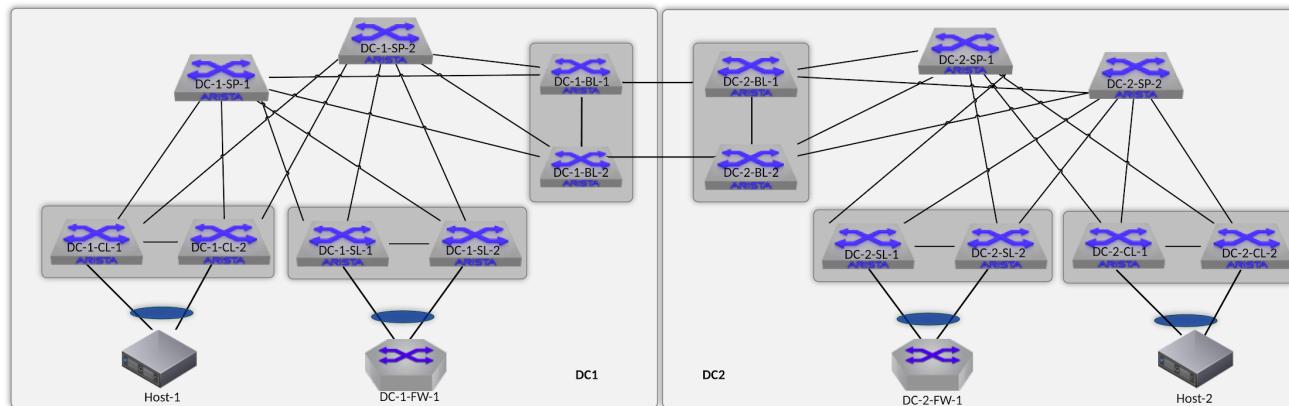
EVPN Symmetric IRB - EVPN L3 Gateway + EVPN filtering + RT membership

Deployment Consideration

- In some scenarios, VTEPs may need to advertise different routes to different VTEPs. For example due to the amount of routes hitting the scale limits in some platforms.
- A Route-map can be applied in an IP VRF (single route-map to all RTs) to filter routes on export or import. On export, it is possible to set different RTs for particular routes, which will be only imported on the VTEPs that need those routes.
- RT membership (or RT constraints) used as well to reduce the number of routes advertised within the EVPN domain and to other EVPN domains, based on the RT usage (reducing the number of routes in RIB as well).

Refer to the following documentation for more information: [EVPN L3 Gateway](#), [Route-Target Membership](#)

Topology



Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
DC-1-SP-1	192.168.101.101	N/A	65001.65000	N/A	N/A	N/A	0000.0001.bbb1
DC-1-SP-2	192.168.101.102	N/A	65001.65000	N/A	N/A	N/A	0000.0001.bbb2
DC-2-SP-1	192.168.102.101	N/A	65001.65000	N/A	N/A	N/A	0000.0002.bbb1
DC-2-SP-2	192.168.102.102	N/A	65001.65000	N/A	N/A	N/A	0000.0002.bbb2
DC-1-CL-1	192.168.101.1	192.168.201.1	65001.1	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0001.aaa1
DC-1-CL-2	192.168.101.2	192.168.201.1	65001.1	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0001.aaa2
DC-1-SL-1	192.168.101.5	192.168.201.5	65001.5	Red Red Red Blue Blue Blue	VLAN10 VLAN20 VLAN50 VLAN30 VLAN40 VLAN60	10.10.10.254/24 10.10.20.254/24 10.10.50.254/24 10.10.30.254/24 10.10.40.254/24 10.10.60.254/24	0000.0001.ddd1
DC-1-SL-2	192.168.101.5	192.168.201.5	65001.5	Red Red Red Blue Blue Blue	VLAN10 VLAN20 VLAN50 VLAN30 VLAN40 VLAN60	10.10.10.254/24 10.10.20.254/24 10.10.50.254/24 10.10.30.254/24 10.10.40.254/24 10.10.60.254/24	0000.0001.ddd2
DC-2-SL-1	192.168.102.5	192.168.202.5	65002.5	Red Red Blue Blue	VLAN70 VLAN90 VLAN80 VLAN100	10.10.70.254/24 10.10.90.254/24 10.10.80.254/24 10.10.100.254/24	0000.0002.ddd1
DC-2-SL-2	192.168.102.5	192.168.202.5	65002.5	Red Red Blue Blue	VLAN70 VLAN90 VLAN80 VLAN100	10.10.70.254/24 10.10.90.254/24 10.10.80.254/24 10.10.100.254/24	0000.0002.ddd2
DC-2-CL-1	192.168.102.1	192.168.202.1	65002.1	Red Blue	VLAN90 VLAN100	10.10.90.254/24 10.10.100.254/24	0000.0002.aaa1
DC-2-CL-2	192.168.102.2	192.168.202.2	65002.1	Red Blue	VLAN90 VLAN100	10.10.90.254/24 10.10.100.254/24	0000.0002.aaa2
DC-1-BL-1	192.168.101.7	192.168.201.7	65001.7	Red Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.50.254/24 10.10.60.254/24	0000.0001.eee1
DC-1-BL-2	192.168.101.8	192.168.201.7	65001.7	Red Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.50.254/24 10.10.60.254/24	0000.0001.eee2
DC-2-BL-1	192.168.102.7	192.168.202.7	65002.7	Red	VLAN90	10.10.90.254/24	0000.0002.eee1

Arista Internal Use Only

				Blue	VLAN100	10.10.100.254/24	
DC-2-BL-2	192.168.102.8	192.168.202.7	65002.7	Red Blue	VLAN90 VLAN100	10.10.90.254/24 10.10.100.254/24	0000.0002.eee2
Host-1	N/A	N/A	N/A	Red Blue	VLAN10 VLAN40	10.10.10.1/24 10.10.40.1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	Red Blue	VLAN20 VLAN30	10.10.20.2/24 10.10.30.2/24	0000.0000.2222
Host-3	N/A	N/A	N/A	Red Blue	VLAN90 VLAN100	10.10.90.3/24 10.10.100.3/24	0000.0000.3333
DC-1-FW-1	N/A	N/A	65001.100	Red Blue Red Blue	VLAN50 VLAN60 Lo10,11 Lo12,13	10.10.50.10/24 10.10.60.10/24 50.50.50.1-2/32 60.60.60.1-2/32	0000.0000.1111
DC-1-FW-2	N/A	N/A	65002.100	Red Blue Red Blue	VLAN70 VLAN80 Lo10,11 Lo12,13	10.1070.10/24 10.10.80.10/24 70.70.70.1-2/32 80.80.80.1-2/32	0000.0000.2222

Important Notes

- General behaviour seen when applying a route-map into a IP VRF:
 - “Route-target export evpn route-map”:
 - Applies to type-5 routes learned on that IP VRF only. Local type-2 routes are not matched and are exchanged normally when they are learned by a local MAC-VRF within that IP VRF.
 - “Route-target import evpn route-map”
 - However on import, the route-map applied to the IP VRF, it will match both type-5 and type-2 mac-ip routes that are imported into that IP VRF.
- In this scenario:
 - DC-1 and DC-2 Service leafs learn a large number of routes from FW/Router-1. A default route is sent to all VTEPs, but all the rest of routes will only be advertised to the BGW Leaves. That will provide reachability to the remote site so they can access specific routes only present in DC1 or DC2 Routers.
 - In the example, let's assume compute leaves are Trident with limited routing capacity and Service Leaves and Border Gateway Leaves are Jericho, with further routing scale capacity to manage all routes learned from the downstream routers. The Service leaves will advertise:
 - A Default route with common RT (vni:vni). Imported by all VTEPs.
 - Any other routes learned from the routers will be set on export with a different RT (vni:1). Imported only by Service leaves and Border Gateway Leaves.
- RT membership:
 - If an RT is not required by EVPN DC2, it will not be requested by the Spines of DC2 to the BGW leaves, resulting in a lower number of routes being advertised into the EVPN domain and optimizing the resource utilization on both sending and receiving VTEPs.
 - In the same way, if within EVPN DC1, if an RT is not needed on a TOR, the Spines will not advertise the routes with that RT, until that RT is explicitly configured.
 - Note: explicit IP-VRF configuration on the EVPN L3 Gateway is required to exchange EVPN type-5 routes with the remote EVPN L3 Gateway.
- Rest of details are the same as the L3 EVPN Gateway scenario.

Configuration

The following configuration is required for Symmetric IRB:

- Underlay
 - Multi-agent model (ArBGP)
 - eBGP IPv4 Unicast peering between spines and leaf switches
 - iBGP IPv4 Unicast peering between MLAG pair
 - MLAG
- Border Gateways:
 - eBGP underlay session to remote Border Gateway (any protocol can be used for this).
 - eBGP EVPN session to remote Border Gateway.
 - Encapsulation and next-hop configuration.
 - IP vrf configuration.

- Service leaves:
 - Transit VLANs for inter-vrf routing.
 - eBGP peering to FW/Router.
- Overlay
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VxLAN
 - MLAG Shared Router MAC Address
 - VLAN to VNI mapping (L2VNI)
 - VRF to VNI mapping (L3VNI)
 - BGP/EVPN
 - MAC-VRF
 - IP-VRF
- Tenant
 - VLAN
 - Tenant VRF
 - Anycast Gateway
- Platform specific (See [Appendix A](#))

Note: Configuration lines in red font color are not supported in vEOS. Some configs not relevant are omitted.

Border Gateways

Function	DC-1-BL-1	DC-1-BL-2
lBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
LAN	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 </pre>	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 </pre>
VRF Instance	<pre> vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue </pre>	<pre> vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue </pre>
Spines Uplink	<pre> interface Ethernet1 no switchport ip address 192.168.1.13/31 ! interface Ethernet2 no switchport ip address 192.168.2.13/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.1.15/31 ! interface Ethernet2 no switchport ip address 192.168.2.15/31 </pre>
GP Loopback0 outer ID	<pre> interface Loopback0 description BGP Router ID ip address 192.168.101.7/32 ! router general router-id ipv4 192.168.101.7 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.101.8/32 ! router general router-id ipv4 192.168.101.8 </pre>
TI Loopback1 VTEP IP	<pre> interface Loopback1 description VTEP IP ip address 192.168.201.7/32 </pre>	<pre> interface Loopback1 description VTEP IP ip address 192.168.201.7/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>
MLAG Config	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 </pre>	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 </pre>

	<pre> ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
unicast Gateway Virtual MAC address	ip virtual-router mac-address 00:1c:73:00:00:99	ip virtual-router mac-address 00:1c:73:00:00:99
P-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
BGP and iBGP Underlay GP/EVPN	<pre> router bgp 65001.7 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_L3GW_EVPN peer group neighbor OVERLAY_L3GW_EVPN remote-as 65002.7 neighbor OVERLAY_L3GW_EVPN update-source Loopback0 neighbor OVERLAY_L3GW_EVPN bfd neighbor OVERLAY_L3GW_EVPN ebgp-multihop 2 neighbor OVERLAY_L3GW_EVPN maximum-routes 0 neighbor UNDERLAY_L3GW_V4 peer group neighbor UNDERLAY_L3GW_V4 remote-as 65002.7 neighbor UNDERLAY_L3GW_V4 maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN remote-as 65001.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65001.7 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65001.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.12 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.12 peer group UNDERLAY_SPINE_V4 neighbor 192.168.101.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.101.102 peer group OVERLAY_SPINE_EVPN neighbor 192.168.102.7 peer group OVERLAY_L3GW_EVPN neighbor 10.99.0.1 peer group UNDERLAY_L3GW_V4 redistribute connected route-map CONNECTED ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate neighbor OVERLAY_L3GW_EVPN activate neighbor OVERLAY_L3GW_EVPN encapsulation vxlan neighbor default next-hop-self received-evpn-routes route-type ip-prefix ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate neighbor UNDERLAY_L3GW_V4 activate ! address-family rt-membership neighbor OVERLAY_SPINE_EVPN activate neighbor OVERLAY_L3GW_EVPN activate ! vlan 10 rd auto </pre>	<pre> router bgp 65001.7 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_L3GW_EVPN peer group neighbor OVERLAY_L3GW_EVPN remote-as 65002.7 neighbor OVERLAY_L3GW_EVPN update-source Loopback0 neighbor OVERLAY_L3GW_EVPN bfd neighbor OVERLAY_L3GW_EVPN ebgp-multihop 2 neighbor OVERLAY_L3GW_EVPN maximum-routes 0 neighbor UNDERLAY_L3GW_V4 peer group neighbor UNDERLAY_L3GW_V4 remote-as 65002.7 neighbor UNDERLAY_L3GW_V4 maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN remote-as 65001.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65001.7 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65001.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.14 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.14 peer group UNDERLAY_SPINE_V4 neighbor 192.168.101.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.101.102 peer group OVERLAY_SPINE_EVPN neighbor 10.99.0.3 peer group UNDERLAY_L3GW_V4 neighbor 192.168.102.8 peer group OVERLAY_L3GW_EVPN redistribute connected route-map CONNECTED ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate neighbor OVERLAY_L3GW_EVPN activate neighbor OVERLAY_L3GW_EVPN encapsulation vxlan neighbor default next-hop-self received-evpn-routes route-type ip-prefix ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate neighbor UNDERLAY_L3GW_V4 activate ! address-family rt-membership neighbor OVERLAY_SPINE_EVPN activate neighbor OVERLAY_L3GW_EVPN activate ! vlan 10 rd auto </pre>

<pre> route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned vrf blue rd 192.168.101.7:2001 route-target import evpn 2001:2001 route-target import evpn 2001:1 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.101.7:2000 route-target import evpn 2000:2000 route-target import evpn 2000:1 route-target export evpn 2000:2000 redistribute connected </pre>	<pre> route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned vrf blue rd 192.168.101.8:2001 route-target import evpn 2001:2001 route-target import evpn 2001:1 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.101.8:2000 route-target import evpn 2000:2000 route-target import evpn 2000:1 route-target export evpn 2000:2000 redistribute connected </pre>
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Function	DC-2-BL-1	DC-2-BL-2
IPBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
LAN	<pre> interface Vlan90 vrf red ip address 10.10.90.254/24 ! interface Vlan100 vrf blue ip address 10.10.100.254/24 </pre>	<pre> interface Vlan90 vrf red ip address 10.10.90.254/24 ! interface Vlan100 vrf blue ip address 10.10.100.254/24 </pre>
RF Instance	<pre> vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue </pre>	<pre> vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue </pre>
Ethernet Uplink	<pre> interface Ethernet1 no switchport ip address 192.168.3.5/31 ! interface Ethernet2 no switchport ip address 192.168.4.5/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.3.7/31 ! interface Ethernet2 no switchport ip address 192.168.4.7/31 </pre>
GP Loopback0 outer ID	<pre> interface Loopback0 description BGP Router ID ip address 192.168.102.7/32 ! router general router-id ipv4 192.168.102.7 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.102.8/32 ! router general router-id ipv4 192.168.102.8 </pre>
TI Loopback1 VTEP IP	<pre> interface Loopback1 description VTEP IP ip address 192.168.202.7/32 </pre>	<pre> interface Loopback1 description VTEP IP ip address 192.168.202.7/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 90 vni 1090 vxlan vlan 100 vni 10100 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 90 vni 1090 vxlan vlan 100 vni 10100 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>
LAG Config	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk </pre>	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk </pre>

	<pre> switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
unicast Gateway Virtual MAC address	ip virtual-router mac-address 00:1c:73:00:00:99	ip virtual-router mac-address 00:1c:73:00:00:99
P-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
BGP and iBGP Underlay GP/EVPN	<pre> router bgp 65002.7 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_L3GW_EVPN peer group neighbor OVERLAY_L3GW_EVPN remote-as 65001.7 neighbor OVERLAY_L3GW_EVPN update-source Loopback0 neighbor OVERLAY_L3GW_EVPN bfd neighbor OVERLAY_L3GW_EVPN ebgp-multipath 2 neighbor OVERLAY_L3GW_EVPN maximum-routes 0 neighbor UNDERLAY_L3GW_V4 peer group neighbor UNDERLAY_L3GW_V4 remote-as 65001.7 neighbor UNDERLAY_L3GW_V4 maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65002.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65002.7 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65002.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.3.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.4.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.102.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.102.102 peer group OVERLAY_SPINE_EVPN neighbor 192.168.101.7 peer group OVERLAY_L3GW_EVPN neighbor 10.99.0.0 peer group UNDERLAY_L3GW_V4 redistribute connected route-map CONNECTED ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate neighbor OVERLAY_L3GW_EVPN activate neighbor OVERLAY_L3GW_EVPN encapsulation vxlan neighbor default next-hop-self received-evpn-routes route-type ip-prefix ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate neighbor UNDERLAY_L3GW_V4 activate address-family rt-membership neighbor OVERLAY_SPINE_EVPN activate neighbor OVERLAY_L3GW_EVPN activate ! vlan 100 rd auto route-target both 10100:10100 </pre>	<pre> router bgp 65002.7 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_L3GW_EVPN peer group neighbor OVERLAY_L3GW_EVPN remote-as 65001.7 neighbor OVERLAY_L3GW_EVPN update-source Loopback0 neighbor OVERLAY_L3GW_EVPN bfd neighbor OVERLAY_L3GW_EVPN ebgp-multipath 2 neighbor OVERLAY_L3GW_EVPN maximum-routes 0 neighbor UNDERLAY_L3GW_V4 peer group neighbor UNDERLAY_L3GW_V4 remote-as 65001.7 neighbor UNDERLAY_L3GW_V4 maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65002.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65002.7 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65002.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.3.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.4.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.102.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.102.102 peer group OVERLAY_SPINE_EVPN neighbor 10.99.0.2 peer group UNDERLAY_L3GW_V4 neighbor 192.168.101.8 peer group OVERLAY_L3GW_EVPN redistribute connected route-map CONNECTED ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate neighbor OVERLAY_L3GW_EVPN activate neighbor OVERLAY_L3GW_EVPN encapsulation vxlan neighbor default next-hop-self received-evpn-routes route-type ip-prefix ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate neighbor UNDERLAY_L3GW_V4 activate address-family rt-membership neighbor OVERLAY_SPINE_EVPN activate neighbor OVERLAY_L3GW_EVPN activate ! vlan 100 rd auto route-target both 10100:10100 </pre>

	<pre> redistribute learned ! vlan 90 rd auto route-target both 1090:1090 redistribute learned vrf blue rd 192.168.102.7:2001 route-target import evpn 2001:2001 route-target import evpn 2001:1 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.102.7:2000 route-target import evpn 2000:2000 route-target import evpn 2000:1 route-target export evpn 2000:2000 redistribute connected </pre>	<pre> redistribute learned ! vlan 90 rd auto route-target both 1090:1090 redistribute learned vrf blue rd 192.168.102.8:2001 route-target import evpn 2001:2001 route-target import evpn 2001:1 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.102.8:2000 route-target import evpn 2000:2000 route-target import evpn 2000:1 route-target export evpn 2000:2000 redistribute connected </pre>
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Service Leaves

Function	DC-1-SL-1	DC1-SL-2
rBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
LAN	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! interface Vlan50 vrf red ip address 10.10.50.252/24 ip virtual-router address 10.10.50.254 ! interface Vlan60 vrf blue ip address 10.10.60.252/24 ip virtual-router address 10.10.60.254 </pre>	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! interface Vlan50 vrf red ip address 10.10.50.253/24 ip virtual-router address 10.10.50.254 ! interface Vlan60 vrf blue ip address 10.10.60.253/24 ip virtual-router address 10.10.60.254 </pre>
RF Instance	<pre> vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue ! ip route vrf blue 0.0.0.0/0 10.10.60.10 ip route vrf red 0.0.0.0/0 10.10.50.10 </pre>	<pre> vrf instance blue vrf instance red ! ip routing vrf red ip routing vrf blue ! ip route vrf blue 0.0.0.0/0 10.10.60.10 ip route vrf red 0.0.0.0/0 10.10.50.10 </pre>
Spines Uplink	<pre> interface Ethernet1 no switchport ip address 192.168.1.9/31 ! interface Ethernet2 no switchport ip address 192.168.2.9/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.1.11/31 ! interface Ethernet2 no switchport ip address 192.168.2.11/31 </pre>
GP Loopback0 outer ID	<pre> interface Loopback0 description BGP Router ID ip address 192.168.101.5/32 ! router general router-id ipv4 192.168.101.5 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.101.6/32 ! router general router-id ipv4 192.168.101.6 </pre>
TI Loopback1 TEP IP	<pre> interface Loopback1 description VTEP IP ip address 192.168.201.5/32 </pre>	<pre> interface Loopback1 description VTEP IP ip address 192.168.201.5/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 </pre>

	<pre> vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>	<pre> vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>
LAG Config	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 mtu 9214 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 mtu 9214 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
Unicast Gateway Virtual MAC address	ip virtual-router mac-address 00:1c:73:00:00:99	ip virtual-router mac-address 00:1c:73:00:00:99
P-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ip prefix-list DEFAULT-ONLY seq 10 permit 0.0.0.0/0 route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P ! route-map CORE-ROUTES-RED permit 10 match ip address prefix-list DEFAULT-ONLY ! route-map CORE-ROUTES-RED permit 20 set extcommunity rt 2000:1 ! route-map CORE-ROUTES-BLUE permit 10 match ip address prefix-list DEFAULT-ONLY ! route-map CORE-ROUTES-BLUE permit 20 set extcommunity rt 2001:1 </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ip prefix-list DEFAULT-ONLY seq 10 permit 0.0.0.0/0 route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P ! route-map CORE-ROUTES-RED permit 10 match ip address prefix-list DEFAULT-ONLY ! route-map CORE-ROUTES-RED permit 20 set extcommunity rt 2000:1 ! route-map CORE-ROUTES-BLUE permit 10 match ip address prefix-list DEFAULT-ONLY ! route-map CORE-ROUTES-BLUE permit 20 set extcommunity rt 2001:1 </pre>
BGP and iBGP Underlay GP/EVPN	<pre> router bgp 65001.5 bgp asn notation asdot router-id 192.168.101.5 no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor CORE peer group neighbor CORE maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65001.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65001.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65001.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.8 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.8 peer group UNDERLAY_SPINE_V4 neighbor 192.168.101.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.101.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED </pre>	<pre> router bgp 65001.5 bgp asn notation asdot router-id 192.168.101.6 no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor CORE peer group neighbor CORE maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65001.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65001.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65001.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.10 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.10 peer group UNDERLAY_SPINE_V4 neighbor 192.168.101.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.101.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED </pre>

<pre> ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor CORE activate neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate address-family rt-membership neighbor OVERLAY_SPINE_EVPN activate ! vrf blue rd 192.168.101.5:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 route-target import evpn 2001:1 route-target export evpn route-map CORE-ROUTES-BLUE bgp listen range 10.10.60.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static ! vrf red rd 192.168.101.5:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 route-target import evpn 2000:1 route-target export evpn route-map CORE-ROUTES-RED bgp listen range 10.10.50.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static </pre>	<pre> ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor CORE activate neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate address-family rt-membership neighbor OVERLAY_SPINE_EVPN activate ! vrf blue rd 192.168.101.6:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 route-target import evpn 2001:1 route-target export evpn route-map CORE-ROUTES-BLUE bgp listen range 10.10.60.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static ! vrf red rd 192.168.101.6:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 route-target import evpn 2000:1 route-target export evpn route-map CORE-ROUTES-RED bgp listen range 10.10.50.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static </pre>
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Function	DC-2-SL-1	DC2-SL-2
rBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
LAN	<pre> interface Vlan70 vrf red ip address 10.10.70.252/24 ip virtual-router address 10.10.70.254 ! interface Vlan80 vrf blue ip address 10.10.80.252/24 ip virtual-router address 10.10.80.254 </pre>	<pre> interface Vlan70 vrf red ip address 10.10.70.253/24 ip virtual-router address 10.10.70.254 ! interface Vlan80 vrf blue ip address 10.10.80.253/24 ip virtual-router address 10.10.80.254 </pre>
RF Instance	<pre> vrf instance blue vrf instance red ip routing vrf red ip routing vrf blue ip route vrf blue 0.0.0.0/0 10.10.80.10 ip route vrf red 0.0.0.0/0 10.10.70.10 </pre>	<pre> vrf instance blue vrf instance red ip routing vrf red ip routing vrf blue ip route vrf blue 0.0.0.0/0 10.10.80.10 ip route vrf red 0.0.0.0/0 10.10.70.10 </pre>
Spines Uplink	<pre> interface Ethernet1 no switchport ip address 192.168.3.1/31 ! interface Ethernet2 no switchport ip address 192.168.4.1/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.3.3/31 ! interface Ethernet2 no switchport ip address 192.168.4.3/31 </pre>
GP Loopback0 outer ID	<pre> interface Loopback0 description BGP Router ID </pre>	<pre> interface Loopback0 description BGP Router ID </pre>

	<pre> ip address 192.168.102.5/32 ! router general router-id ipv4 192.168.102.5 </pre>	<pre> ip address 192.168.102.6/32 ! router general router-id ipv4 192.168.102.5 </pre>
TI Loopback1 TEP IP	<pre> interface Loopback1 description VTEP IP ip address 192.168.202.5/32 ! </pre>	<pre> interface Loopback1 description VTEP IP ip address 192.168.202.5/32 ! </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 90 vni 1090 vxlan vlan 1000 vni 10100 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 90 vni 1090 vxlan vlan 1000 vni 10100 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>
MLAG Config	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
Broadcast Gateway Virtual MAC address	<pre> ip virtual-router mac-address 00:1c:73:00:00:99 </pre>	<pre> ip virtual-router mac-address 00:1c:73:00:00:99 </pre>
P-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.102.0/24 eq 32 seq 20 permit 192.168.202.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.3.0/24 ge 31 seq 20 permit 192.168.4.0/24 ge 31 ! ip prefix-list DEFAULT-ONLY seq 10 permit 0.0.0.0/0 route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P route-map CORE-ROUTES-RED permit 10 match ip address prefix-list DEFAULT-ONLY ! route-map CORE-ROUTES-RED permit 20 set extcommunity rt 2000:1 ! route-map CORE-ROUTES-BLUE permit 10 match ip address prefix-list DEFAULT-ONLY ! route-map CORE-ROUTES-BLUE permit 20 set extcommunity rt 2001:1 </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.102.0/24 eq 32 seq 20 permit 192.168.202.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.3.0/24 ge 31 seq 20 permit 192.168.4.0/24 ge 31 ! ip prefix-list DEFAULT-ONLY seq 10 permit 0.0.0.0/0 route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P route-map CORE-ROUTES-RED permit 10 match ip address prefix-list DEFAULT-ONLY ! route-map CORE-ROUTES-RED permit 20 set extcommunity rt 2000:1 ! route-map CORE-ROUTES-BLUE permit 10 match ip address prefix-list DEFAULT-ONLY ! route-map CORE-ROUTES-BLUE permit 20 set extcommunity rt 2001:1 </pre>
BGP and iBGP Underlay GP/EVPN	<pre> router bgp 65002.5 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor CORE peer group neighbor CORE maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65002.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65002.5 </pre>	<pre> router bgp 65002.5 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor CORE peer group neighbor CORE maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65002.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65002.5 </pre>

<pre> neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65002.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.3.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.4.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.102.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.102.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 100 rd auto route-target both 10100:10100 redistribute learned ! vlan 90 rd auto route-target both 1090:1090 redistribute learned address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor CORE activate neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate address-family rt-membership neighbor OVERLAY_SPINE_EVPN activate ! vrf blue rd 192.168.102.5:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 route-target import evpn 2001:1 route-target export evpn route-map CORE-ROUTES-BLUE bgp listen range 10.10.80.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static ! vrf red rd 192.168.102.5:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 route-target import evpn 2000:1 route-target export evpn route-map CORE-ROUTES-RED bgp listen range 10.10.70.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static </pre>	<pre> neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65002.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.3.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.4.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.102.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.102.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 100 rd auto route-target both 10100:10100 redistribute learned ! vlan 90 rd auto route-target both 1090:1090 redistribute learned address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor CORE activate neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate address-family rt-membership neighbor OVERLAY_SPINE_EVPN activate ! vrf blue rd 192.168.102.6:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 route-target import evpn 2001:1 route-target export evpn route-map CORE-ROUTES-BLUE bgp listen range 10.10.80.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static ! vrf red rd 192.168.102.6:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 route-target import evpn 2000:1 route-target export evpn route-map CORE-ROUTES-RED bgp listen range 10.10.70.0/24 peer-group CORE peer-filter CORE-AS-RANGE redistribute connected redistribute static </pre>
---	---

Verification

Verification steps specific to L3 EVPN filtering and RT membership:

show bgp evpn route-type ip-prefix ipv4 vni <vnid> next-hop <vtep_ip> detail

Verify received EVPN Type-5 routes from remote BWG leaf.

DC-1-BL-1#show bgp evpn route-type ip-prefix 70.70.70.1/32 vni 2000 next-hop 192.168.202.7

BGP routing table information for VRF default
 Router identifier 192.168.101.7, local AS number 4259905543
 BGP routing table entry for ip-prefix 70.70.70.1/32, Route Distinguisher: 192.168.102.5:2000
 Paths: 1 available
 65002.7 65002.65000 65002.5 65002.100
 192.168.202.7 from 192.168.102.7 (192.168.102.7)
 Origin IGP, metric -, localpref 100, weight 0, valid, external, best
 Extended Community: **Route-Target-AS:2000:1** TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:02:ee:e1
 VNI: 2000

BGP routing table entry for ip-prefix 70.70.70.1/32, Route Distinguisher: 192.168.102.6:2000
 Paths: 1 available
 65002.7 65002.65000 65002.5 65002.100
 192.168.202.7 from 192.168.102.7 (192.168.102.7)
 Origin IGP, metric -, localpref 100, weight 0, valid, external, best
 Extended Community: **Route-Target-AS:2000:1** TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:02:ee:e1
 VNI: 2000

DC-1-BL-1#show bgp evpn route-type ip-prefix 0.0.0.0/0 vni 2000 next-hop 192.168.202.7

```
BGP routing table information for VRF default
Router identifier 192.168.101.7, local AS number 4259905543
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.102.5:2000
Paths: 1 available
  65002.7 65002.65000 65002.5
    192.168.202.7 from 192.168.102.7 (192.168.102.7)
      Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, best
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:02:ee:e1
      VNI: 2000
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.102.6:2000
Paths: 1 available
  65002.7 65002.65000 65002.5
    192.168.202.7 from 192.168.102.7 (192.168.102.7)
      Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, best
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:02:ee:e1
      VNI: 2000
```

show bgp evpn route-type ip-prefix ipv4 vni <vnid> next-hop <vtep_ip> detail

Verify received route with rewritten RT via EVPN Type-5 routes from the local BGW leaf.

```
DC-1-SL-1#show bgp evpn route-type ip-prefix 70.70.70.1/32 vni 2000 next-hop 192.168.201.7
BGP routing table information for VRF default
Router identifier 192.168.101.5, local AS number 4259905541
BGP routing table entry for ip-prefix 70.70.70.1/32, Route Distinguisher: 192.168.102.5:2000
Paths: 2 available
  65001.65000 65001.7 65002.7 65002.65000 65002.5 65002.100
    192.168.201.7 from 192.168.101.101 (192.168.101.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:1 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
      VNI: 2000
  65001.65000 65001.7 65002.7 65002.65000 65002.5 65002.100
    192.168.201.7 from 192.168.101.102 (192.168.101.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:1 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
      VNI: 2000
BGP routing table entry for ip-prefix 70.70.70.1/32, Route Distinguisher: 192.168.102.6:2000
Paths: 2 available
  65001.65000 65001.7 65002.7 65002.65000 65002.5 65002.100
    192.168.201.7 from 192.168.101.101 (192.168.101.101)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:1 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
      VNI: 2000
  65001.65000 65001.7 65002.7 65002.65000 65002.5 65002.100
    192.168.201.7 from 192.168.101.102 (192.168.101.102)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:1 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
      VNI: 2000
```

DC-1-SL-1

```
DC-1-SL-1#show bgp evpn route-type ip-prefix 0.0.0.0/0 vni 2000 next-hop 192.168.201.7
BGP routing table information for VRF default
Router identifier 192.168.101.5, local AS number 4259905541
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.102.5:2000
Paths: 2 available
  65001.65000 65001.7 65002.7 65002.65000 65002.5
    192.168.201.7 from 192.168.101.101 (192.168.101.101)
      Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
      VNI: 2000
  65001.65000 65001.7 65002.7 65002.65000 65002.5
    192.168.201.7 from 192.168.101.102 (192.168.101.102)
      Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
      VNI: 2000
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.102.6:2000
Paths: 2 available
  65001.65000 65001.7 65002.7 65002.65000 65002.5
    192.168.201.7 from 192.168.101.101 (192.168.101.101)
      Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
      VNI: 2000
  65001.65000 65001.7 65002.7 65002.65000 65002.5
    192.168.201.7 from 192.168.101.102 (192.168.101.102)
      Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:01:ee:e1
      VNI: 2000
```

Note: Remote routes have the next-hop rewritten to the local Border Gateway Leaf. Default route is within the common RT, but Service leave learned routers set with a different RT.

show ip route vrf <svrf_name>

Verify the remote EVPN type-5 routes are received.

```
DC-1-SL-1#show ip route vrf red
VRF: red

Gateway of last resort:
S      0.0.0.0/0 [1/0] via 10.10.50.10, Vlan50

C      10.10.10.0/24 is directly connected, Vlan10
C      10.10.20.0/24 is directly connected, Vlan20
C      10.10.50.0/24 is directly connected, Vlan50
B E    10.10.70.0/24 [20/0] via VTEP 192.168.201.7 VNI 2000 router-mac 02:00:00:01:ee:e1
B E    10.10.90.0/24 [20/0] via VTEP 192.168.201.7 VNI 2000 router-mac 02:00:00:01:ee:e1
B E    50.50.50.1/32 [20/0] via 10.10.50.10, Vlan50
B E    50.50.50.2/32 [20/0] via 10.10.50.10, Vlan50
B E    70.70.70.1/32 [20/0] via VTEP 192.168.201.7 VNI 2000 router-mac 02:00:00:01:ee:e1
B E    70.70.70.2/32 [20/0] via VTEP 192.168.201.7 VNI 2000 router-mac 02:00:00:01:ee:e1

DC-1-SL-1#show ip route vrf blue
VRF: blue

Gateway of last resort:
S      0.0.0.0/0 [1/0] via 10.10.60.10, Vlan60

C      10.10.30.0/24 is directly connected, Vlan30
C      10.10.40.0/24 is directly connected, Vlan40
C      10.10.60.0/24 is directly connected, Vlan60
B E    10.10.80.0/24 [20/0] via VTEP 192.168.201.7 VNI 2001 router-mac 02:00:00:01:ee:e1
B E    10.10.100.0/24 [20/0] via VTEP 192.168.201.7 VNI 2001 router-mac 02:00:00:01:ee:e1
B E    60.60.60.1/32 [20/0] via 10.10.60.10, Vlan60
B E    60.60.60.2/32 [20/0] via 10.10.60.10, Vlan60
B E    80.80.80.1/32 [20/0] via VTEP 192.168.201.7 VNI 2001 router-mac 02:00:00:01:ee:e1
B E    80.80.80.2/32 [20/0] via VTEP 192.168.201.7 VNI 2001 router-mac 02:00:00:01:ee:e1
```

```
DC-1-CL-1#show ip route vrf red
VRF: red

Gateway of last resort:
B E      0.0.0.0/0 [20/0] via VTEP 192.168.201.5 VNI 2000 router-mac 02:00:00:01:dd:d1

C      10.10.10.0/24 is directly connected, Vlan10
C      10.10.20.0/24 is directly connected, Vlan20
B E      10.10.90.0/24 [20/0] via VTEP 192.168.201.7 VNI 2000 router-mac 02:00:00:01:ee:e1

DC-1-CL-1#show ip route vrf blue
VRF: blue
Gateway of last resort:
B E      0.0.0.0/0 [20/0] via VTEP 192.168.201.5 VNI 2001 router-mac 02:00:00:01:dd:d1

C      10.10.30.0/24 is directly connected, Vlan30
C      10.10.40.0/24 is directly connected, Vlan40
B E      10.10.100.0/24 [20/0] via VTEP 192.168.201.7 VNI 2001 router-mac 02:00:00:01:ee:e1
```

ping <remote_host_ip>

Verify connectivity between Routers

```
DC-1-FW-1#ping vrf red 70.70.70.1
PING 70.70.70.1 (70.70.70.1) 72(100) bytes of data.
80 bytes from 70.70.70.1: icmp_seq=1 ttl=60 time=58.1 ms
80 bytes from 70.70.70.1: icmp_seq=2 ttl=60 time=62.1 ms
80 bytes from 70.70.70.1: icmp_seq=3 ttl=60 time=95.1 ms
80 bytes from 70.70.70.1: icmp_seq=4 ttl=60 time=87.4 ms
80 bytes from 70.70.70.1: icmp_seq=5 ttl=60 time=87.3 ms

--- 70.70.70.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 42ms
rtt min/avg/max/mdev = 58.130/78.047/95.105/14.942 ms, pipe 5, ipg/ewma 10.633/68.871 ms

DC-1-FW#ping vrf red 80.80.80.1
PING 80.80.80.1 (80.80.80.1) 72(100) bytes of data.
80 bytes from 80.80.80.1: icmp_seq=1 ttl=61 time=67.3 ms
80 bytes from 80.80.80.1: icmp_seq=2 ttl=61 time=89.9 ms
80 bytes from 80.80.80.1: icmp_seq=3 ttl=61 time=82.5 ms
80 bytes from 80.80.80.1: icmp_seq=4 ttl=61 time=73.8 ms
80 bytes from 80.80.80.1: icmp_seq=5 ttl=61 time=78.2 ms

--- 80.80.80.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 45ms
rtt min/avg/max/mdev = 67.327/78.378/89.915/7.660 ms, pipe 5, ipg/ewma 11.498/72.754 ms
```

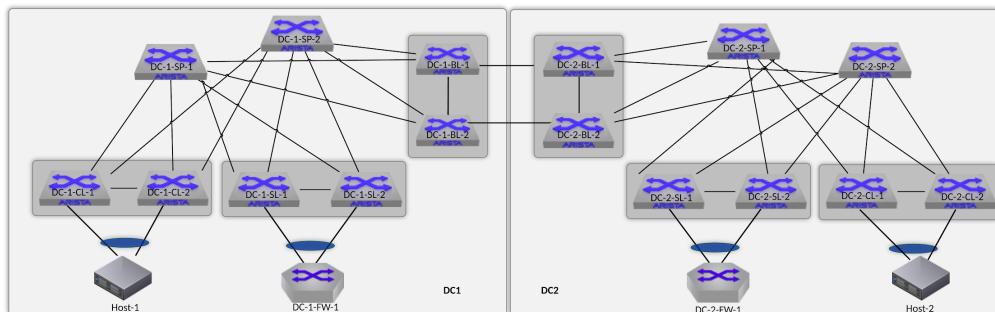
EVPN Symmetric IRB - EVPN Multidomain

Deployment Consideration

- Ability to interconnect EVPN VXLAN domains.
- Between domains, gateway nodes advertise intra-domain EVPN routes with the gateway inserting itself as the nexthop.
- From the perspective of a gateway node, there is the local EVPN domain, which contains intra-domain VTEPs and peer gateway nodes, and the remote EVPN domain, which contains the gateway nodes of other EVPN VXLAN domains.
- From the perspective of a leaf VTEP, all routes to remote domains appear to be directly connected to the gateway nodes in that domain. This means that leaf VTEPs are not visible to remote domains.
- Collapsing all VTEPs in a domain behind the gateway nodes results in significant hardware savings in terms of flood-list entries.
- Gateway nodes only advertise intra-domain MAC-IP (type-2), IMET (type-3), and IP-PREFIX (type-5) routes to remote domains.
- The asymmetric, symmetric, and centralized gateway routing models are supported with multi-domain EVPN VXLAN, while the overlay may be IPv4 or IPv6. For an IPv4 overlay with L2 VTEPs, the gateway nodes will proxy reply to ARP requests when possible in order to avoid flooding to remote domains.
- Gateway redundancy is accomplished by provisioning an MLAG pair (no A-A multihoming).
- Check specific platform support and tcam profile. Support introduced in 4.26.1F (only the BGW leaves must be upgraded).

Refer to the following documentation for more information: [EVPN Multidomain VXLAN](#)

Topology



Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
DC-1-SP-1	192.168.101.101	N/A	65001.65000	N/A	N/A	N/A	0000.0001.bbb1
DC-1-SP-2	192.168.101.102	N/A	65001.65000	N/A	N/A	N/A	0000.0001.bbb2
DC-2-SP-1	192.168.102.101	N/A	65001.65000	N/A	N/A	N/A	0000.0002.bbb1
DC-2-SP-2	192.168.102.102	N/A	65001.65000	N/A	N/A	N/A	0000.0002.bbb2
DC-1-CL-1	192.168.101.1	192.168.201.1	65001.1	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0001.aaa1
DC-1-CL-2	192.168.101.2	192.168.201.1	65001.1	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0001.aaa2
DC-1-SL-1	192.168.101.5	192.168.201.5	65001.5	Red Red Red Blue Blue Blue	VLAN10 VLAN20 VLAN50 VLAN30 VLAN40 VLAN60	10.10.10.254/24 10.10.20.254/24 10.10.50.254/24 10.10.30.254/24 10.10.40.254/24 10.10.60.254/24	0000.0001.ddd1
DC-1-SL-2	192.168.101.5	192.168.201.5	65001.5	Red Red Red Blue Blue Blue	VLAN10 VLAN20 VLAN50 VLAN30 VLAN40 VLAN60	10.10.10.254/24 10.10.20.254/24 10.10.50.254/24 10.10.30.254/24 10.10.40.254/24 10.10.60.254/24	0000.0001.ddd2

DC-2-SL-1	192.168.102.5	192.168.202.5	65002.5	Red Red Red Blue Blue Blue	VLAN10 VLAN20 VLAN70 VLAN30 VLAN40 VLAN80	10.10.10.254/24 10.10.20.254/24 10.10.70.254/24 10.10.30.254/24 10.10.40.254/24 10.10.80.254/24	0000.0002.ddd1
DC-2-SL-2	192.168.102.6	192.168.202.5	65002.5	Red Red Red Blue Blue Blue	VLAN10 VLAN20 VLAN70 VLAN30 VLAN40 VLAN80	10.10.10.254/24 10.10.20.254/24 10.10.70.254/24 10.10.30.254/24 10.10.40.254/24 10.10.80.254/24	0000.0002.ddd2
DC-2-CL-1	192.168.102.1	192.168.202.1	65002.1	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0002.aaa1
DC-2-CL-2	192.168.102.2	192.168.202.2	65002.1	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24	0000.0002.aaa2
DC-1-BL-1	192.168.101.7	192.168.201.7	65001.7	Red Blue	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	0000.0001.eee1
DC-1-BL-2	192.168.101.8	192.168.201.7	65001.7	Red Blue	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	0000.0001.eee2
DC-2-BL-1	192.168.102.7	192.168.202.7	65002.7	Red Blue	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	0000.0002.eee1
DC-2-BL-2	192.168.102.8	192.168.202.7	65002.7	Red Blue	Red Red Blue Blue	VLAN10 VLAN20 VLAN30 VLAN40	0000.0002.eee2
Host-1	N/A	N/A	N/A	Red Blue	VLAN10 VLAN40	10.10.10.1/24 10.10.40.1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	Red Blue	VLAN10 VLAN40	10.10.10.3/24 10.10.40.3/24	0000.0000.3333
DC-1-FW-1	N/A	N/A	65001.100	Red Blue	VLAN50 VLAN60	10.10.50.10/24 10.10.60.10/24	0000.0000.1111
DC-1-FW-2	N/A	N/A	65002.100	Red Blue	VLAN70 VLAN80	10.1070.10/24 10.10.80.10/24	0000.0000.2222

Important Notes

- Border Gateway leaves provide connectivity to remote subnets:
 - Vlans 10,20,30,40 stretched across the two domains.
- Multi-domain configuration:
 - neighbor default next-hop-self received-evpn-routes route-type ip-prefix:** no type-5 route crosses the EVPN domains.
Note: type-2 host routes (/32s) are still advertised between domains.
 - neighbor default next-hop-self received-evpn-routes route-type ip-prefix inter-domain:** type-5 routes cross the EVPN domains. Note: type-2 host routes (/32s) are also advertised between domains.
- Service leafs:
 - Inter-VRF routing provided by the FW/Router using local VLANs with VARP (50,60 on DC1, 70,80 on DC2). Static default route in the services leaves to the FW/Router to ensure inter-VRF leaking occurs regardless of external connectivity problems.
 - Service leafs learning routes from FW/Router via eBGP on each IP VRF:
 - Default routes advertised as a EVPN type-5 from the service leaves to all TORs. Less preferred default route from remote sites learned as a backup path (due to longer AS-Path).
 - BGP listen range configured within the IP VRFs for BGP peerings with the FW/Router.

- FW/Router:
 - VRF leaking used for inter-VRF routing.
 - Loopbacks redistributed into BGP to test end-to-end connectivity across the sites.

Configuration

The following configuration is required for Symmetric IRB:

- Underlay
 - Multi-agent model (ArBGP)
 - eBGP IPv4 Unicast peering between spines and leaf switches
 - iBGP IPv4 Unicast peering between MLAG pair
 - MLAG
- Border Gateways:
 - eBGP underlay session to remote Border Gateway (any protocol can be used for this).
 - eBGP EVPN session to remote Border Gateway.
 - Encapsulation and next-hop configuration.
 - IP vrf configuration.
 - **EVPN remote domain.**
 - **For IP-VRFs, the configured route-targets apply to both domains.**
 - **MAC-VRFs RTs for local and remote domains can be different (example uses the same RTs).**

```
route-target both 1020:1020
route-target import export evpn domain remote 1021:1021
```

- Service leaves:
 - Transit VLANs for inter-vrf routing.
 - eBGP peering to FW/Router.
- Overlay
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VxLAN
 - MLAG Shared Router MAC Address
 - VLAN to VNI mapping (L2VNI)
 - VRF to VNI mapping (L3VNI)
 - BGP/EVPN
 - MAC-VRF
 - IP-VRF
- Tenant
 - VLAN
 - Tenant VRF
 - Anycast Gateway
- Platform specific (See [Appendix A](#))

Note: Configuration lines in red font color are not supported in vEOS. Some configs not relevant are omitted.

Border Gateways

Function	DC-1-BL-1	DC-1-BL-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	<pre>interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24</pre>	<pre>interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24</pre>
VRF Instance	<pre>vrf instance blue vrf instance red ip routing vrf red ip routing vrf blue</pre>	<pre>vrf instance blue vrf instance red ip routing vrf red ip routing vrf blue</pre>
Spines Uplink	<pre>interface Ethernet1 no switchport ip address 192.168.1.13/31</pre>	<pre>interface Ethernet1 no switchport ip address 192.168.1.15/31</pre>

	<pre> ! interface Ethernet2 no switchport ip address 192.168.2.13/31 </pre>	<pre> ! interface Ethernet2 no switchport ip address 192.168.2.15/31 </pre>
BGP Loopback0 Router ID	<pre> interface Loopback0 description BGP Router ID ip address 192.168.101.7/32 ! router general router-id ipv4 192.168.101.7 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.101.8/32 ! router general router-id ipv4 192.168.101.8 </pre>
VTI Loopback1 VTEP IP	<pre> interface Loopback1 description VTEP IP ip address 192.168.201.7/32 </pre>	<pre> interface Loopback1 description VTEP IP ip address 192.168.201.7/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>
MLAG Config	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
Anycast Gateway Virtual MAC address	<pre> ip virtual-router mac-address 00:1c:73:00:00:99 </pre>	<pre> ip virtual-router mac-address 00:1c:73:00:00:99 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.101.0/24 eq 32 seq 20 permit 192.168.201.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65001.7 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_L3GW_EVPN peer group neighbor OVERLAY_L3GW_EVPN remote-as 65002.7 neighbor OVERLAY_L3GW_EVPN update-source Loopback0 neighbor OVERLAY_L3GW_EVPN bfd neighbor OVERLAY_L3GW_EVPN ebgp-multihop 2 neighbor OVERLAY_L3GW_EVPN maximum-routes 0 neighbor UNDERLAY_L3GW_V4 peer group neighbor UNDERLAY_L3GW_V4 remote-as 65002.7 neighbor UNDERLAY_L3GW_V4 maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN remote-as 65001.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65001.7 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65001.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.12 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.12 peer group UNDERLAY_SPINE_V4 neighbor 192.168.101.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.101.102 peer group OVERLAY_SPINE_EVPN neighbor 192.168.102.7 peer group OVERLAY_L3GW_EVPN </pre>	<pre> router bgp 65001.7 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_L3GW_EVPN peer group neighbor OVERLAY_L3GW_EVPN remote-as 65002.7 neighbor OVERLAY_L3GW_EVPN update-source Loopback0 neighbor OVERLAY_L3GW_EVPN bfd neighbor OVERLAY_L3GW_EVPN ebgp-multihop 2 neighbor OVERLAY_L3GW_EVPN maximum-routes 0 neighbor UNDERLAY_L3GW_V4 peer group neighbor UNDERLAY_L3GW_V4 remote-as 65002.7 neighbor UNDERLAY_L3GW_V4 maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN remote-as 65001.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN send-community neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65001.7 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65001.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.14 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.14 peer group UNDERLAY_SPINE_V4 neighbor 192.168.101.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.101.102 peer group OVERLAY_SPINE_EVPN </pre>

```

neighbor 10.99.0.1 peer group UNDERLAY_L3GW_V4
redistribute connected route-map CONNECTED
!
address-family evpn
  neighbor OVERLAY_SPINE_EVPN activate
  neighbor OVERLAY_L3GW_EVPN activate
  neighbor OVERLAY_L3GW_EVPN encapsulation vxlan
  neighbor OVERLAY_L3GW_EVPN domain remote
  neighbor default next-hop-self received-evpn-routes route-type ip-prefix inter-domain
!
address-family ipv4
  neighbor UNDERLAY_MLAG_PEER_V4 activate
  neighbor UNDERLAY_SPINE_V4 activate
  neighbor UNDERLAY_L3GW_V4 activate

vlan 10
  rd evpn domain all 192.168.101.7:10
  route-target import export evpn domain remote 1010:1010
  redistribute learned
!
vlan 20
  rd evpn domain all 192.168.101.7:20
  route-target import export evpn domain remote 1020:1020
  redistribute learned
!
vlan 30
  rd evpn domain all 192.168.101.7:30
  route-target import export evpn domain remote 1030:1030
  redistribute learned
!
vlan 40
  rd evpn domain all 192.168.101.7:40
  route-target import export evpn domain remote 1040:1040
  redistribute learned

vrf blue
  rd 192.168.101.7:2001
  route-target import evpn 2001:2001
  route-target export evpn 2001:2001
  redistribute connected
!
vrf red
  rd 192.168.101.7:2000
  route-target import evpn 2000:2000
  route-target export evpn 2000:2000
  redistribute connected

neighbor 10.99.0.3 peer group UNDERLAY_L3GW_V4
neighbor 192.168.102.8 peer group OVERLAY_L3GW_EVPN
redistribute connected route-map CONNECTED
!
address-family evpn
  neighbor OVERLAY_SPINE_EVPN activate
  neighbor OVERLAY_L3GW_EVPN activate
  neighbor OVERLAY_L3GW_EVPN encapsulation vxlan
  neighbor OVERLAY_L3GW_EVPN domain remote
  neighbor default next-hop-self received-evpn-routes route-type ip-prefix inter-domain
!
address-family ipv4
  neighbor UNDERLAY_MLAG_PEER_V4 activate
  neighbor UNDERLAY_SPINE_V4 activate
  neighbor UNDERLAY_L3GW_V4 activate

vlan 10
  rd evpn domain all 192.168.101.8:10
  route-target import export evpn domain remote 1010:1010
  redistribute learned
!
vlan 20
  rd evpn domain all 192.168.101.8:20
  route-target import export evpn domain remote 1020:1020
  redistribute learned
!
vlan 30
  rd evpn domain all 192.168.101.8:30
  route-target import export evpn domain remote 1030:1030
  redistribute learned
!
vlan 40
  rd evpn domain all 192.168.101.8:40
  route-target import export evpn domain remote 1040:1040
  redistribute learned

vrf blue
  rd 192.168.101.8:2001
  route-target import evpn 2001:2001
  route-target export evpn 2001:2001
  redistribute connected
!
vrf red
  rd 192.168.101.8:2000
  route-target import evpn 2000:2000
  route-target export evpn 2000:2000
  redistribute connected

```

Function	DC-2-BL-1	DC-2-BL-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 </pre>	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 </pre>
VRF Instance	<pre> vrf instance blue vrf instance red ip routing vrf red ip routing vrf blue </pre>	<pre> vrf instance blue vrf instance red ip routing vrf red ip routing vrf blue </pre>
Spines Uplink	<pre> interface Ethernet1 no switchport ip address 192.168.3.5/31 ! interface Ethernet2 no switchport ip address 192.168.4.5/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.3.7/31 ! interface Ethernet2 no switchport ip address 192.168.4.7/31 </pre>
BGP Loopback0 Router ID	<pre> interface Loopback0 description BGP Router ID ip address 192.168.102.7/32 ! router general router-id ipv4 192.168.102.7 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.102.8/32 ! router general router-id ipv4 192.168.102.8 </pre>
VTI Loopback1 VTEP IP	<pre> interface Loopback1 description VTEP IP ip address 192.168.202.7/32 </pre>	<pre> interface Loopback1 description VTEP IP ip address 192.168.202.7/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan udp-port 4789 </pre>

	<pre> vxlan vlan 90 vni 1090 vxlan vlan 100 vni 10100 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>	<pre> vxlan vlan 90 vni 1090 vxlan vlan 100 vni 10100 vxlan vrf blue vni 2001 vxlan vrf red vni 2000 </pre>
MLAG Config	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
Anycast Gateway Virtual MAC address	ip virtual-router mac-address 00:1c:73:00:00:99	ip virtual-router mac-address 00:1c:73:00:00:99
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.102.0/24 eq 32 seq 20 permit 192.168.202.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.3.0/24 ge 31 seq 20 permit 192.168.4.0/24 ge 31 route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.102.0/24 eq 32 seq 20 permit 192.168.202.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.3.0/24 ge 31 seq 20 permit 192.168.4.0/24 ge 31 route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65002.7 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_L3GW_EVPN peer group neighbor OVERLAY_L3GW_EVPN remote-as 65001.7 neighbor OVERLAY_L3GW_EVPN update-source Loopback0 neighbor OVERLAY_L3GW_EVPN bfd neighbor OVERLAY_L3GW_EVPN ebgp-multihop 2 neighbor OVERLAY_L3GW_EVPN maximum-routes 0 neighbor UNDERLAY_L3GW_V4 peer group neighbor UNDERLAY_L3GW_V4 remote-as 65001.7 neighbor UNDERLAY_L3GW_V4 maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65002.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65002.7 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65002.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.3.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.4.4 peer group UNDERLAY_SPINE_V4 neighbor 192.168.102.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.102.102 peer group OVERLAY_SPINE_EVPN neighbor 192.168.101.7 peer group OVERLAY_L3GW_EVPN neighbor 10.99.0.0 peer group UNDERLAY_L3GW_V4 redistribute connected route-map CONNECTED ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate neighbor OVERLAY_L3GW_EVPN activate neighbor OVERLAY_L3GW_EVPN encapsulation vxlan neighbor OVERLAY_L3GW_EVPN domain remote neighbor default next-hop-self received-evpn-routes route-type ip-prefix inter-domain ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate neighbor UNDERLAY_L3GW_V4 activate vlan 10 rd evpn domain all 192.168.102.7:10 route-target import export evpn domain remote 1010:1010 redistribute learned !</pre>	<pre> router bgp 65002.7 bgp asn notation asdot no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_L3GW_EVPN peer group neighbor OVERLAY_L3GW_EVPN remote-as 65001.7 neighbor OVERLAY_L3GW_EVPN update-source Loopback0 neighbor OVERLAY_L3GW_EVPN bfd neighbor OVERLAY_L3GW_EVPN ebgp-multihop 2 neighbor OVERLAY_L3GW_EVPN maximum-routes 0 neighbor UNDERLAY_L3GW_V4 peer group neighbor UNDERLAY_L3GW_V4 remote-as 65001.7 neighbor UNDERLAY_L3GW_V4 maximum-routes 12000 neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65002.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65002.7 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65002.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.3.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.4.6 peer group UNDERLAY_SPINE_V4 neighbor 192.168.102.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.102.102 peer group OVERLAY_SPINE_EVPN neighbor 10.99.0.2 peer group UNDERLAY_L3GW_V4 neighbor 192.168.101.8 peer group OVERLAY_L3GW_EVPN redistribute connected route-map CONNECTED ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate neighbor OVERLAY_L3GW_EVPN activate neighbor OVERLAY_L3GW_EVPN encapsulation vxlan neighbor OVERLAY_L3GW_EVPN domain remote neighbor default next-hop-self received-evpn-routes route-type ip-prefix inter-domain ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate neighbor UNDERLAY_L3GW_V4 activate vlan 10 rd evpn domain all 192.168.102.8:10 route-target import export evpn domain remote 1010:1010 redistribute learned !</pre>

<pre>vlan 20 rd evpn domain all 192.168.102.7:20 route-target import export evpn domain remote 1020:1020 redistribute learned ! vlan 30 rd evpn domain all 192.168.102.7:30 route-target import export evpn domain remote 1030:1030 redistribute learned ! vlan 40 rd evpn domain all 192.168.102.7:40 route-target import export evpn domain remote 1040:1040 redistribute learned vrf blue rd 192.168.102.7:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.102.7:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected</pre>	<pre>vlan 20 rd evpn domain all 192.168.102.8:20 route-target import export evpn domain remote 1020:1020 redistribute learned ! vlan 30 rd evpn domain all 192.168.102.8:30 route-target import export evpn domain remote 1030:1030 redistribute learned ! vlan 40 rd evpn domain all 192.168.102.8:40 route-target import export evpn domain remote 1040:1040 redistribute learned vrf blue rd 192.168.102.8:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 redistribute connected ! vrf red rd 192.168.102.8:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected</pre>
---	---

Verification

Verification steps specific to L3 Border Gateway Feature:

Show ip bgp summary	
Verify the peerings with local Spines, MLAG peer and remote site	
DC-1-BL-1	<pre>DC-1-BL-1#show ip bgp summ BGP summary information for VRF default Router identifier 192.168.101.7, local AS number 65001.7 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRc d PfxAcc 10.99.0.1 4 65002.7 15766 15787 0 0 18:37:33 Estab 20 20 172.16.0.2 4 65001.7 15768 15785 0 0 18:38:24 Estab 34 34 192.168.1.12 4 65001.65000 15790 15785 0 0 18:38:21 Estab 11 11 192.168.2.12 4 65001.65000 15750 15780 0 0 18:38:20 Estab 11 11</pre>
DC-2-BL-1	<pre>DC-1-BL-2#show ip bgp summ BGP summary information for VRF default Router identifier 192.168.101.8, local AS number 65001.7 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRc d PfxAcc 10.99.0.3 4 65002.7 119 114 0 0 00:07:20 Estab 20 20 172.16.0.1 4 65001.7 119 120 0 0 00:07:25 Estab 35 35 192.168.1.14 4 65001.65000 111 118 0 0 00:07:20 Estab 11 11 192.168.2.14 4 65001.65000 113 114 0 0 00:07:20 Estab 11 11</pre>

show bgp evpn summary	
Verify the eBGP IPv4 EVPN peering with local Spines and remote BGW leaves	
DC-1-BL-1	<pre>DC-1-BL-1#show bgp evpn summ BGP summary information for VRF default Router identifier 192.168.101.7, local AS number 65001.7 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRc d PfxAcc 192.168.101.101 4 65001.65000 327 269 0 0 00:00:38 Estab 72 72 192.168.101.102 4 65001.65000 364 336 0 0 00:00:38 Estab 72 72 192.168.102.7 4 65002.7 200 240 0 0 00:00:39 Estab 34 34</pre>
DC-2-BL-1	<pre>DC-1-BL-2#show bgp evpn sum BGP summary information for VRF default Router identifier 192.168.101.8, local AS number 65001.7 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRc d PfxAcc 192.168.101.101 4 65001.65000 316 272 0 0 00:01:05 Estab 72 72 192.168.101.102 4 65001.65000 349 349 0 0 00:01:05 Estab 72 72 192.168.102.8 4 65002.7 202 245 0 0 00:01:06 Estab 34 34</pre>

	<pre>show interfaces vxlan 1</pre> <p>Verify the interface VxLAN 1 is connected Verify EVPN is used for flood list population and remote MAC learning Verify VRFs are mapped to the correct VNIs</p>
DC-1-BL-1	<pre>DC-1-BL-1#show int vxlan 1 Vxlani is up, line protocol is up (connected) Hardware is Vxlan Source interface is Loopback1 and is active with 192.168.201.7 Replication/Flood Mode is headend with Flood List Source: EVPN Remote MAC learning via EVPN VNI mapping to VLANs Static VLAN to VNI mapping is [10, 1010] [20, 1020] [30, 1030] [40, 1040] Dynamic VLAN to VNI mapping for 'evpn' is [4090, 2001] [4091, 2000] Note: All Dynamic VLANs used by VCS are internal VLANs. Use 'show vxlan vni' for details. Static VRF to VNI mapping is [blue, 2001] [red, 2000] Headend replication flood vtep list is: 10 192.168.201.5 192.168.201.1 192.168.202.7 20 192.168.201.5 192.168.201.1 192.168.202.7 30 192.168.201.5 192.168.201.1 192.168.202.7 40 192.168.201.5 192.168.201.1 192.168.202.7 MLAG Shared Router MAC is 521d.0077.caef VTEP to VTEP bridging is enabled</pre>
DC-2-BL-1	<pre>Vxlani is up, line protocol is up (connected) Hardware is Vxlan Source interface is Loopback1 and is active with 192.168.201.7 Replication/Flood Mode is headend with Flood List Source: EVPN Remote MAC learning via EVPN VNI mapping to VLANs Static VLAN to VNI mapping is [10, 1010] [20, 1020] [30, 1030] [40, 1040] Dynamic VLAN to VNI mapping for 'evpn' is [4090, 2001] [4091, 2000] Note: All Dynamic VLANs used by VCS are internal VLANs. Use 'show vxlan vni' for details. Static VRF to VNI mapping is [blue, 2001] [red, 2000] Headend replication flood vtep list is: 10 192.168.201.5 192.168.201.1 192.168.202.7 20 192.168.201.5 192.168.201.1 192.168.202.7 30 192.168.201.5 192.168.201.1 192.168.202.7 40 192.168.201.5 192.168.201.1 192.168.202.7 MLAG Shared Router MAC is 521d.0077.caef VTEP to VTEP bridging is enabled</pre>

	<pre>show bgp evpn route-type ip-prefix ipv4 vni <vni_id> next-hop <vtep_ip> detail</pre> <p>Verify received routes in VNI 2000 via EVPN Type-5 routes from remote BWG leaf.</p>
DC-1-BL-1	<pre>DC-1-BL-1#show bgp evpn route-type ip-prefix 10.10.10.0/24 domain local BGP routing table information for VRF default Router identifier 192.168.101.7, local AS number 4259905543 BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.101.1:2000 Paths: 2 available 65001.65000 65001.1 192.168.201.1 from 192.168.101.102 (192.168.101.102) Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:11:38:44 VNI: 2000 65001.65000 65001.1 192.168.201.1 from 192.168.101.101 (192.168.101.101) Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:11:38:44 VNI: 2000 BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.101.2:2000 Paths: 2 available 65001.65000 65001.1 192.168.201.1 from 192.168.101.102 (192.168.101.102) Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:11:38:44</pre>

	<pre>VNI: 2000 [...] DC-1-BL-1#show bgp evpn route-type ip-prefix 10.10.10.0/24 domain remote BGP routing table information for VRF default Router identifier 192.168.101.7, local AS number 4259905543 BGP routing table entry for ip-prefix 10.10.10.0/24 remote, Route Distinguisher: 192.168.101.1:2000 Paths: 2 available 65001.65000 65001.1 192.168.201.1 from - (0.0.0.0) Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:11:38:44 VNI: 2000 65001.65000 65001.1 192.168.201.1 from - (0.0.0.0) Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:11:38:44 VNI: 2000 [...]</pre>
DC-1-CL-1	<pre>DC-1-CL-1#show bgp evpn route-type ip-prefix 10.10.10.0/24 det BGP routing table information for VRF default Router identifier 192.168.101.1, local AS number 4259905537 BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.101.1:2000 Paths: 1 available Local - from - (0.0.0.0) Origin IGP, metric -, localpref -, weight 0, valid, local, best, redistributed (Connected) Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:11:38:44 VNI: 2000 BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.101.5:2000 Paths: 2 available 65001.65000 65001.5 192.168.201.5 from 192.168.101.101 (192.168.101.101) Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:37:4a:c8 VNI: 2000 65001.65000 65001.5 192.168.201.5 from 192.168.101.102 (192.168.101.102) Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:37:4a:c8 VNI: 2000 BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.101.6:2000 Paths: 2 available 65001.65000 65001.5 192.168.201.5 from 192.168.101.101 (192.168.101.101) Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:37:4a:c8 VNI: 2000 65001.65000 65001.5 192.168.201.5 from 192.168.101.102 (192.168.101.102) Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:37:4a:c8 VNI: 2000 BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.101.7:2000 Paths: 2 available 65001.65000 65001.7 192.168.201.7 from 192.168.101.101 (192.168.101.101) Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:77:ca:e1 VNI: 2000 65001.65000 65001.7 192.168.201.7 from 192.168.101.102 (192.168.101.102) Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:77:ca:e1 VNI: 2000 BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.101.8:2000 Paths: 2 available 65001.65000 65001.7 192.168.201.7 from 192.168.101.101 (192.168.101.101) Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor</pre>

```
Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:77:ca:e1
  VNI: 2000
65001.65000 65001.7
  192.168.201.7 from 192.168.101.102 (192.168.101.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:77:ca:e1
  VNI: 2000
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.102.1:2000
Paths: 2 available
65001.65000 65001.7 65002.7 65002.65000 65002.1
  192.168.201.7 from 192.168.101.101 (192.168.101.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP
    contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:77:ca:e1
  VNI: 2000
65001.65000 65001.7 65002.7 65002.65000 65002.1
  192.168.201.7 from 192.168.101.102 (192.168.101.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:77:ca:e1
  VNI: 2000
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.102.2:2000
Paths: 2 available
65001.65000 65001.7 65002.7 65002.65000 65002.1
  192.168.201.7 from 192.168.101.101 (192.168.101.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP
    contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:77:ca:e1
  VNI: 2000
65001.65000 65001.7 65002.7 65002.65000 65002.1
  192.168.201.7 from 192.168.101.102 (192.168.101.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:77:ca:e1
  VNI: 2000
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.102.5:2000
Paths: 2 available
65001.65000 65001.7 65002.7 65002.65000 65002.5
  192.168.201.7 from 192.168.101.101 (192.168.101.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP
    contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:77:ca:e1
  VNI: 2000
65001.65000 65001.7 65002.7 65002.65000 65002.5
  192.168.201.7 from 192.168.101.102 (192.168.101.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:77:ca:e1
  VNI: 2000
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.102.6:2000
Paths: 2 available
65001.65000 65001.7 65002.7 65002.65000 65002.5
  192.168.201.7 from 192.168.101.101 (192.168.101.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP
    contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:77:ca:e1
  VNI: 2000
65001.65000 65001.7 65002.7 65002.65000 65002.5
  192.168.201.7 from 192.168.101.102 (192.168.101.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:77:ca:e1
  VNI: 2000
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.102.7:2000
Paths: 2 available
65001.65000 65001.7 65002.7
  192.168.201.7 from 192.168.101.101 (192.168.101.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP
    contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:77:ca:e1
  VNI: 2000
65001.65000 65001.7 65002.7
  192.168.201.7 from 192.168.101.102 (192.168.101.102)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:77:ca:e1
  VNI: 2000
BGP routing table entry for ip-prefix 10.10.10.0/24, Route Distinguisher: 192.168.102.8:2000
Paths: 2 available
65001.65000 65001.7 65002.7
  192.168.201.7 from 192.168.101.101 (192.168.101.101)
    Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP
    contributor
```

```

Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:77:ca:e1
VNI: 2000
65001.65000 65001.7 65002.7
    192.168.201.7 from 192.168.101.102 (192.168.101.102)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
        Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan
EvpnRouterMac:52:1d:00:77:ca:e1
VNI: 2000

```

Note: Remote routes have the next-hop rewritten to the local Border Gateway Leaf.

show bgp evpn route-type imet vni <vni_id>next-hop <step_ip> detail

Verify CL-1 and CL-2 advertise the membership of VNI 1010 via EVPN Type-3 IMET routes

```

DC-1-CL-1#show bgp evpn route-type imet vni 1010 detail
BGP routing table information for VRF default
Router identifier 192.168.101.1, local AS number 4259905537
BGP routing table entry for imet 192.168.201.1, Route Distinguisher: 192.168.101.1:10
Paths: 1 available
Local
- from - (0.0.0.0)
    Origin IGP, metric -, localpref -, weight 0, valid, local, best
    Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
    VNI: 1010
    PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.201.1
BGP routing table entry for imet 192.168.201.5, Route Distinguisher: 192.168.101.5:10
Paths: 2 available
65001.65000 65001.5
    192.168.201.5 from 192.168.101.101 (192.168.101.101)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
        Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
        PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.201.5
65001.65000 65001.5
    192.168.201.5 from 192.168.101.102 (192.168.101.102)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
        Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
        PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.201.5
BGP routing table entry for imet 192.168.201.5, Route Distinguisher: 192.168.101.6:10
Paths: 2 available
65001.65000 65001.5
    192.168.201.5 from 192.168.101.101 (192.168.101.101)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
        Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
        PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.201.5
65001.65000 65001.5
    192.168.201.5 from 192.168.101.102 (192.168.101.102)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
        Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
        PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.201.5
BGP routing table entry for imet 192.168.201.7, Route Distinguisher: 192.168.100.8:10
Paths: 2 available
65001.65000 65001.7
    192.168.201.7 from 192.168.101.101 (192.168.101.101)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
        Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
        PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.201.7
65001.65000 65001.7
    192.168.201.7 from 192.168.101.102 (192.168.101.102)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
        Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
        VNI: 1010
        PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID: 192.168.201.7
BGP routing table entry for imet 192.168.201.7, Route Distinguisher: 192.168.101.7:10
Paths: 2 available
65001.65000 65001.7
    192.168.201.7 from 192.168.101.101 (192.168.101.101)
        Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor

```

CL-1

```

Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
VNI: 1010
PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID:
192.168.201.7
65001.65000 65001.7
192.168.201.7 from 192.168.101.102 (192.168.101.102)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:1010:1010 TunnelEncap:tunnelTypeVxlan
VNI: 1010
PMSI Tunnel: Ingress Replication, MPLS Label: 1010, Leaf Information Required: false, Tunnel ID:
192.168.201.7

```

show bgp evpn route-type mac-ip <mac_address>next-hop <vtep_ip>detail

Verify CL-1 and CL-2 advertise Host-1 MAC address and IP to MAC bindings via EVPN Type-2 MAC-IP routes. EVPN Type-2 MAC-IP routes in Symmetric IRB are dual labeled (L2VNI and L3VNI) as well as they contain the EVPN router MAC of the VTEP that originates the advertisements

```

DC-1-CL-1#show bgp evpn route-type mac-ip 10.10.10.3 det
BGP routing table information for VRF default
Router identifier 192.168.101.1, local AS number 4259905537
BGP routing table entry for mac-ip 0000.0000.3333 10.10.10.3, Route Distinguisher: 192.168.100.8:10
Paths: 2 available
65001.65000 65001.7 65002.7 65002.65000 65002.1
192.168.201.7 from 192.168.101.101 (192.168.101.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP
contributor
Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000
TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:77:ca:e1
VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
65001.65000 65001.7 65002.7 65002.65000 65002.1
192.168.201.7 from 192.168.101.102 (192.168.101.102)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000
TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:77:ca:e1
VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000
65001.65000 65001.7 65002.7 65002.65000 65002.1
192.168.201.7 from 192.168.101.101 (192.168.101.101)
Origin IGP, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:1010:1010 Route-Target-AS:2000:2000
TunnelEncap:tunnelTypeVxlan EvpnRouterMac:52:1d:00:77:ca:e1
VNI: 1010 L3 VNI: 2000 ESI: 0000:0000:0000:0000:0000

```

show ip route vrf <vrf_name>

Verify the host routes for Host-1 along with VLAN10 networks are presented in the VRF red routing table on CL-3. These routes must be known via CL-1 VTEP IP + VRF red L3VNI + CL-1 MLAG system ID MAC.

```

CL-1#show ip route vrf red
B E      0.0.0.0/0 [20/0] via VTEP 192.168.201.5 VNI 2000 router-mac 52:1d:00:37:4a:c8
B E      10.10.10.3/32 [20/0] via VTEP 192.168.201.7 VNI 2000 router-mac 52:1d:00:77:ca:e1
C      10.10.10.0/24 is directly connected, Vlan10
C      10.10.20.0/24 is directly connected, Vlan20
B E      10.10.50.0/24 [20/0] via VTEP 192.168.201.5 VNI 2000 router-mac 52:1d:00:37:4a:c8
B E      10.10.70.0/24 [20/0] via VTEP 192.168.201.7 VNI 2000 router-mac 52:1d:00:77:ca:e1

CL-1#show ip route vrf blue
B E      0.0.0.0/0 [20/0] via VTEP 192.168.201.5 VNI 2001 router-mac 52:1d:00:37:4a:c8
C      10.10.30.0/24 is directly connected, Vlan30
B E      10.10.40.3/32 [20/0] via VTEP 192.168.201.7 VNI 2001 router-mac 52:1d:00:77:ca:e1
C      10.10.40.0/24 is directly connected, Vlan40
B E      10.10.60.0/24 [20/0] via VTEP 192.168.201.5 VNI 2001 router-mac 52:1d:00:37:4a:c8
B E      10.10.80.0/24 [20/0] via VTEP 192.168.201.7 VNI 2001 router-mac 52:1d:00:77:ca:e1

```

ping <remote_host_ip>

Verify connectivity between Host-1 and Host-2

Host-1

```

HOST-1:06:09#ping vrf red 10.10.10.3
PING 10.10.10.3 (10.10.10.3) 72(100) bytes of data.
80 bytes from 10.10.10.3: icmp_seq=1 ttl=64 time=84.5 ms
80 bytes from 10.10.10.3: icmp_seq=2 ttl=64 time=76.3 ms
80 bytes from 10.10.10.3: icmp_seq=3 ttl=64 time=110 ms
80 bytes from 10.10.10.3: icmp_seq=4 ttl=64 time=102 ms
80 bytes from 10.10.10.3: icmp_seq=5 ttl=64 time=95.4 ms
--- 10.10.10.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 41ms
rtt min/avg/max/mdev = 76.384/93.819/110.663/12.215 ms, pipe 5, ipg/ewma 10.324/89.6
26 ms

HOST-1:06:11#ping vrf blue 10.10.40.3
PING 10.10.40.3 (10.10.40.3) 72(100) bytes of data.
80 bytes from 10.10.40.3: icmp_seq=1 ttl=64 time=55.9 ms
80 bytes from 10.10.40.3: icmp_seq=2 ttl=64 time=81.1 ms
80 bytes from 10.10.40.3: icmp_seq=3 ttl=64 time=109 ms
80 bytes from 10.10.40.3: icmp_seq=4 ttl=64 time=109 ms
80 bytes from 10.10.40.3: icmp_seq=5 ttl=64 time=101 ms

--- 10.10.40.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 42ms
rtt min/avg/max/mdev = 55.982/91.516/109.852/20.569 ms, pipe 5, ipg/ewma 10.643/74.7
52 ms

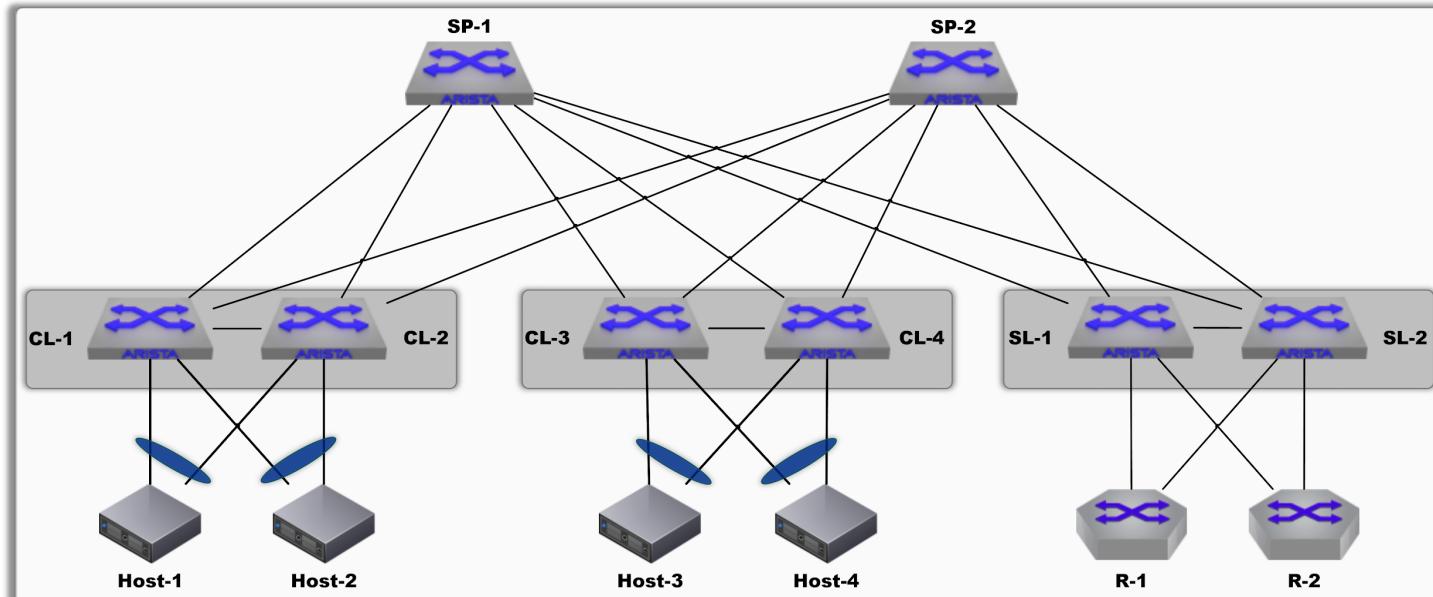
```

External Connectivity

Deployment Considerations

This section is intended to address the different options when connecting to 3rd party devices firewalls, load balancers or routers for inter-vrf routing.

Topology



Base Configuration

The following base configuration is required for Symmetric IRB:

- Underlay
 - Multi-agent model (ArBGP)
 - eBGP IPv4 Unicast peering between spines and leaf switches
 - iBGP IPv4 Unicast peering between MLAG pair
 - MLAG
- Overlay
 - eBGP IPv4 EVPN peering between spines (RS) and leaf switches
 - VxLAN
 - MLAG Shared Router MAC Address

- VLAN to VNI mapping (L2VNI)
 - VRF to VNI mapping (L3VNI)
- BGP/EVPN
 - MAC-VRF
 - IP-VRF
- Tenant
 - VLAN
 - Tenant VRF
 - Anycast Gateway
- SL scenario specific
 - [Static routing + VRF-Lite + SVI](#)
 - [eBGP + VRF-Lite + SVI](#)
 - [eBGP + VRF-Lite + Subinterfaces](#)
 - [EVPN Internetworking with IPVPN](#)
- Platform specific (See [Appendix A](#))

Note: Configuration lines in red font color are not supported in vEOS.

Compute Leaf

Function	CL-1	CL-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20	vlan 10,20
VRF Instance	vrf instance red ! ip routing vrf red	vrf instance red ! ip routing vrf red
Spines Uplink	interface Ethernet1 no switchport ip address 192.168.1.1/31 ! interface Ethernet2 no switchport ip address 192.168.2.1/31	interface Ethernet1 no switchport ip address 192.168.1.3/31 ! interface Ethernet2 no switchport ip address 192.168.2.3/31
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID ip address 192.168.100.1/32 ! router general router-id ipv4 192.168.100.1	interface Loopback0 description BGP Router ID ip address 192.168.100.2/32 ! router general router-id ipv4 192.168.100.2
VTI Loopback1 VTEP IP	interface Loopback1 description VTEP IP ip address 192.168.200.1/32	interface Loopback1 description VTEP IP ip address 192.168.200.1/32
VxLAN	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vrf red vni 2000	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vrf red vni 2000
MLAG Config	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000
Anycast Gateway Virtual MAC address	interface Vlan10 vrf red ip address virtual 10.10.10.254/24	interface Vlan10 vrf red ip address virtual 10.10.10.254/24

	<pre> ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>	<pre> ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>
eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.0 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vrf red rd 192.168.100.1:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>	<pre> router bgp 65000.1 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.1 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.2 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vrf red rd 192.168.100.2:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>

Function	CL-3	CL-4
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 30,40	vlan 30,40
VRF Instance	vrf instance blue ! ip routing vrf blue	vrf instance blue ! ip routing vrf blue
Spines Uplink	interface Ethernet1 no switchport ip address 192.168.1.5/31 ! interface Ethernet2 no switchport	interface Ethernet1 no switchport ip address 192.168.1.7/31 ! interface Ethernet2 no switchport

	ip address 192.168.2.5/31	ip address 192.168.2.7/31
BGP Loopback0 Router ID	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.3/32 ! router general router-id ipv4 192.168.100.3</pre>	<pre>interface Loopback0 description BGP Router ID ip address 192.168.100.4/32 ! router general router-id ipv4 192.168.100.4</pre>
VTI Loopback1 VTEP IP	<pre>interface Loopback1 description Logical VTEP ip address 192.168.200.3/32</pre>	<pre>interface Loopback1 description Logical VTEP ip address 192.168.200.3/32</pre>
VxLAN	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001</pre>	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf blue vni 2001</pre>
MLAG Config	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000</pre>	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000</pre>
Anycast Gateway Virtual MAC address	<pre>interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>	<pre>interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>
IP-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>
eBGP and iBGP Underlay BGP/EVPN	<pre>router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000</pre>	<pre>router bgp 65000.3 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.3 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000</pre>

```

neighbor UNDERLAY_SPINE_V4 maximum-routes 12000
neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4
neighbor 192.168.1.4 peer group UNDERLAY_SPINE_V4
neighbor 192.168.2.4 peer group UNDERLAY_SPINE_V4
neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN
neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN
redistribute connected route-map CONNECTED
!
vlan 30
  rd auto
  route-target both 1030:1030
  redistribute learned
!
vlan 40
  rd auto
  route-target both 1040:1040
  redistribute learned
!
vrf blue
  rd 192.168.100.3:2001
  route-target import evpn 2001:2001
  route-target export evpn 2001:2001
  redistribute connected
!
address-family evpn
  neighbor OVERLAY_SPINE_EVPN activate
!
address-family ipv4
  neighbor UNDERLAY_MLAG_PEER_V4 activate
  neighbor UNDERLAY_SPINE_V4 activate

```

```

neighbor UNDERLAY_SPINE_V4 maximum-routes 12000
neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4
neighbor 192.168.1.6 peer group UNDERLAY_SPINE_V4
neighbor 192.168.2.6 peer group UNDERLAY_SPINE_V4
neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN
neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN
redistribute connected route-map CONNECTED
!
vlan 30
  rd auto
  route-target both 1010:1030
  redistribute learned
!
vlan 40
  rd auto
  route-target both 1040:1040
  redistribute learned
!
vrf blue
  rd 192.168.100.4:2001
  route-target import evpn 2001:2001
  route-target export evpn 2001:2001
  redistribute connected
!
address-family evpn
  neighbor OVERLAY_SPINE_EVPN activate
!
address-family ipv4
  neighbor UNDERLAY_MLAG_PEER_V4 activate
  neighbor UNDERLAY_SPINE_V4 activate

```

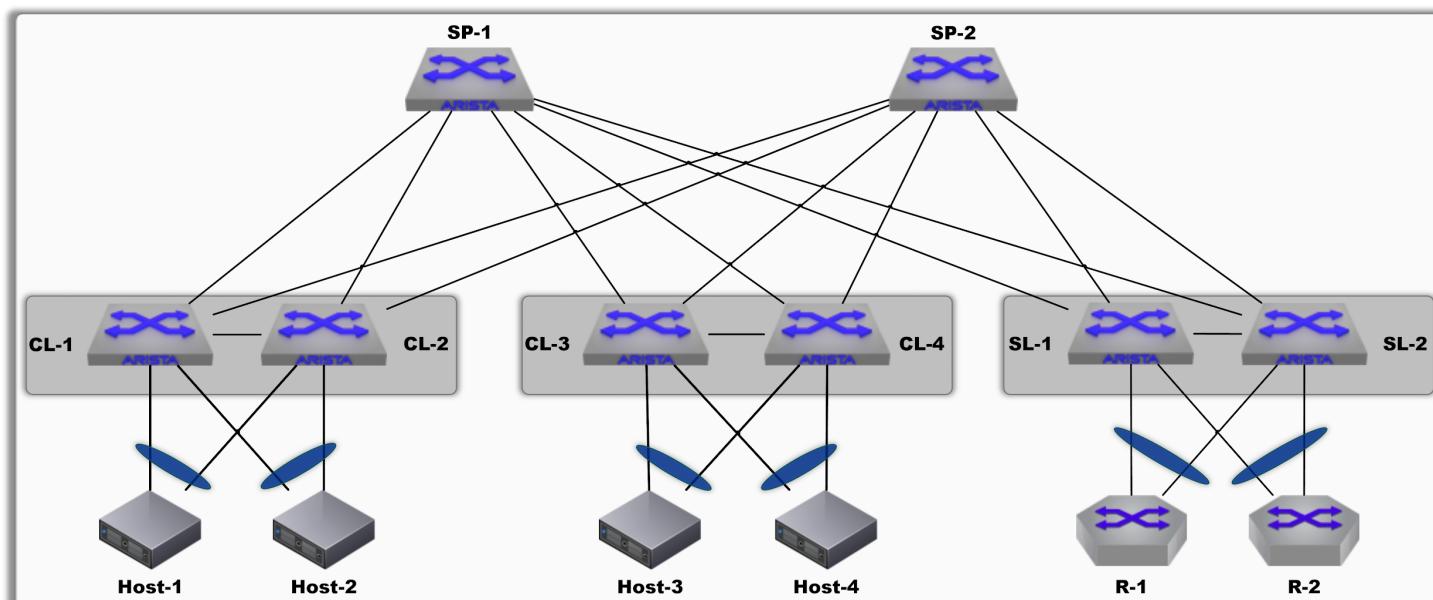
Spine

Function	SP-1	SP-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
Leaf Downlinks	<pre> interface Ethernet1 no switchport ip address 192.168.1.0/31 ! interface Ethernet2 no switchport ip address 192.168.1.2/31 ! interface Ethernet3 no switchport ip address 192.168.1.4/31 ! interface Ethernet4 no switchport ip address 192.168.1.6/31 ! interface Ethernet5 no switchport ip address 192.168.1.8/31 ! interface Ethernet6 no switchport ip address 192.168.1.10/31 </pre>	<pre> interface Ethernet1 no switchport ip address 192.168.2.0/31 ! interface Ethernet2 no switchport ip address 192.168.2.2/31 ! interface Ethernet3 no switchport ip address 192.168.2.4/31 ! interface Ethernet4 no switchport ip address 192.168.2.6/31 ! interface Ethernet5 no switchport ip address 192.168.2.8/31 ! interface Ethernet6 no switchport ip address 192.168.2.10/31 </pre>
BGP Loopback0 (Router ID)	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.101/32 ! router general router-id ipv4 192.168.100.101 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.102/32 ! router general router-id ipv4 192.168.100.102 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P </pre>

eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.1.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multipath 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept </pre>	<pre> router bgp 65000.65000 bgp asn notation asdot update wait-for-convergence update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 128 neighbor default send-community bgp listen range 192.168.100.0/24 peer-group OVERLAY_LEAF_EVPN peer-filter LEAF-AS-RANGE bgp listen range 192.168.2.0/24 peer-group UNDERLAY_LEAF_V4 peer-filter LEAF-AS-RANGE neighbor OVERLAY_LEAF_EVPN peer group neighbor OVERLAY_LEAF_EVPN update-source Loopback0 neighbor OVERLAY_LEAF_EVPN bfd neighbor OVERLAY_LEAF_EVPN ebgp-multipath 2 neighbor OVERLAY_LEAF_EVPN maximum-routes 0 neighbor UNDERLAY_LEAF_V4 peer group neighbor UNDERLAY_LEAF_V4 maximum-routes 12000 redistribute connected route-map CONNECTED ! address-family evpn bgp next-hop-unchanged neighbor OVERLAY_LEAF_EVPN activate ! address-family ipv4 neighbor UNDERLAY_LEAF_V4 activate ! peer-filter LEAF-AS-RANGE 10 match as-range 4200000000-4294967294 result accept </pre>
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Scenario 1 - Static Routing + VRF-Lite + SVI

Topology



Deployment Consideration

- L3 failure isolation between the EVPN domain and the external network
- Easy to troubleshoot and maintain

Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
SP-1	192.168.100.101	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb1
SP-2	192.168.100.102	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb2
CL-1	192.168.100.1	192.168.200.1	65000.1	Red Red	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa1
CL-2	192.168.100.2	192.168.200.1	65000.1	Red Red	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa2
CL-3	192.168.100.3	192.168.200.3	65000.3	Blue	VLAN30	10.10.30.254/24	0000.0000.aaa3

Arista Internal Use Only

				Blue	VLAN40	10.10.40.254/24	
CL-4	192.168.100.4	192.168.200.3	65000.3	Blue Blue	VLAN30 VLAN40	10.10.30.254/24 10.10.40.254/24	0000.0000.aaa4
SL-1	192.168.100.5	192.168.200.5	65000.5	Red Red Blue Blue Red Blue	VLAN10 VLAN20 VLAN30 VLAN40 VLAN100 VLAN200	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24 172.16.100.253/29 172.16.200.253/29	0000.0000.ddd1
SL-2	192.168.100.6	192.168.200.5	65000.5	Red Red Blue Blue Red Blue	VLAN10 VLAN20 VLAN30 VLAN40 VLAN100 VLAN200	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24 172.16.100.252/29 172.16.200.252/29	0000.0000.ddd2
R-1	N/A	N/A	N/A	N/A	VLAN100 VLAN200	172.16.100.251/29 172.16.100.251/29	0000.0000.ccc1
R-2	N/A	N/A	N/A	N/A	VLAN100 VLAN200	172.16.100.250/29 172.16.100.250/29	0000.0000.ccc2
Host-1	N/A	N/A	N/A	N/A	VLAN10	10.10.10.1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	N/A	VLAN20	10.10.20.2/24	0000.0000.2222
Host-3	N/A	N/A	N/A	N/A	VLAN10	10.10.30.3/24	0000.0000.3333
Host-4	N/A	N/A	N/A	N/A	VLAN20	10.10.40.4/24	0000.0000.4444

Configuration

The following configuration is required on the SL:

- SVI + VARP per VRF
- Static route per VRF
- Redistribute static under IP-VRF

Service Leaf

Function	SL-1	SL-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20,30,40,100,200	vlan 10,20,30,40,100,200
VRF Instance	vrf instance red vrf instance blue ! ip routing vrf red ip routing vrf blue	vrf instance red vrf instance blue ! ip routing vrf red ip routing vrf blue
Spines Uplink	interface Ethernet1 no switchport ip address 192.168.1.9/31 ! interface Ethernet2 no switchport ip address 192.168.2.9/31	interface Ethernet1 no switchport ip address 192.168.1.11/31 ! interface Ethernet2 no switchport ip address 192.168.2.11/31
Router Downlink	interface port-channel1 switchport mode trunk mlag 1 ! interface port-channel2 switchport mode trunk mlag 2 ! interface Ethernet4 channel-group 1 mode active ! interface Ethernet5 channel-group 2 mode active	interface port-channel1 switchport mode trunk mlag 1 ! interface port-channel2 switchport mode trunk mlag 2 ! interface Ethernet4 channel-group 1 mode active ! interface Ethernet5 channel-group 2 mode active
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID ip address 192.168.100.5/32 ! router general router-id ipv4 192.168.100.5	interface Loopback0 description BGP Router ID ip address 192.168.100.6/32 ! router general router-id ipv4 192.168.100.6
VTI Loopback1 VTEP IP	interface Loopback1 description VTEP IP	interface Loopback1 description VTEP IP

	ip address 192.168.200.5/32	ip address 192.168.200.5/32
VxLAN	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf red vni 2000 vxlan vrf blue vni 2001</pre>	<pre>interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf red vni 2000 vxlan vrf blue vni 2001</pre>
MLAG Config	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000</pre>	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000</pre>
Anycast Gateway Virtual MAC address	<pre>interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>	<pre>interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>
Router P2P SVI	<pre>interface Vlan100 vrf red ip address 172.16.100.253/29 ip virtual-router address 172.16.100.254 ! interface Vlan200 vrf blue ip address 172.16.200.253/29 ip virtual-router address 172.16.200.254</pre>	<pre>interface Vlan100 vrf red ip address 172.16.100.252/29 ip virtual-router address 172.16.100.254 ! interface Vlan200 vrf blue ip address 172.16.200.252/29 ip virtual-router address 172.16.200.254</pre>
Static Routes	<pre>ip route vrf blue 0.0.0.0/0 172.16.200.251 ip route vrf blue 0.0.0.0/0 172.16.200.250 ip route vrf red 0.0.0.0/0 172.16.100.251 ip route vrf red 0.0.0.0/0 172.16.100.250</pre>	<pre>ip route vrf blue 0.0.0.0/0 172.16.200.251 ip route vrf blue 0.0.0.0/0 172.16.200.250 ip route vrf red 0.0.0.0/0 172.16.100.251 ip route vrf red 0.0.0.0/0 172.16.100.250</pre>
IP-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P</pre>
eBGP and iBGP Underlay BGP/EVPN	<pre>router bgp 65000.5 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2</pre>	<pre>router bgp 65000.5 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2</pre>

```

neighbor default send-community
neighbor OVERLAY_SPINE_EVPN peer group
neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000
neighbor OVERLAY_SPINE_EVPN update-source Loopback0
neighbor OVERLAY_SPINE_EVPN bfd
neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2
neighbor OVERLAY_SPINE_EVPN maximum-routes 0
neighbor UNDERLAY_MLAG_PEER_V4 peer group
neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.5
neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self
neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000
neighbor UNDERLAY_SPINE_V4 peer group
neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000
neighbor UNDERLAY_SPINE_V4 maximum-routes 12000
neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4
neighbor 192.168.1.8 peer group UNDERLAY_SPINE_V4
neighbor 192.168.2.8 peer group UNDERLAY_SPINE_V4
neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN
neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN
redistribute connected route-map CONNECTED
!
vlan 10
  rd auto
  route-target both 1010:1010
  redistribute learned
!
vlan 20
  rd auto
  route-target both 1020:1020
  redistribute learned
!
vlan 30
  rd auto
  route-target both 1030:1030
  redistribute learned
!
vlan 40
  rd auto
  route-target both 1040:1040
  redistribute learned
!
vrf red
  rd 192.168.100.5:2000
  route-target import evpn 2000:2000
  route-target export evpn 2000:2000
  redistribute connected
  redistribute static
!
vrf blue
  rd 192.168.100.5:2001
  route-target import evpn 2001:2001
  route-target export evpn 2001:2001
  redistribute connected
  redistribute static
!
address-family evpn
  neighbor OVERLAY_SPINE_EVPN activate
!
address-family ipv4
  neighbor UNDERLAY_MLAG_PEER_V4 activate
  neighbor UNDERLAY_SPINE_V4 activate

```



```

neighbor default send-community
neighbor OVERLAY_SPINE_EVPN peer group
neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000
neighbor OVERLAY_SPINE_EVPN update-source Loopback0
neighbor OVERLAY_SPINE_EVPN bfd
neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2
neighbor OVERLAY_SPINE_EVPN maximum-routes 0
neighbor UNDERLAY_MLAG_PEER_V4 peer group
neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.5
neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self
neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000
neighbor UNDERLAY_SPINE_V4 peer group
neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000
neighbor UNDERLAY_SPINE_V4 maximum-routes 12000
neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4
neighbor 192.168.1.10 peer group UNDERLAY_SPINE_V4
neighbor 192.168.2.10 peer group UNDERLAY_SPINE_V4
neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN
neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN
redistribute connected route-map CONNECTED
!
vlan 10
  rd auto
  route-target both 1010:1010
  redistribute learned
!
vlan 20
  rd auto
  route-target both 1020:1020
  redistribute learned
!
vlan 30
  rd auto
  route-target both 1030:1030
  redistribute learned
!
vlan 40
  rd auto
  route-target both 1040:1040
  redistribute learned
!
vrf red
  rd 192.168.100.6:2000
  route-target import evpn 2000:2000
  route-target export evpn 2000:2000
  redistribute connected
  redistribute static
!
vrf blue
  rd 192.168.100.6:2001
  route-target import evpn 2001:2001
  route-target export evpn 2001:2001
  redistribute connected
  redistribute static
!
address-family evpn
  neighbor OVERLAY_SPINE_EVPN activate
!
address-family ipv4
  neighbor UNDERLAY_MLAG_PEER_V4 activate
  neighbor UNDERLAY_SPINE_V4 activate

```

Router

Function	R-1	R-2
VLAN	vlan 100,200	vlan 100,200
Service Leaf Uplinks	<pre> interface port-channel1 switchport mode trunk ! interface Ethernet4 channel-group 1 mode active ! interface Ethernet5 channel-group 1 mode active </pre>	<pre> interface port-channel1 switchport mode trunk ! interface Ethernet4 channel-group 1 mode active ! interface Ethernet5 channel-group 1 mode active </pre>
Service Leaf P2P SVI	<pre> interface Vlan100 vrf red ip address 172.16.100.251/29 ! interface Vlan200 vrf blue ip address 172.16.200.251/29 </pre>	<pre> interface Vlan100 vrf red ip address 172.16.100.250/29 ! interface Vlan200 vrf blue ip address 172.16.200.250/29 </pre>
Static Routes	ip route 10.10.10.0/24 172.16.100.254	ip route 10.10.10.0/24 172.16.100.254

ip route 10.10.20.0/24 172.16.100.254 ip route 10.10.30.0/24 172.16.200.254 ip route 10.10.40.0/24 172.16.200.254	ip route 10.10.20.0/24 172.16.100.254 ip route 10.10.30.0/24 172.16.200.254 ip route 10.10.40.0/24 172.16.200.254
---	---

Verification

show ip route vrf <vrf_name>

- Verify a default route is presented in the VRF red and blue routing table on SL-1
- Verify a default route is presented in the VRF red routing table on CL-1
- Verify a default route is presented in the VRF blue routing table on CL-3

SL-1#show ip route vrf red

```
VRF: red
Codes: C - connected, S - static, K - kernel,
       O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
       R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
       O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
       NG - Nexthop Group Static Route, V - VXLAN Control Service,
       DH - DHCP client installed default route, M - Martian,
       DP - Dynamic Policy Route, L - VRF Leaked,
       RC - Route Cache Route

Gateway of last resort:
S      0.0.0.0/0 [1/0] via 172.16.100.250, Vlan100
                                              via 172.16.100.251, Vlan100

B E      10.10.10.1/32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
C      10.10.10.0/24 is directly connected, Vlan10
B E      10.10.20.2/32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
C      10.10.20.0/24 is directly connected, Vlan20
C      172.16.100.248/29 is directly connected, Vlan100
```

SL-1#show ip route vrf blue

```
VRF: blue
Codes: C - connected, S - static, K - kernel,
       O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
       R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
       O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
       NG - Nexthop Group Static Route, V - VXLAN Control Service,
       DH - DHCP client installed default route, M - Martian,
       DP - Dynamic Policy Route, L - VRF Leaked,
       RC - Route Cache Route

Gateway of last resort:
S      0.0.0.0/0 [1/0] via 172.16.200.250, Vlan200
                                              via 172.16.200.251, Vlan200

B E      10.10.30.3/32 [20/0] via VTEP 192.168.200.3 VNI 2001 router-mac 02:00:00:00:aa:a3
C      10.10.30.0/24 is directly connected, Vlan30
B E      10.10.40.4/32 [20/0] via VTEP 192.168.200.3 VNI 2001 router-mac 02:00:00:00:aa:a3
C      10.10.40.0/24 is directly connected, Vlan40
C      172.16.200.248/29 is directly connected, Vlan200
```

CL-1#sh ip route vrf red

```
VRF: red
Codes: C - connected, S - static, K - kernel,
       O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
       R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
       O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
       NG - Nexthop Group Static Route, V - VXLAN Control Service,
       DH - DHCP client installed default route, M - Martian,
       DP - Dynamic Policy Route, L - VRF Leaked,
       RC - Route Cache Route

Gateway of last resort:
B E      0.0.0.0/0 [20/0] via VTEP 192.168.200.5 VNI 2000 router-mac 02:00:00:00:dd:d1

C      10.10.10.0/24 is directly connected, Vlan10
C      10.10.20.0/24 is directly connected, Vlan20
B E      172.16.100.248/29 [20/0] via VTEP 192.168.200.5 VNI 2000 router-mac 02:00:00:00:dd:d1
```

CL-3#show ip route vrf blue

```
VRF: blue
Codes: C - connected, S - static, K - kernel,
       0 - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
       R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
       O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
       NG - Nexthop Group Static Route, V - VXLAN Control Service,
       DH - DHCP client installed default route, M - Martian,
       DP - Dynamic Policy Route, L - VRF Leaked,
       RC - Route Cache Route

Gateway of last resort:
  B E      0.0.0.0/0 [20/0] via VTEP 192.168.200.5 VNI 2001 router-mac 02:00:00:00:dd:d1

  C      10.10.30.0/24 is directly connected, Vlan30
  C      10.10.40.0/24 is directly connected, Vlan40
  B E    172.16.200.248/29 [20/0] via VTEP 192.168.200.5 VNI 2001 router-mac 02:00:00:00:dd:d1
```

show bgp evpn route-type ip-prefix <prefix> vni <vnid> next-hop <vtep_ip> detail

Verify SL-1 and SL-2 advertise 0.0.0.0/0 via EVPN Type-5 routes on CL-1 and CL-3

```
CL-1#show bgp evpn route-type ip-prefix 0.0.0.0/0 vni 2000 next-hop 192.168.200.5 detail
BGP routing table information for VRF default
Router identifier 192.168.100.1, local AS number 4259840001
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.5:2000
Paths: 2 available
 65000.65000 65000.5
  192.168.200.5 from 192.168.100.101 (192.168.100.101)
    Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
    VNI: 2000
  65000.65000 65000.5
  192.168.200.5 from 192.168.100.102 (192.168.100.102)
    Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
    VNI: 2000
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.6:2000
Paths: 2 available
 65000.65000 65000.5
  192.168.200.5 from 192.168.100.101 (192.168.100.101)
    Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
    VNI: 2000
  65000.65000 65000.5
  192.168.200.5 from 192.168.100.102 (192.168.100.102)
    Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
    VNI: 2000
```

```
CL-3#show bgp evpn route-type ip-prefix 0.0.0.0/0 vni 2001 next-hop 192.168.200.5 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.5:2001
Paths: 2 available
 65000.65000 65000.5
  192.168.200.5 from 192.168.100.101 (192.168.100.101)
    Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
    Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
    VNI: 2001
  65000.65000 65000.5
  192.168.200.5 from 192.168.100.102 (192.168.100.102)
    Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
    VNI: 2001
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.6:2001
Paths: 2 available
 65000.65000 65000.5
  192.168.200.5 from 192.168.100.101 (192.168.100.101)
    Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
    Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
    VNI: 2001
  65000.65000 65000.5
  192.168.200.5 from 192.168.100.102 (192.168.100.102)
    Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
    Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
    VNI: 2001
```

ping <remote_host_ip>

Verify connectivity between Host-1 and Host-3 and Host-4

```
HOST-1#ping 10.10.30.3
PING 10.10.30.3 (10.10.30.3) 72(100) bytes of data.
80 bytes from 10.10.30.3: icmp_seq=1 ttl=59 time=105 ms
```

```

80 bytes from 10.10.30.3: icmp_seq=2 ttl=59 time=110 ms
80 bytes from 10.10.30.3: icmp_seq=3 ttl=59 time=100 ms
80 bytes from 10.10.30.3: icmp_seq=4 ttl=59 time=96.0 ms
80 bytes from 10.10.30.3: icmp_seq=5 ttl=59 time=93.3 ms

--- 10.10.30.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 44ms
rtt min/avg/max/mdev = 93.338/101.261/110.500/6.319 ms, pipe 5, ipg/ewma 11.170/103.170 ms

HOST-1#ping 10.10.40.4
PING 10.10.40.4 (10.10.40.4) 72(100) bytes of data.
80 bytes from 10.10.40.4: icmp_seq=1 ttl=59 time=55.7 ms
80 bytes from 10.10.40.4: icmp_seq=2 ttl=59 time=65.9 ms
80 bytes from 10.10.40.4: icmp_seq=3 ttl=59 time=82.2 ms
80 bytes from 10.10.40.4: icmp_seq=4 ttl=59 time=73.9 ms
80 bytes from 10.10.40.4: icmp_seq=5 ttl=59 time=72.3 ms

--- 10.10.40.4 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 40ms
rtt min/avg/max/mdev = 55.702/70.066/82.273/8.863 ms, pipe 5, ipg/ewma 10.123/63.191 ms

```

traceroute ip <remote_host_ip>

Verify traffic from Host-1 to Host-3 and Host-4 traverses R-1 or R-2

Host-1

```

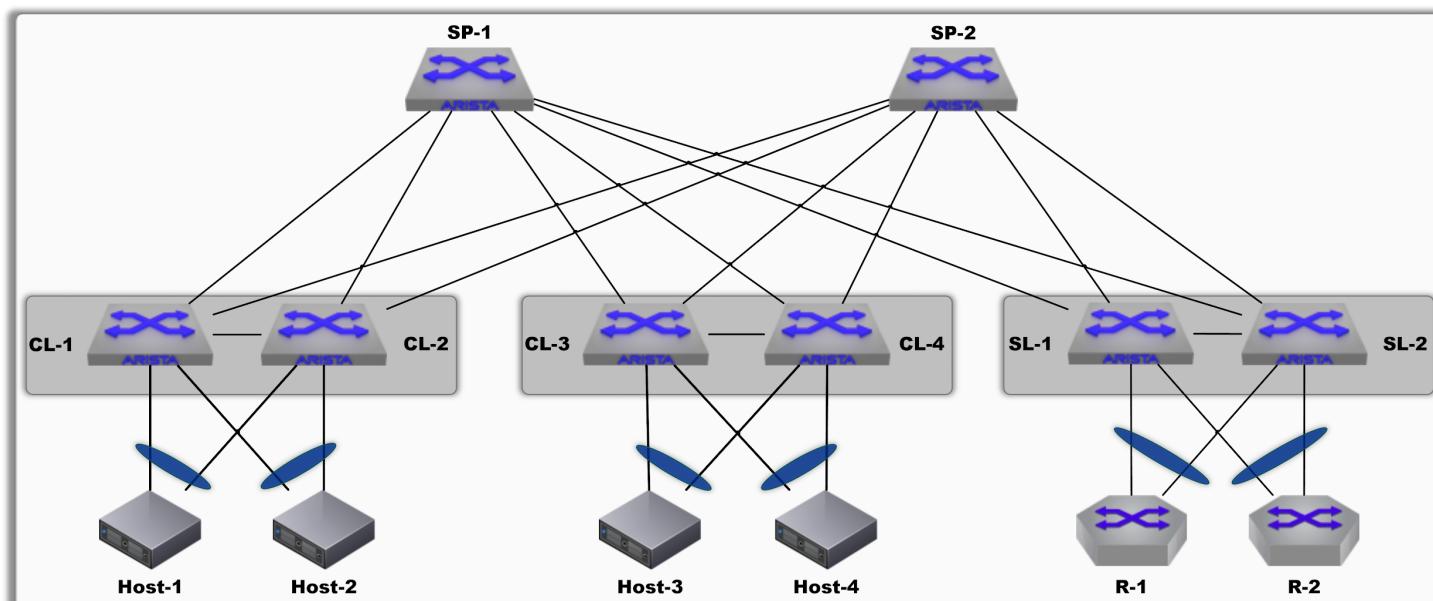
HOST-1#traceroute ip 10.10.30.3
traceroute to 10.10.30.3 (10.10.30.3), 30 hops max, 60 byte packets
 1  10.10.10.254 (10.10.10.254)  23.774 ms  23.377 ms  23.229 ms
 2  * * *
 3  172.16.100.250 (172.16.100.250)  87.383 ms  90.282 ms  150.481 ms
 4  172.16.200.253 (172.16.200.253)  191.394 ms  222.886 ms  236.195 ms
 5  * * *
 6  10.10.30.3 (10.10.30.3)  272.356 ms  252.322 ms  267.704 ms

HOST-1#traceroute ip 10.10.40.4
traceroute to 10.10.40.4 (10.10.40.4), 30 hops max, 60 byte packets
 1  10.10.10.254 (10.10.10.254)  16.484 ms  17.632 ms  23.720 ms
 2  * * *
 3  172.16.100.250 (172.16.100.250)  78.328 ms  80.312 ms  85.276 ms
 4  172.16.200.253 (172.16.200.253)  120.003 ms  133.000 ms  142.585 ms
 5  * * *
 6  10.10.40.4 (10.10.40.4)  222.240 ms  211.854 ms  221.753 ms

```

Scenario 2 - eBGP + VRF-Lite + SVI

Topology



Deployment Consideration

- No L3 failure isolation between the EVPN domain and the external network
- Flexible routing policies
- A layer 2 Port-Channel is used between the 3rd party device and the SL

Setup Details

Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
-----------	-----------	--------	-----	------	------------	------------

SP-1	192.168.100.101	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb1
SP-2	192.168.100.102	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb2
CL-1	192.168.100.1	192.168.200.1	65000.1	Red Red	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa1
CL-2	192.168.100.2	192.168.200.1	65000.1	Red Red	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa2
CL-3	192.168.100.3	192.168.200.3	65000.3	Blue Blue	VLAN30 VLAN40	10.10.30.254/24 10.10.40.254/24	0000.0000.aaa3
CL-4	192.168.100.4	192.168.200.3	65000.3	Blue Blue	VLAN30 VLAN40	10.10.30.254/24 10.10.40.254/24	0000.0000.aaa4
SL-1	192.168.100.5	192.168.200.5	65000.5	Red Red Blue Blue Red Blue	VLAN10 VLAN20 VLAN30 VLAN40 VLAN100 VLAN200	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24 172.16.100.253/29 172.16.200.253/29	0000.0000.ddd1
SL-2	192.168.100.6	192.168.200.5	65000.5	Red Red Blue Blue Red Blue	VLAN10 VLAN20 VLAN30 VLAN40 VLAN100 VLAN200	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24 172.16.100.252/29 172.16.200.252/29	0000.0000.ddd2
R-1	192.168.100.201	N/A	65000.201	Default Default	VLAN100 VLAN200	172.16.100.251/29 172.16.100.251/29	0000.0000.ccc1
R-2	192.168.100.202	N/A	65000.201	Default Default	VLAN100 VLAN200	172.16.100.250/29 172.16.100.250/29	0000.0000.ccc2
Host-1	N/A	N/A	N/A	N/A	VLAN10	10.10.10.1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	N/A	VLAN20	10.10.20.2/24	0000.0000.2222
Host-3	N/A	N/A	N/A	N/A	VLAN10	10.10.30.3/24	0000.0000.3333
Host-4	N/A	N/A	N/A	N/A	VLAN20	10.10.40.4/24	0000.0000.4444

Important Notes

- VARP can be enabled on the P2P in combination with a route-map outbound towards the router to set ip next-hop of the routes to the VARP IP. This will prevent north-south traffic crossing the peer link due to dual hashing operation on the router (port-channel and ECMP).

Configuration

The following configuration is required on the SL:

- A SVI belonging to its respective VRF
- A separate eBGP sessions for each VRF with R1 and R2
- MLAG interface towards R1 and R2
- Route-map outbound towards the router to filter host routes (/32)

Service Leaf

Function	SL-1	SL-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20,30,40,100,200	vlan 10,20,30,40,100,200
VRF Instance	vrf instance red vrf instance blue ! ip routing vrf red ip routing vrf blue	vrf instance red vrf instance blue ! ip routing vrf red ip routing vrf blue
Spines Uplink	interface Ethernet1 no switchport ip address 192.168.1.9/31 ! interface Ethernet2 no switchport ip address 192.168.2.9/31	interface Ethernet1 no switchport ip address 192.168.1.11/31 ! interface Ethernet2 no switchport ip address 192.168.2.11/31
Router Downlink	interface port-channel1 switchport mode trunk	interface port-channel1 switchport mode trunk

	<pre> mlag 1 ! interface port-channel2 switchport mode trunk mlag 2 ! interface Ethernet4 channel-group 1 mode active ! interface Ethernet5 channel-group 2 mode active </pre>	<pre> mlag 1 ! interface port-channel2 switchport mode trunk mlag 2 ! interface Ethernet4 channel-group 1 mode active ! interface Ethernet5 channel-group 2 mode active </pre>
BGP Loopback0 Router ID	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.5/32 ! router general router-id ipv4 192.168.100.5 </pre>	<pre> interface Loopback0 description BGP Router ID ip address 192.168.100.6/32 ! router general router-id ipv4 192.168.100.6 </pre>
VTI Loopback1 VTEP IP	<pre> interface Loopback1 description VTEP IP ip address 192.168.200.5/32 </pre>	<pre> interface Loopback1 description VTEP IP ip address 192.168.200.5/32 </pre>
VxLAN	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf red vni 2000 vxlan vrf blue vni 2001 </pre>	<pre> interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf red vni 2000 vxlan vrf blue vni 2001 </pre>
MLAG Config	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000 </pre>	<pre> vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000 </pre>
Anycast Gateway Virtual MAC address	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>	<pre> interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99 </pre>
Router P2P SVI	<pre> interface Vlan100 vrf red ip address 172.16.100.253/29 ! interface Vlan200 vrf blue ip address 172.16.200.253/29 </pre>	<pre> interface Vlan100 vrf red ip address 172.16.100.252/29 ! interface Vlan200 vrf blue ip address 172.16.200.252/29 </pre>
IP-Prefix Route-map	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! </pre>	<pre> ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! </pre>

	<pre> ip prefix-list HOST_ROUTES_V4 seq 10 permit 0.0.0.0/0 ge 32 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P ! route-map RM_ROUTER_OUT_V4 deny 10 match ip address prefix-list HOST_ROUTES_V4 ! route-map RM_ROUTER_OUT_V4 permit 20 </pre>	<pre> ip prefix-list HOST_ROUTES_V4 seq 10 permit 0.0.0.0/0 ge 32 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P ! route-map RM_ROUTER_OUT_V4 deny 10 match ip address prefix-list HOST_ROUTES_V4 ! route-map RM_ROUTER_OUT_V4 permit 20 </pre>
eBGP and iBGP Underlay BGP/EVPN	<pre> router bgp 65000.5 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor PG_ROUTER_V4 peer group neighbor PG_ROUTER_V4 remote-as 65000.201 neighbor PG_ROUTER_V4 route-map RM_ROUTER_OUT_V4 out neighbor PG_ROUTER_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.8 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.8 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf red rd 192.168.100.5:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 neighbor 172.16.100.250 peer group PG_ROUTER_V4 neighbor 172.16.100.251 peer group PG_ROUTER_V4 redistribute connected ! vrf blue rd 192.168.100.5:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 neighbor 172.16.200.250 peer group PG_ROUTER_V4 neighbor 172.16.200.251 peer group PG_ROUTER_V4 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor PG_ROUTER_V4 activate </pre>	<pre> router bgp 65000.5 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multihop 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor PG_ROUTER_V4 peer group neighbor PG_ROUTER_V4 remote-as 65000.201 neighbor PG_ROUTER_V4 route-map RM_ROUTER_OUT_V4 out neighbor PG_ROUTER_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.10 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.10 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf red rd 192.168.100.6:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 neighbor 172.16.100.250 peer group PG_ROUTER_V4 neighbor 172.16.100.251 peer group PG_ROUTER_V4 redistribute connected ! vrf blue rd 192.168.100.6:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 neighbor 172.16.200.250 peer group PG_ROUTER_V4 neighbor 172.16.200.251 peer group PG_ROUTER_V4 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor PG_ROUTER_V4 activate </pre>

	neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate	neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate
--	--	--

Router

Function	R-1	R-2
VLAN	vlan 100,200	vlan 100,200
Service Leaf Uplinks	interface port-channel1 switchport mode trunk ! interface Ethernet4 channel-group 1 mode active ! interface Ethernet5 channel-group 1 mode active	interface port-channel1 switchport mode trunk ! interface Ethernet4 channel-group 1 mode active ! interface Ethernet5 channel-group 1 mode active
Service Leaf P2P SVI	interface Vlan100 ip address 172.16.100.251/29 ! interface Vlan200 ip address 172.16.200.251/29	interface Vlan100 ip address 172.16.100.250/29 ! interface Vlan200 ip address 172.16.200.250/29
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID ip address 192.168.200.201/32	interface Loopback0 description BGP Router ID ip address 192.168.200.202/32
Static Routes	ip route 0.0.0.0/0 Null0	ip route 0.0.0.0/0 Null0
BGP	router bgp 65000.201 bgp asn notation asdot router-id 192.168.100.201 no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor PG_SL_V4 peer group neighbor PG_SL_V4 remote-as 65000.5 neighbor PG_SL_V4 maximum-routes 12000 neighbor 172.16.100.252 peer group PG_SL_V4 neighbor 172.16.100.253 peer group PG_SL_V4 neighbor 172.16.200.252 peer group PG_SL_V4 neighbor 172.16.200.253 peer group PG_SL_V4 redistribute static ! address-family ipv4 neighbor PG_SL_V4 activate	router bgp 65000.201 bgp asn notation asdot router-id 192.168.100.202 no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor PG_SL_V4 peer group neighbor PG_SL_V4 remote-as 65000.5 neighbor PG_SL_V4 maximum-routes 12000 neighbor 172.16.100.252 peer group PG_SL_V4 neighbor 172.16.100.253 peer group PG_SL_V4 neighbor 172.16.200.252 peer group PG_SL_V4 neighbor 172.16.200.253 peer group PG_SL_V4 redistribute static ! address-family ipv4 neighbor PG_SL_V4 activate

Verification

show ip bgp summary vrf <vrf_name>

Verify the eBGP peering between SL-1 and R-1 and R-2 are established

SL-1#show ip bgp summary vrf red BGP summary information for VRF red Router identifier 192.168.100.5, local AS number 65000.5 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 172.16.100.250 4 65000.201 813 808 0 0 00:46:31 Estab 1 1 172.16.100.251 4 65000.201 810 806 0 0 00:50:43 Estab 1 1

SL-1#show ip bgp summary vrf blue BGP summary information for VRF blue Router identifier 192.168.100.5, local AS number 65000.5 Neighbor Status Codes: m - Under maintenance Neighbor V AS MsgRcvd MsgSent InQ OutQ Up/Down State PfxRcd PfxAcc 172.16.200.250 4 65000.201 693 691 0 0 00:46:35 Estab 1 1 172.16.200.251 4 65000.201 689 690 0 0 00:48:27 Estab 1 1

show ip route vrf <vrf_name>

Verify a default route is presented in the VRF red and blue routing table on SL-1

Verify a default route is presented in the VRF red routing table on CL-1

Verify a default route is presented in the VRF blue routing table on CL-3

Verify only tenants routes are presented in the routing table on R-1

SL-1#show ip route vrf red

```
VRF: red
Codes: C - connected, S - static, K - kernel,
       0 - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
       R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
       O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
       NG - Nexthop Group Static Route, V - VXLAN Control Service,
       DH - DHCP client installed default route, M - Martian,
       DP - Dynamic Policy Route, L - VRF Leaked,
       RC - Route Cache Route
```

Gateway of last resort:

```
B E      0.0.0.0/0 [20/0] via 172.16.100.250, Vlan100
          via 172.16.100.251, Vlan100

B E      10.10.10.1/32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
C       10.10.10.0/24 is directly connected, Vlan10
B E      10.10.20.2/32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
C       10.10.20.0/24 is directly connected, Vlan20
C       172.16.100.248/29 is directly connected, Vlan100
```

SL-1

SL-1#show ip route vrf blue

```
VRF: blue
Codes: C - connected, S - static, K - kernel,
       0 - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
       R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
       O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
       NG - Nexthop Group Static Route, V - VXLAN Control Service,
       DH - DHCP client installed default route, M - Martian,
       DP - Dynamic Policy Route, L - VRF Leaked,
       RC - Route Cache Route
```

Gateway of last resort:

```
B E      0.0.0.0/0 [20/0] via 172.16.200.250, Vlan200
          via 172.16.200.251, Vlan200

B E      10.10.30.3/32 [20/0] via VTEP 192.168.200.3 VNI 2001 router-mac 02:00:00:00:aa:a3
C       10.10.30.0/24 is directly connected, Vlan30
B E      10.10.40.4/32 [20/0] via VTEP 192.168.200.3 VNI 2001 router-mac 02:00:00:00:aa:a3
C       10.10.40.0/24 is directly connected, Vlan40
C       172.16.200.248/29 is directly connected, Vlan200
```

CL-1#sh ip route vrf red

```
VRF: red
Codes: C - connected, S - static, K - kernel,
       0 - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
       R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
       O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
       NG - Nexthop Group Static Route, V - VXLAN Control Service,
       DH - DHCP client installed default route, M - Martian,
       DP - Dynamic Policy Route, L - VRF Leaked,
       RC - Route Cache Route
```

Gateway of last resort:

```
B E      0.0.0.0/0 [20/0] via VTEP 192.168.200.5 VNI 2000 router-mac 02:00:00:00:dd:d1
C       10.10.10.0/24 is directly connected, Vlan10
C       10.10.20.0/24 is directly connected, Vlan20
B E      172.16.100.248/29 [20/0] via VTEP 192.168.200.5 VNI 2000 router-mac 02:00:00:00:dd:d1
```

CL-1

CL-3#show ip route vrf blue

```
VRF: blue
Codes: C - connected, S - static, K - kernel,
       0 - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
       R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
       O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
       NG - Nexthop Group Static Route, V - VXLAN Control Service,
       DH - DHCP client installed default route, M - Martian,
       DP - Dynamic Policy Route, L - VRF Leaked,
       RC - Route Cache Route
```

Gateway of last resort:

```
B E      0.0.0.0/0 [20/0] via VTEP 192.168.200.5 VNI 2001 router-mac 02:00:00:00:dd:d1
C       10.10.30.0/24 is directly connected, Vlan30
C       10.10.40.0/24 is directly connected, Vlan40
```

CL-3

	B E 172.16.200.248/29 [20/0] via VTEP 192.168.200.5 VNI 2001 router-mac 02:00:00:00:dd:d1
R-1	<pre>R-1#show ip route VRF: default Codes: C - connected, S - static, K - kernel, O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1, E2 - OSPF external type 2, N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary, NG - Nexthop Group Static Route, V - VXLAN Control Service, DH - DHCP client installed default route, M - Martian, DP - Dynamic Policy Route, L - VRF Leaked, RC - Route Cache Route Gateway of last resort: S 0.0.0.0/0 is directly connected, Null0 B E 10.10.0.0/24 [20/0] via 172.16.100.252, Vlan100 via 172.16.100.253, Vlan100 B E 10.10.20.0/24 [20/0] via 172.16.100.252, Vlan100 via 172.16.100.253, Vlan100 B E 10.10.30.0/24 [20/0] via 172.16.200.252, Vlan200 via 172.16.200.253, Vlan200 B E 10.10.40.0/24 [20/0] via 172.16.200.252, Vlan200 via 172.16.200.253, Vlan200 C 172.16.100.248/29 is directly connected, Vlan100 C 172.16.200.248/29 is directly connected, Vlan200 C 192.168.100.201/32 is directly connected, Loopback0</pre>

show bgp evpn route-type ip-prefix <prefix> vni <vn_id> next-hop <vtep_ip> detail

Verify SL-1 and SL-2 advertise 0.0.0.0/0 via EVPN Type-5 routes on CL-1 and CL-3

CL-1#show bgp evpn route-type ip-prefix 0.0.0.0/0 vni 2000 next-hop 192.168.200.5 detail
BGP routing table information for VRF default
Router identifier 192.168.100.1, local AS number 4259840001
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.5:2000
Paths: 2 available
65000.65000.65000.5 65000.201
192.168.200.5 from 192.168.100.102 (192.168.100.102)
Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
VNI: 2000
65000.65000.65000.5 65000.201
192.168.200.5 from 192.168.100.101 (192.168.100.101)
Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
VNI: 2000
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.6:2000
Paths: 2 available
65000.65000.65000.5 65000.201
192.168.200.5 from 192.168.100.101 (192.168.100.101)
Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
VNI: 2000
65000.65000.65000.5 65000.201
192.168.200.5 from 192.168.100.102 (192.168.100.102)
Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
VNI: 2000

CL-3#show bgp evpn route-type ip-prefix 0.0.0.0/0 vni 2001 next-hop 192.168.200.5 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.5:2001
Paths: 2 available
65000.65000.65000.5 65000.201
192.168.200.5 from 192.168.100.101 (192.168.100.101)
Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
VNI: 2001
65000.65000.65000.5 65000.201
192.168.200.5 from 192.168.100.102 (192.168.100.102)
Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
VNI: 2001
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.6:2001
Paths: 2 available
65000.65000.65000.5 65000.201
192.168.200.5 from 192.168.100.102 (192.168.100.102)
Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
VNI: 2001
65000.65000.65000.5 65000.201
192.168.200.5 from 192.168.100.101 (192.168.100.101)

```
Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor  
Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1  
VNI: 2001
```

ping <remote_host_ip>

Verify connectivity between Host-1 and Host-3 and Host-4

Host-1

```
HOST-1#ping 10.10.30.3  
PING 10.10.30.3 (10.10.30.3) 72(100) bytes of data.  
80 bytes from 10.10.30.3: icmp_seq=1 ttl=59 time=105 ms  
80 bytes from 10.10.30.3: icmp_seq=2 ttl=59 time=110 ms  
80 bytes from 10.10.30.3: icmp_seq=3 ttl=59 time=100 ms  
80 bytes from 10.10.30.3: icmp_seq=4 ttl=59 time=96.0 ms  
80 bytes from 10.10.30.3: icmp_seq=5 ttl=59 time=93.3 ms  
  
--- 10.10.30.3 ping statistics ---  
5 packets transmitted, 5 received, 0% packet loss, time 44ms  
rtt min/avg/max/mdev = 93.338/101.261/110.500/6.319 ms, pipe 5, ipg/ewma 11.170/103.170 ms  
  
HOST-1#ping 10.10.40.4  
PING 10.10.40.4 (10.10.40.4) 72(100) bytes of data.  
80 bytes from 10.10.40.4: icmp_seq=1 ttl=59 time=55.7 ms  
80 bytes from 10.10.40.4: icmp_seq=2 ttl=59 time=65.9 ms  
80 bytes from 10.10.40.4: icmp_seq=3 ttl=59 time=82.2 ms  
80 bytes from 10.10.40.4: icmp_seq=4 ttl=59 time=73.9 ms  
80 bytes from 10.10.40.4: icmp_seq=5 ttl=59 time=72.3 ms  
  
--- 10.10.40.4 ping statistics ---  
5 packets transmitted, 5 received, 0% packet loss, time 40ms  
rtt min/avg/max/mdev = 55.702/70.066/82.273/8.863 ms, pipe 5, ipg/ewma 10.123/63.191 ms
```

traceroute ip <remote_host_ip>

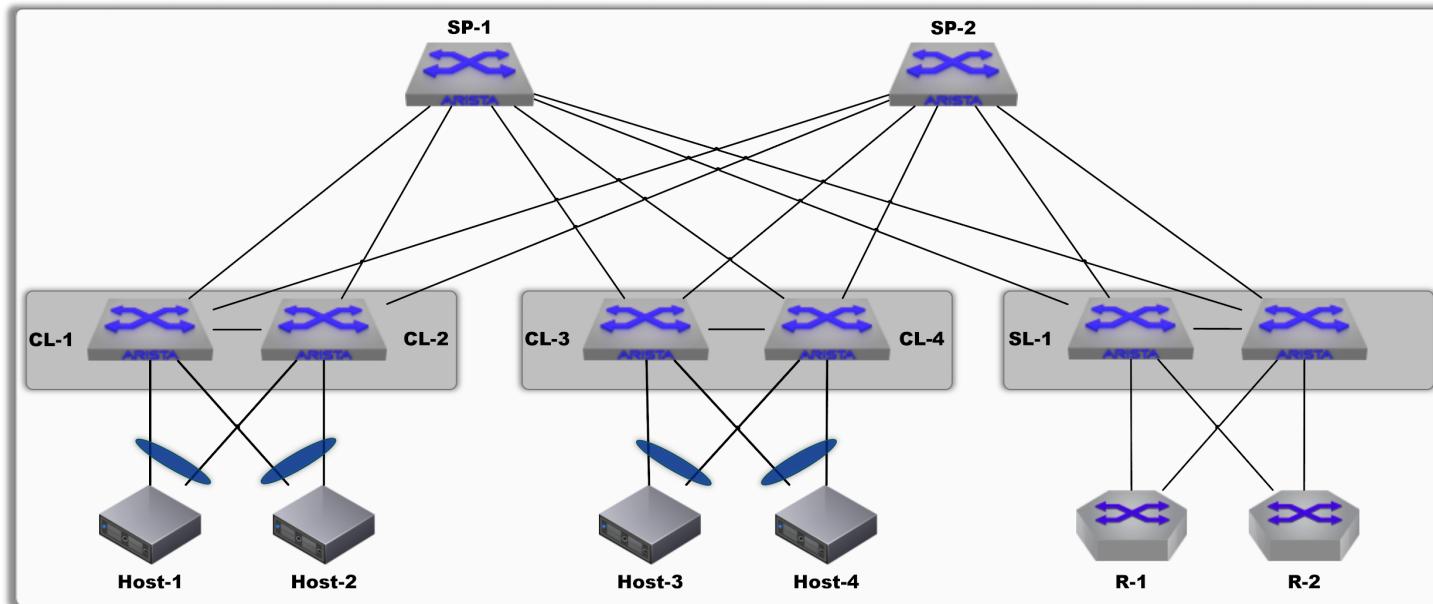
Verify traffic from Host-1 to Host-3 and Host-4 traverses R-1 or R-2

Host-1

```
HOST-1#traceroute ip 10.10.30.3  
traceroute to 10.10.30.3 (10.10.30.3), 30 hops max, 60 byte packets  
1 10.10.10.254 (10.10.10.254) 16.349 ms 16.743 ms 18.786 ms  
2 * * *  
3 172.16.100.251 (172.16.100.251) 77.776 ms 81.823 ms 88.418 ms  
4 172.16.200.253 (172.16.200.253) 159.274 ms 177.048 ms 178.839 ms  
5 * * *  
6 10.10.30.3 (10.10.30.3) 257.764 ms 294.406 ms 295.054 ms  
  
HOST-1#traceroute ip 10.10.40.4  
traceroute to 10.10.40.4 (10.10.40.4), 30 hops max, 60 byte packets  
1 10.10.10.254 (10.10.10.254) 21.532 ms 22.283 ms 25.480 ms  
2 * * *  
3 172.16.100.251 (172.16.100.251) 131.998 ms 172.424 ms 174.419 ms  
4 172.16.200.253 (172.16.200.253) 204.382 ms 206.600 ms 227.952 ms  
5 * * *  
6 10.10.40.4 (10.10.40.4) 302.391 ms 321.200 ms 320.683 ms
```

Scenario 3 - eBGP + VRF-Lite + Subinterfaces

Topology



Deployment Consideration

- No L3 failure isolation between the EVPN domain and the external network
- Flexible routing policies

Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
SP-1	192.168.100.101	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb1
SP-2	192.168.100.102	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb2
CL-1	192.168.100.1	192.168.200.1	65000.1	Red Red	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa1
CL-2	192.168.100.2	192.168.200.1	65000.1	Red Red	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa2
CL-3	192.168.100.3	192.168.200.3	65000.3	Blue Blue	VLAN30 VLAN40	10.10.30.254/24 10.10.40.254/24	0000.0000.aaa3
CL-4	192.168.100.4	192.168.200.3	65000.3	Blue Blue	VLAN30 VLAN40	10.10.30.254/24 10.10.40.254/24	0000.0000.aaa4
SL-1	192.168.100.5	192.168.200.5	65000.5	Red Red Blue Blue Red Blue Red Blue	VLAN10 VLAN20 VLAN30 VLAN40 Ethernet4.100 Ethernet4.200 Ethernet5.100 Ethernet5.200	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24 172.16.100.1/31 172.16.200.1/31 172.16.100.5/31 172.16.200.5/31	0000.0000.ddd1
SL-2	192.168.100.6	192.168.200.5	65000.5	Red Red Blue Blue Red Blue Red Blue	VLAN10 VLAN20 VLAN30 VLAN40 Ethernet4.101 Ethernet4.201 Ethernet5.101 Ethernet5.201	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24 172.16.100.3/31 172.16.200.3/31 172.16.100.7/31 172.16.200.7/31	0000.0000.ddd2
R-1	192.168.100.201	N/A	65000.201	Default Default	Ethernet1.100 Ethernet1.200 Ethernet2.101 Ethernet2.201	172.16.100.0/31 172.16.200.0/31 172.16.100.2/31 172.16.200.2/31	0000.0000.ccc1
R-2	192.168.100.202	N/A	65000.201	Default Default	Ethernet1.100 Ethernet1.200 Ethernet2.101 Ethernet2.201	172.16.100.4/31 172.16.200.4/31 172.16.100.6/31 172.16.200.6/31	0000.0000.ccc2
Host-1	N/A	N/A	N/A	N/A	VLAN10	10.10.10.1/24	0000.0000.1111

Host-2	N/A	N/A	N/A	N/A	VLAN20	10.10.20.2/24	0000.0000.2222
Host-3	N/A	N/A	N/A	N/A	VLAN10	10.10.30.3/24	0000.0000.3333
Host-4	N/A	N/A	N/A	N/A	VLAN20	10.10.40.4/24	0000.0000.4444

Important Notes

- When the 3rd party devices are deployed in active-standby and MLAG shared router MAC address is enabled on the SL. An iBGP session will be required per VRF to prevent traffic lost in case of a single link failure.

Configuration

The following configuration is required on the SL:

- A subinterface belonging to its respective VRF
- A separate eBGP sessions for each VRF with R1 and R2
- iBGP session for each VRF between the SLs
- Route-map outbound towards the router to filter host routes (/32)

Service Leaf

Function	SL-1	SL-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20,30,40	vlan 10,20,30,40
VRF Instance	vrf instance red vrf instance blue ! ip routing vrf red ip routing vrf blue	vrf instance red vrf instance blue ! ip routing vrf red ip routing vrf blue
Spines Uplink	interface Ethernet1 no switchport ip address 192.168.1.9/31 ! interface Ethernet2 no switchport ip address 192.168.2.9/31	interface Ethernet1 no switchport ip address 192.168.1.11/31 ! interface Ethernet2 no switchport ip address 192.168.2.11/31
Router Downlink and Subinterfaces	interface Ethernet4 no switchport ! interface Ethernet4.100 encapsulation dot1q vlan 100 vrf red ip address 172.16.100.1/31 ! interface Ethernet4.200 encapsulation dot1q vlan 200 vrf blue ip address 172.16.200.1/31 ! interface Ethernet5 no switchport ! interface Ethernet5.100 encapsulation dot1q vlan 100 vrf red ip address 172.16.100.5/31 ! interface Ethernet5.200 encapsulation dot1q vlan 200 vrf blue ip address 172.16.200.5/31	interface Ethernet4 no switchport ! interface Ethernet4.101 encapsulation dot1q vlan 101 vrf red ip address 172.16.100.3/31 ! interface Ethernet4.201 encapsulation dot1q vlan 201 vrf blue ip address 172.16.200.3/31 ! interface Ethernet5 no switchport ! interface Ethernet5.101 encapsulation dot1q vlan 101 vrf red ip address 172.16.100.7/31 ! interface Ethernet5.201 encapsulation dot1q vlan 201 vrf blue ip address 172.16.200.7/31
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID ip address 192.168.100.5/32 ! router general router-id ipv4 192.168.100.5	interface Loopback0 description BGP Router ID ip address 192.168.100.6/32 ! router general router-id ipv4 192.168.100.6
VTI Loopback1 VTEP IP	interface Loopback1 description VTEP IP ip address 192.168.200.5/32	interface Loopback1 description VTEP IP ip address 192.168.200.5/32
VxLAN	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040

	<pre>vxlan vrf red vni 2000 vxlan vrf blue vni 2001</pre>	<pre>vxlan vrf red vni 2000 vxlan vrf blue vni 2001</pre>
MLAG Config	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000</pre>	<pre>vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000</pre>
Anycast Gateway Virtual MAC address	<pre>interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>	<pre>interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99</pre>
IP-Prefix Route-map	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! ip prefix-list HOST_ROUTES_V4 seq 10 permit 0.0.0.0/0 ge 32 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P ! route-map RM_ROUTER_OUT_V4 deny 10 match ip address prefix-list HOST_ROUTES_V4 ! route-map RM_ROUTER_OUT_V4 permit 20</pre>	<pre>ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 ! ip prefix-list HOST_ROUTES_V4 seq 10 permit 0.0.0.0/0 ge 32 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P ! route-map RM_ROUTER_OUT_V4 deny 10 match ip address prefix-list HOST_ROUTES_V4 ! route-map RM_ROUTER_OUT_V4 permit 20</pre>
eBGP and iBGP Underlay BGP/EVPN	<pre>router bgp 65000.5 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor PG_ROUTER_V4 peer group neighbor PG_ROUTER_V4 remote-as 65000.201 neighbor PG_ROUTER_V4 route-map RM_ROUTER_OUT_V4 out neighbor PG_ROUTER_V4 maximum-routes 12000</pre>	<pre>router bgp 65000.5 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor PG_ROUTER_V4 peer group neighbor PG_ROUTER_V4 remote-as 65000.201 neighbor PG_ROUTER_V4 route-map RM_ROUTER_OUT_V4 out neighbor PG_ROUTER_V4 maximum-routes 12000</pre>

<pre> neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.8 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.8 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf red rd 192.168.100.5:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 neighbor 172.16.100.0 peer group PG_ROUTER_V4 neighbor 172.16.100.4 peer group PG_ROUTER_V4 redistribute connected ! vrf blue rd 192.168.100.5:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 neighbor 172.16.200.0 peer group PG_ROUTER_V4 neighbor 172.16.200.4 peer group PG_ROUTER_V4 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor PG_ROUTER_V4 activate neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>	<pre> neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.10 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.10 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! vrf red rd 192.168.100.6:2000 route-target import evpn 2000:2000 route-target export evpn 2000:2000 neighbor 172.16.100.2 peer group PG_ROUTER_V4 neighbor 172.16.100.6 peer group PG_ROUTER_V4 redistribute connected ! vrf blue rd 192.168.100.6:2001 route-target import evpn 2001:2001 route-target export evpn 2001:2001 neighbor 172.16.200.2 peer group PG_ROUTER_V4 neighbor 172.16.200.6 peer group PG_ROUTER_V4 redistribute connected ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor PG_ROUTER_V4 activate neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate </pre>
---	---

Router

Function	R-1	R-2
Service Leaf Uplinks and Subinterfaces	<pre> interface Ethernet1 no switchport ! interface Ethernet1.100 encapsulation dot1q vlan 100 ip address 172.16.100.0/31 ! interface Ethernet1.200 encapsulation dot1q vlan 200 ip address 172.16.200.0/31 ! interface Ethernet2 no switchport ! interface Ethernet2.101 encapsulation dot1q vlan 101 ip address 172.16.100.2/31 ! interface Ethernet2.201 encapsulation dot1q vlan 201 ip address 172.16.200.2/31 </pre>	<pre> interface Ethernet1 no switchport ! interface Ethernet1.100 encapsulation dot1q vlan 100 ip address 172.16.100.4/31 ! interface Ethernet1.200 encapsulation dot1q vlan 200 ip address 172.16.200.4/31 ! interface Ethernet2 no switchport ! interface Ethernet2.101 encapsulation dot1q vlan 101 ip address 172.16.100.6/31 ! interface Ethernet2.201 encapsulation dot1q vlan 201 ip address 172.16.200.6/31 </pre>
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID ip address 192.168.200.201/32	interface Loopback0 description BGP Router ID ip address 192.168.200.202/32
Static Routes	ip route 0.0.0.0/0 Null0	ip route 0.0.0.0/0 Null0
BGP	router bgp 65000.201 bgp asn notation asdot router-id 192.168.100.201	router bgp 65000.201 bgp asn notation asdot router-id 192.168.100.202

```

no bgp default ipv4-unicast
timers bgp 5 15
distance bgp 20 200 200
maximum-paths 2 ecmp 2
neighbor default send-community
neighbor PG_SL_V4 peer group
neighbor PG_SL_V4 remote-as 65000.5
neighbor PG_SL_V4 maximum-routes 12000
neighbor 172.16.100.1 peer group PG_SL_V4
neighbor 172.16.100.3 peer group PG_SL_V4
neighbor 172.16.200.1 peer group PG_SL_V4
neighbor 172.16.200.3 peer group PG_SL_V4
redistribute static
!
address-family ipv4
    neighbor PG_SL_V4 activate
no bgp default ipv4-unicast
timers bgp 5 15
distance bgp 20 200 200
maximum-paths 2 ecmp 2
neighbor default send-community
neighbor PG_SL_V4 peer group
neighbor PG_SL_V4 remote-as 65000.5
neighbor PG_SL_V4 maximum-routes 12000
neighbor 172.16.100.5 peer group PG_SL_V4
neighbor 172.16.100.7 peer group PG_SL_V4
neighbor 172.16.200.5 peer group PG_SL_V4
neighbor 172.16.200.7 peer group PG_SL_V4
redistribute static
!
address-family ipv4
    neighbor PG_SL_V4 activate

```

Verification

show ip bgp summary vrf <vrf_name>

Verify the eBGP peering between SL-1 and R-1 and R-2 are established

SL-1#show ip bgp summary vrf red
BGP summary information for VRF red
Router identifier 192.168.100.5, local AS number 65000.5
Neighbor Status Codes: m - Under maintenance

Neighbor	V	AS	MsgRcvd	MsgSent	InQ	OutQ	Up/Down	State	PfxRcd	PfxAcc
172.16.100.0	4	65000.201	687	687	0	0	00:48:26	Estab	1	1
172.16.100.4	4	65000.201	599	601	0	0	00:42:16	Estab	1	1

SL-1#show ip bgp summary vrf blue
BGP summary information for VRF blue
Router identifier 192.168.100.5, local AS number 65000.5
Neighbor Status Codes: m - Under maintenance

Neighbor	V	AS	MsgRcvd	MsgSent	InQ	OutQ	Up/Down	State	PfxRcd	PfxAcc
172.16.200.0	4	65000.201	692	688	0	0	00:48:41	Estab	1	1
172.16.200.4	4	65000.201	590	588	0	0	00:41:05	Estab	1	1

show ip route vrf <vrf_name>

Verify a default route is presented in the VRF red and blue routing table on SL-1

Verify a default route is presented in the VRF red routing table on CL-1

Verify a default route is presented in the VRF blue routing table on CL-3

Verify only tenants routes are presented in the routing table on R-1

SL-1#show ip route vrf red

VRF: red
Codes: C - connected, S - static, K - kernel,
O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,
NG - Nexthop Group Static Route, V - VXLAN Control Service,
DH - DHCP client installed default route, M - Martian,
DP - Dynamic Policy Route, L - VRF Leaked,
RC - Route Cache Route

Gateway of last resort:

B E 0.0.0.0/0 [20/0] via 172.16.100.0, Ethernet4.100
via 172.16.100.4, Ethernet5.100

B E 10.10.10.1/32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
C 10.10.10.0/24 is directly connected, Vlan10
B E 10.10.20.2/32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1
C 10.10.20.0/24 is directly connected, Vlan20
C 172.16.100.0/31 is directly connected, Ethernet4.100
C 172.16.100.4/31 is directly connected, Ethernet5.100

SL-1#show ip route vrf blue

VRF: blue
Codes: C - connected, S - static, K - kernel,
O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP,
R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2,
O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary,

	<p>NG - Nexthop Group Static Route, V - VXLAN Control Service, DH - DHCP client installed default route, M - Martian, DP - Dynamic Policy Route, L - VRF Leaked, RC - Route Cache Route</p> <p>Gateway of last resort: B E 0.0.0.0/0 [20/0] via 172.16.200.0, Ethernet4.200 via 172.16.200.4, Ethernet5.200</p> <p>B E 10.10.30.3/32 [20/0] via VTEP 192.168.200.3 VNI 2001 router-mac 02:00:00:00:aa:a3 C 10.10.30.0/24 is directly connected, Vlan30 B E 10.10.40.4/32 [20/0] via VTEP 192.168.200.3 VNI 2001 router-mac 02:00:00:00:aa:a3 C 10.10.40.0/24 is directly connected, Vlan40 C 172.16.200.0/31 is directly connected, Ethernet4.200 C 172.16.200.4/31 is directly connected, Ethernet5.200</p>
CL-1	<p>CL-1#sh ip route vrf red</p> <p>VRF: red Codes: C - connected, S - static, K - kernel, O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1, E2 - OSPF external type 2, N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary, NG - Nexthop Group Static Route, V - VXLAN Control Service, DH - DHCP client installed default route, M - Martian, DP - Dynamic Policy Route, L - VRF Leaked, RC - Route Cache Route</p> <p>Gateway of last resort: B E 0.0.0.0/0 [20/0] via VTEP 192.168.200.5 VNI 2000 router-mac 02:00:00:00:dd:d1</p> <p>C 10.10.10.0/24 is directly connected, Vlan10 C 10.10.20.0/24 is directly connected, Vlan20 B E 172.16.100.0/31 [20/0] via VTEP 192.168.200.5 VNI 2000 router-mac 02:00:00:00:dd:d1 B E 172.16.100.2/31 [20/0] via VTEP 192.168.200.5 VNI 2000 router-mac 02:00:00:00:dd:d1 B E 172.16.100.4/31 [20/0] via VTEP 192.168.200.5 VNI 2000 router-mac 02:00:00:00:dd:d1 B E 172.16.100.6/31 [20/0] via VTEP 192.168.200.5 VNI 2000 router-mac 02:00:00:00:dd:d1</p>
CL-3	<p>CL-3#show ip route vrf blue</p> <p>VRF: blue Codes: C - connected, S - static, K - kernel, O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1, E2 - OSPF external type 2, N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary, NG - Nexthop Group Static Route, V - VXLAN Control Service, DH - DHCP client installed default route, M - Martian, DP - Dynamic Policy Route, L - VRF Leaked, RC - Route Cache Route</p> <p>Gateway of last resort: B E 0.0.0.0/0 [20/0] via VTEP 192.168.200.5 VNI 2001 router-mac 02:00:00:00:dd:d1</p> <p>C 10.10.30.0/24 is directly connected, Vlan30 C 10.10.40.0/24 is directly connected, Vlan40 B E 172.16.200.0/31 [20/0] via VTEP 192.168.200.5 VNI 2001 router-mac 02:00:00:00:dd:d1 B E 172.16.200.2/31 [20/0] via VTEP 192.168.200.5 VNI 2001 router-mac 02:00:00:00:dd:d1 B E 172.16.200.4/31 [20/0] via VTEP 192.168.200.5 VNI 2001 router-mac 02:00:00:00:dd:d1 B E 172.16.200.6/31 [20/0] via VTEP 192.168.200.5 VNI 2001 router-mac 02:00:00:00:dd:d1</p>
R-1	<p>R-1#show ip route</p> <p>VRF: default Codes: C - connected, S - static, K - kernel, O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1, E2 - OSPF external type 2, N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary, NG - Nexthop Group Static Route, V - VXLAN Control Service, DH - DHCP client installed default route, M - Martian, DP - Dynamic Policy Route, L - VRF Leaked, RC - Route Cache Route</p> <p>Gateway of last resort: S 0.0.0.0/0 is directly connected, Null0</p> <p>B E 10.10.10.0/24 [20/0] via 172.16.100.1, Ethernet1.100 via 172.16.100.3, Ethernet2.101 B E 10.10.20.0/24 [20/0] via 172.16.100.1, Ethernet1.100 via 172.16.100.3, Ethernet2.101 B E 10.10.30.0/24 [20/0] via 172.16.200.1, Ethernet1.200 via 172.16.200.3, Ethernet2.201 B E 10.10.40.0/24 [20/0] via 172.16.200.1, Ethernet1.200 via 172.16.200.3, Ethernet2.201 C 172.16.100.0/31 is directly connected, Ethernet1.100</p>

```

C      172.16.100.2/31 is directly connected, Ethernet2.101
B E    172.16.100.4/31 [20/0] via 172.16.100.1, Ethernet1.100
B E    172.16.100.6/31 [20/0] via 172.16.100.3, Ethernet2.101
C      172.16.200.0/31 is directly connected, Ethernet1.200
C      172.16.200.2/31 is directly connected, Ethernet2.201
B E    172.16.200.4/31 [20/0] via 172.16.200.1, Ethernet1.200
B E    172.16.200.6/31 [20/0] via 172.16.200.3, Ethernet2.201
C      192.168.100.201/32 is directly connected, Loopback0

```

show bgp evpn route-type ip-prefix <prefix> vni <vnid> next-hop <vtep_ip> detail

Verify SL-1 and SL-2 advertise 0.0.0.0/0 via EVPN Type-5 routes on CL-1 and CL-3

```

CL-1#show bgp evpn route-type ip-prefix 0.0.0.0/0 vni 2000 next-hop 192.168.200.5 detail
BGP routing table information for VRF default
Router identifier 192.168.100.1, local AS number 4259840001
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.5:2000
Paths: 2 available
 65000.65000 65000.5 65000.201
    192.168.200.5 from 192.168.100.101 (192.168.100.101)
      Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
        VNI: 2000
 65000.65000 65000.5 65000.201
    192.168.200.5 from 192.168.100.102 (192.168.100.102)
      Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
        VNI: 2000
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.6:2000
Paths: 2 available
 65000.65000 65000.5 65000.201
    192.168.200.5 from 192.168.100.101 (192.168.100.101)
      Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
        VNI: 2000
 65000.65000 65000.5 65000.201
    192.168.200.5 from 192.168.100.102 (192.168.100.102)
      Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
        VNI: 2000

```

```

CL-3#show bgp evpn route-type ip-prefix 0.0.0.0/0 vni 2001 next-hop 192.168.200.5 detail
BGP routing table information for VRF default
Router identifier 192.168.100.3, local AS number 4259840003
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.5:2001
Paths: 2 available
 65000.65000 65000.5 65000.201
    192.168.200.5 from 192.168.100.101 (192.168.100.101)
      Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
        VNI: 2001
 65000.65000 65000.5 65000.201
    192.168.200.5 from 192.168.100.102 (192.168.100.102)
      Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
        VNI: 2001
BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.6:2001
Paths: 2 available
 65000.65000 65000.5 65000.201
    192.168.200.5 from 192.168.100.102 (192.168.100.102)
      Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor
      Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
        VNI: 2001
 65000.65000 65000.5 65000.201
    192.168.200.5 from 192.168.100.101 (192.168.100.101)
      Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor
      Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1
        VNI: 2001

```

ping <remote_host_ip>

Verify connectivity between Host-1 and Host-3 and Host-4

```

HOST-1#ping 10.10.30.3
PING 10.10.30.3 (10.10.30.3) 72(100) bytes of data.
80 bytes from 10.10.30.3: icmp_seq=1 ttl=59 time=105 ms
80 bytes from 10.10.30.3: icmp_seq=2 ttl=59 time=110 ms
80 bytes from 10.10.30.3: icmp_seq=3 ttl=59 time=100 ms
80 bytes from 10.10.30.3: icmp_seq=4 ttl=59 time=96.0 ms
80 bytes from 10.10.30.3: icmp_seq=5 ttl=59 time=93.3 ms

--- 10.10.30.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 44ms
rtt min/avg/max/mdev = 93.338/101.261/110.500/6.319 ms, pipe 5, ipg/ewma 11.170/103.170 ms

HOST-1#ping 10.10.40.4

```

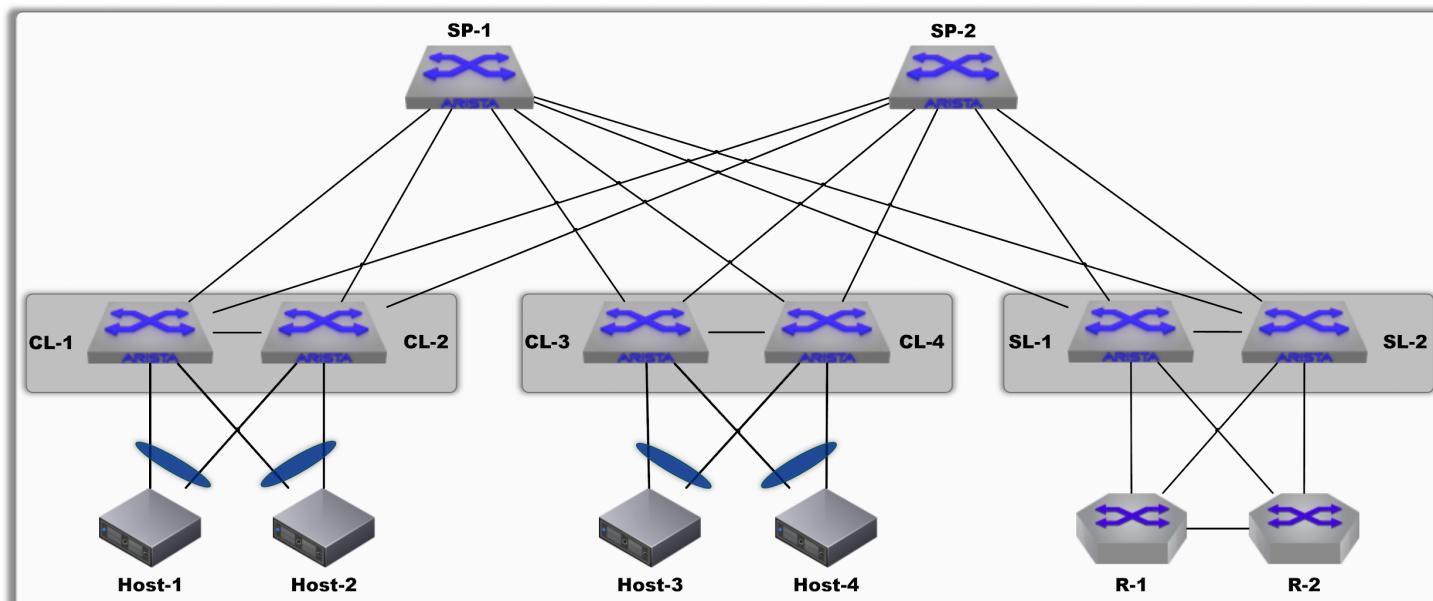
```
PING 10.10.40.4 (10.10.40.4) 72(100) bytes of data.
80 bytes from 10.10.40.4: icmp_seq=1 ttl=59 time=55.7 ms
80 bytes from 10.10.40.4: icmp_seq=2 ttl=59 time=65.9 ms
80 bytes from 10.10.40.4: icmp_seq=3 ttl=59 time=82.2 ms
80 bytes from 10.10.40.4: icmp_seq=4 ttl=59 time=73.9 ms
80 bytes from 10.10.40.4: icmp_seq=5 ttl=59 time=72.3 ms

--- 10.10.40.4 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 40ms
rtt min/avg/max/mdev = 55.702/70.066/82.273/8.863 ms, pipe 5, ipg/ewma 10.123/63.191 ms
```

traceroute ip <remote_host_ip>

Verify traffic from Host-1 to Host-3 and Host-4 traverses R-1 or R-2

Host-1	<pre>HOST-1#traceroute ip 10.10.30.3 traceroute to 10.10.30.3 (10.10.30.3), 30 hops max, 60 byte packets 1 10.10.10.254 (10.10.10.254) 16.349 ms 16.743 ms 18.786 ms 2 * * 3 172.16.100.251 (172.16.100.251) 77.776 ms 81.823 ms 88.418 ms 4 172.16.200.253 (172.16.200.253) 159.274 ms 177.048 ms 178.839 ms 5 * * 6 10.10.30.3 (10.10.30.3) 257.764 ms 294.406 ms 295.054 ms HOST-1#traceroute ip 10.10.40.4 traceroute to 10.10.40.4 (10.10.40.4), 30 hops max, 60 byte packets 1 10.10.10.254 (10.10.10.254) 21.532 ms 22.283 ms 25.480 ms 2 * * 3 172.16.100.251 (172.16.100.251) 131.998 ms 172.424 ms 174.419 ms 4 172.16.200.253 (172.16.200.253) 204.382 ms 206.600 ms 227.952 ms 5 * * 6 10.10.40.4 (10.10.40.4) 302.391 ms 321.200 ms 320.683 ms</pre>
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Scenario 4 - EVPN Internetworking with IPVPN**Topology****Deployment Consideration**

- No L3 failure isolation between the EVPN and VPN domain
- Inter-subnet between EVPN/VxLAN domains via an VPN/MPLS network

Setup Details

	Loopback0	Loopback1	BGP AS	VRF	VLAN	IP Address	System MAC
SP-1	192.168.100.101	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb1
SP-2	192.168.100.102	N/A	65000.65000	N/A	N/A	N/A	0000.0000.bbb2
CL-1	192.168.100.1	192.168.200.1	65000.1	Red Red	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa1
CL-2	192.168.100.2	192.168.200.1	65000.1	Red Red	VLAN10 VLAN20	10.10.10.254/24 10.10.20.254/24	0000.0000.aaa2
CL-3	192.168.100.3	192.168.200.3	65000.3	Blue	VLAN30	10.10.30.254/24	0000.0000.aaa3

Arista Internal Use Only

				Blue	VLAN40	10.10.40.254/24	
CL-4	192.168.100.4	192.168.200.3	65000.3	Blue Blue	VLAN30 VLAN40	10.10.30.254/24 10.10.40.254/24	0000.0000.aaa4
SL-1	192.168.100.5	192.168.200.5	65000.5	Red Red Blue Blue Default Default	VLAN10 VLAN20 VLAN30 VLAN40 Ethernet4 Ethernet5	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24 172.16.100.1/31 172.16.100.5/31	0000.0000.ddd1
SL-2	192.168.100.6	192.168.200.5	65000.5	Red Red Blue Blue Default Default	VLAN10 VLAN20 VLAN30 VLAN40 Ethernet4 Ethernet5	10.10.10.254/24 10.10.20.254/24 10.10.30.254/24 10.10.40.254/24 172.16.100.3/31 172.16.100.7/31	0000.0000.ddd2
R-1	192.168.100.201	N/A	65000.201	Default Default Red Blue Red Blue Red Blue	Ethernet1 Ethernet2 Loopback101 Loopback102 Vlan10 Vlan20 Vlan4001 Vlan4002	172.16.100.0/31 172.16.100.2/31 10.101.10.1/32 10.102.10.1/32 10.101.20.1/24 10.102.20.1/24 172.16.10.1/30 172.16.10.1/30	0000.0000.ccc1
R-2	192.168.100.202	N/A	65000.201	Default Default Red Blue Red Blue Red Blue	Ethernet1 Ethernet2 Loopback101 Loopback102 Vlan10 Vlan20 Vlan4001 Vlan4002	172.16.100.4/31 172.16.100.6/31 10.101.10.2/32 10.102.10.2/32 10.101.20.2/24 10.102.20.2/24 172.16.10.2/30 172.16.10.2/30	0000.0000.ccc2
Host-1	N/A	N/A	N/A	N/A	VLAN10	10.10.10.1/24	0000.0000.1111
Host-2	N/A	N/A	N/A	N/A	VLAN20	10.10.20.2/24	0000.0000.2222
Host-3	N/A	N/A	N/A	N/A	VLAN10	10.10.30.3/24	0000.0000.3333
Host-4	N/A	N/A	N/A	N/A	VLAN20	10.10.40.4/24	0000.0000.4444

Important Notes

- Dual-VNI Type-2 MAC-IP routes (/32) are eligible for export into IPVPN network
- VXLAN routes do not form ECMP paths with MPLS routes. MPLS tunnels are always preferred
- EVPN MAC-VRFs cannot be extended across IPVPN networks
- Routes leaked from importing VRF are not eligible for inter-VPN export
- The interworking PE only prepends the D-PATH attribute to prefixes learnt via either EVPN or IP-VPN (D-PATH attribute is not prepended to local prefix).

Refer to the [EVPN Internetworking with IPVPN](#) for more information.

Configuration

The following configuration is required on the SL:

- Enable MPLS and LDP
- eBGP VPN-IPv4 sessions with R1 and R2
- Route-map at export to filter host routes towards R-1 and R-2

Service Leaf

Function	SL-1	SL-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20,30,40	vlan 10,20,30,40
VRF Instance	vrf instance red vrf instance blue ! ip routing vrf red ip routing vrf blue	vrf instance red vrf instance blue ! ip routing vrf red ip routing vrf blue
Spines Uplink	interface Ethernet1 no switchport ip address 192.168.1.9/31 ! interface Ethernet2	interface Ethernet1 no switchport ip address 192.168.1.11/31 ! interface Ethernet2

	no switchport ip address 192.168.2.9/31	no switchport ip address 192.168.2.11/31
Router Downlink	interface Ethernet4 no switchport ip address 172.16.100.1/31 mpls ldp interface ! interface Ethernet5 no switchport ip address 172.16.100.5/31 mpls ldp interface	interface Ethernet4 no switchport ip address 172.16.100.3/31 mpls ldp interface ! interface Ethernet5 no switchport ip address 172.16.100.7/31 mpls ldp interface
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID ip address 192.168.100.5/32 mpls ldp interface ! router general router-id ipv4 192.168.100.5	interface Loopback0 description BGP Router ID ip address 192.168.100.6/32 mpls ldp interface ! router general router-id ipv4 192.168.100.6
VTEP IP VTEP1 Loopback1	interface Loopback1 description VTEP IP ip address 192.168.200.5/32	interface Loopback1 description VTEP IP ip address 192.168.200.5/32
VxLAN	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf red vni 2000 vxlan vrf blue vni 2001	interface Vxlan1 vxlan source-interface Loopback1 vxlan udp-port 4789 vxlan virtual-router encapsulation mac-address mlag-system-id vxlan vlan 10 vni 1010 vxlan vlan 20 vni 1020 vxlan vlan 30 vni 1030 vxlan vlan 40 vni 1040 vxlan vrf red vni 2000 vxlan vrf blue vni 2001
MLAG Config	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.1/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.2 peer-link port-channel1000	vlan 4094 trunk group mlag ! no spanning-tree vlan-id 4094 ! interface port-channel1000 switchport mode trunk switchport trunk group mlag ! interface ethernet3 channel-group 1000 mode active ! interface vlan 4094 ip address 172.16.0.2/30 no autostate ! mlag configuration domain-id Arista-EVPN local-interface Vlan4094 peer-address 172.16.0.1 peer-link port-channel1000
MPLS LDP	mpls ip ! mpls ldp router-id interface Loopback0 interface disabled default no shutdown	mpls ip ! mpls ldp router-id interface Loopback0 interface disabled default no shutdown
Anycast Gateway Virtual MAC address	interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99	interface Vlan10 vrf red ip address virtual 10.10.10.254/24 ! interface Vlan20 vrf red ip address virtual 10.10.20.254/24 ! interface Vlan30 vrf blue ip address virtual 10.10.30.254/24 ! interface Vlan40 vrf blue ip address virtual 10.10.40.254/24 ! ip virtual-router mac-address 00:1c:73:00:00:99
IP-Prefix Route-map	ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 !	ip prefix-list LOOPBACK seq 10 permit 192.168.100.0/24 eq 32 seq 20 permit 192.168.200.0/24 eq 32 ! ip prefix-list P2P seq 10 permit 192.168.1.0/24 ge 31 seq 20 permit 192.168.2.0/24 ge 31 !

	<pre> ip prefix-list HOST_ROUTES_V4 seq 10 permit 0.0.0.0/0 ge 32 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P ! route-map RM_MPLS_EXP deny 10 match ip address prefix-list HOST_ROUTE_V4 ! route-map RM_MPLS_EXP permit 20 </pre>	<pre> ip prefix-list HOST_ROUTES_V4 seq 10 permit 0.0.0.0/0 ge 32 ! route-map CONNECTED permit 10 match ip address prefix-list LOOPBACK ! route-map CONNECTED permit 20 match ip address prefix-list P2P ! route-map RM_MPLS_EXP deny 10 match ip address prefix-list HOST_ROUTE_V4 ! route-map RM_MPLS_EXP permit 20 </pre>
eBGP and iBGP Underlay BGP/EVPN BGP/VPN-IPv4	<pre> router bgp 65000.5 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor PG_ROUTER_MPLS peer group neighbor PG_ROUTER_MPLS remote-as 65000.201 neighbor PG_ROUTER_MPLS update-source Loopback0 neighbor PG_ROUTER_MPLS ebgp-multipath 2 neighbor PG_ROUTER_MPLS maximum-routes 12000 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.2 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.8 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.8 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.201 peer group PG_ROUTER_MPLS neighbor 192.168.100.202 peer group PG_ROUTER_MPLS redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate ! address-family vpn-ipv4 neighbor PG_ROUTER_MPLS activate neighbor default encapsulation mpls next-hop-self source-interface Loopback0 ! vrf blue rd 192.168.100.5:2001 route-target import evpn 2001:2001 route-target import vpn-ipv4 65000:2001 route-target export evpn 2001:2001 route-target export vpn-ipv4 65000:2001 route-target export vpn-ipv4 route-map RM_MPLS_EXP redistribute connected !</pre>	<pre> router bgp 65000.5 bgp asn notation asdot update wait-install no bgp default ipv4-unicast timers bgp 5 15 distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor OVERLAY_SPINE_EVPN peer group neighbor OVERLAY_SPINE_EVPN remote-as 65000.65000 neighbor OVERLAY_SPINE_EVPN update-source Loopback0 neighbor OVERLAY_SPINE_EVPN bfd neighbor OVERLAY_SPINE_EVPN ebgp-multipath 2 neighbor OVERLAY_SPINE_EVPN maximum-routes 0 neighbor PG_ROUTER_MPLS peer group neighbor PG_ROUTER_MPLS remote-as 65000.201 neighbor PG_ROUTER_MPLS update-source Loopback0 neighbor PG_ROUTER_MPLS ebgp-multipath 2 neighbor PG_ROUTER_MPLS maximum-routes 12000 neighbor UNDERLAY_MLAG_PEER_V4 peer group neighbor UNDERLAY_MLAG_PEER_V4 remote-as 65000.5 neighbor UNDERLAY_MLAG_PEER_V4 next-hop-self neighbor UNDERLAY_MLAG_PEER_V4 maximum-routes 12000 neighbor UNDERLAY_SPINE_V4 peer group neighbor UNDERLAY_SPINE_V4 remote-as 65000.65000 neighbor UNDERLAY_SPINE_V4 maximum-routes 12000 neighbor 172.16.0.1 peer group UNDERLAY_MLAG_PEER_V4 neighbor 192.168.1.10 peer group UNDERLAY_SPINE_V4 neighbor 192.168.2.10 peer group UNDERLAY_SPINE_V4 neighbor 192.168.100.101 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.102 peer group OVERLAY_SPINE_EVPN neighbor 192.168.100.201 peer group PG_ROUTER_MPLS neighbor 192.168.100.202 peer group PG_ROUTER_MPLS redistribute connected route-map CONNECTED ! vlan 10 rd auto route-target both 1010:1010 redistribute learned ! vlan 20 rd auto route-target both 1020:1020 redistribute learned ! vlan 30 rd auto route-target both 1030:1030 redistribute learned ! vlan 40 rd auto route-target both 1040:1040 redistribute learned ! address-family evpn neighbor OVERLAY_SPINE_EVPN activate ! address-family ipv4 neighbor UNDERLAY_MLAG_PEER_V4 activate neighbor UNDERLAY_SPINE_V4 activate ! address-family vpn-ipv4 neighbor PG_ROUTER_MPLS activate neighbor default encapsulation mpls next-hop-self source-interface Loopback0 ! vrf blue rd 192.168.100.6:2001 route-target import evpn 2001:2001 route-target import vpn-ipv4 65000:2001 route-target export evpn 2001:2001 route-target export vpn-ipv4 65000:2001 route-target export vpn-ipv4 route-map RM_MPLS_EXP redistribute connected !</pre>

	<pre>vrf red rd 192.168.100.5:2000 route-target import evpn 2000:2000 route-target import vpn-ipv4 65000:2000 route-target export evpn 2000:2000 route-target export vpn-ipv4 65000:2000 route-target export vpn-ipv4 route-map RM_MPLS_EXP redistribute connected</pre>	<pre>vrf red rd 192.168.100.6:2000 route-target import evpn 2000:2000 route-target import vpn-ipv4 65000:2000 route-target export evpn 2000:2000 route-target export vpn-ipv4 65000:2000 route-target export vpn-ipv4 route-map RM_MPLS_EXP redistribute connected</pre>
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Router

Function	R-1	R-2
ArBGP	service routing protocols model multi-agent	service routing protocols model multi-agent
VLAN	vlan 10,20,4000,4001	vlan 10,20,4000,4001
VRF Instance	<pre>vrf instance red vrf instance blue ! ip routing vrf red ip routing vrf blue</pre>	<pre>vrf instance red vrf instance blue ! ip routing vrf red ip routing vrf blue</pre>
Service Leaf Uplinks	<pre>interface Ethernet1 no switchport ip address 172.16.100.0/31 mpls ldp interface ! interface Ethernet2 no switchport ip address 172.16.100.2/31 mpls ldp interface</pre>	<pre>interface Ethernet1 no switchport ip address 172.16.100.4/31 mpls ldp interface ! interface Ethernet2 no switchport ip address 172.16.100.6/31 mpls ldp interface</pre>
Inter-Link	interface Ethernet3 switchport mode trunk	interface Ethernet3 switchport mode trunk
BGP Loopback0 Router ID	interface Loopback0 description BGP Router ID ip address 192.168.200.201/32 mpls ldp interface	interface Loopback0 description BGP Router ID ip address 192.168.200.202/32 mpls ldp interface
MPLS LDP	<pre>mpls ip ! mpls ldp router-id interface Loopback0 interface disabled default no shutdown</pre>	<pre>mpls ip ! mpls ldp router-id interface Loopback0 interface disabled default no shutdown</pre>
SVIs and Loopbacks	<pre>interface Vlan10 vrf red ip address 10.101.20.1/24 ! interface Vlan20 vrf blue ip address 10.102.20.1/24 ! interface Vlan4001 vrf red ip address 172.16.10.1/30 ! interface Vlan4002 vrf blue ip address 172.16.10.1/30 ! interface Loopback101 vrf red ip address 10.101.10.1/32 ! interface Loopback102 vrf blue ip address 10.102.10.1/32</pre>	<pre>interface Vlan10 vrf red ip address 10.101.20.2/24 ! interface Vlan20 vrf blue ip address 10.102.20.2/24 ! interface Vlan4001 vrf red ip address 172.16.10.2/30 ! interface Vlan4002 vrf blue ip address 172.16.10.2/30 ! interface Loopback101 vrf red ip address 10.101.10.2/32 ! interface Loopback102 vrf blue ip address 10.102.10.2/32</pre>
Static Routes	<pre>ip route 192.168.100.5/32 172.16.100.1 ip route 192.168.100.6/32 172.16.100.3 ip route vrf blue 0.0.0.0/0 Null0 ip route vrf red 0.0.0.0/0 Null0</pre>	<pre>ip route 192.168.100.5/32 172.16.100.5 ip route 192.168.100.6/32 172.16.100.7 ip route vrf blue 0.0.0.0/0 Null0 ip route vrf red 0.0.0.0/0 Null0</pre>
IP-Prefix Route-map	<pre>ip prefix-list DEFAULT_ROUTE_V4 seq 10 permit 0.0.0.0/0 ! route-map RM_MPLS_EXP permit 10 match ip address prefix-list DEFAULT_ROUTE_V4</pre>	<pre>ip prefix-list DEFAULT_ROUTE_V4 seq 10 permit 0.0.0.0/0 ! route-map RM_MPLS_EXP permit 10 match ip address prefix-list DEFAULT_ROUTE_V4</pre>
BGP BGP/VPN-IPv4	<pre>router bgp 65000.201 bgp asn notation asdot router-id 192.168.100.201 no bgp default ipv4-unicast timers bgp 5 15</pre>	<pre>router bgp 65000.201 bgp asn notation asdot router-id 192.168.100.202 no bgp default ipv4-unicast timers bgp 5 15</pre>

<pre> distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor PG_PEER_ROUTER_V4 peer group neighbor PG_PEER_ROUTER_V4 remote-as 65000.201 neighbor PG_PEER_ROUTER_V4 next-hop-self neighbor PG_PEER_ROUTER_V4 maximum-routes 12000 neighbor PG_SL_MPLS peer group neighbor PG_SL_MPLS remote-as 65000.5 neighbor PG_SL_MPLS update-source Loopback0 neighbor PG_SL_MPLS ebgp-multipath 2 neighbor PG_SL_MPLS maximum-routes 12000 neighbor 192.168.100.5 peer group PG_SL_MPLS neighbor 192.168.100.6 peer group PG_SL_MPLS ! address-family ipv4 neighbor PG_PEER_ROUTER_V4 activate ! address-family vpn-ipv4 neighbor PG_SL_MPLS activate neighbor default encapsulation mpls next-hop-self source-interface Loopback0 ! vrf blue rd 192.168.100.201:2001 route-target import vpn-ipv4 65000:2001 route-target export vpn-ipv4 65000:2001 route-target export vpn-ipv4 route-map RM_MPLS_EXP router-id 192.168.100.201 neighbor 172.16.10.2 peer group PG_PEER_ROUTER_V4 redistribute connected redistribute static ! vrf red rd 192.168.100.201:2000 route-target import vpn-ipv4 65000:2000 route-target export vpn-ipv4 65000:2000 route-target export vpn-ipv4 route-map RM_MPLS_EXP router-id 192.168.100.201 neighbor 172.16.10.2 peer group PG_PEER_ROUTER_V4 redistribute connected redistribute static </pre>	<pre> distance bgp 20 200 200 maximum-paths 2 ecmp 2 neighbor default send-community neighbor PG_PEER_ROUTER_V4 peer group neighbor PG_PEER_ROUTER_V4 remote-as 65000.201 neighbor PG_PEER_ROUTER_V4 next-hop-self neighbor PG_PEER_ROUTER_V4 maximum-routes 12000 neighbor PG_SL_MPLS peer group neighbor PG_SL_MPLS remote-as 65000.5 neighbor PG_SL_MPLS update-source Loopback0 neighbor PG_SL_MPLS ebgp-multipath 2 neighbor PG_SL_MPLS maximum-routes 12000 neighbor 192.168.100.5 peer group PG_SL_MPLS neighbor 192.168.100.6 peer group PG_SL_MPLS ! address-family ipv4 neighbor PG_PEER_ROUTER_V4 activate ! address-family vpn-ipv4 neighbor PG_SL_MPLS activate neighbor default encapsulation mpls next-hop-self source-interface Loopback0 ! vrf blue rd 192.168.100.202:2001 route-target import vpn-ipv4 65000:2001 route-target export vpn-ipv4 65000:2001 route-target export vpn-ipv4 route-map RM_MPLS_EXP router-id 192.168.100.202 neighbor 172.16.10.1 peer group PG_PEER_ROUTER_V4 redistribute connected redistribute static ! vrf red rd 192.168.100.202:2000 route-target import vpn-ipv4 65000:2000 route-target export vpn-ipv4 65000:2000 route-target export vpn-ipv4 route-map RM_MPLS_EXP router-id 192.168.100.202 neighbor 172.16.10.1 peer group PG_PEER_ROUTER_V4 redistribute connected redistribute static </pre>
---	---

Verification

show bgp evpn summary

Verify the eBGP IPv4 EVPN peering between spines and service leaf switches is established

SL-1

```

SL-1#show bgp evpn summary
BGP summary information for VRF default
Router identifier 192.168.100.5, local AS number 65000.5
Neighbor Status Codes: m - Under maintenance
  Neighbor      V  AS        MsgRcvd  MsgSent  InQ  OutQ  Up/Down State  PfxRcd PfxAcc
  192.168.100.101  4  65000.65000    76139   75983   0     0 03:40:44 Estab   32     32
  192.168.100.102  4  65000.65000    61980   61880   0     0 03:40:44 Estab   32     32

```

show bgp vpn-ipv4 summary

Verify the eBGP VPN IPv4 peering between service leaf switches and routers is established

SL-1

```

SL-1#show bgp vpn-ipv4 summary
BGP summary information for VRF default
Router identifier 192.168.100.5, local AS number 65000.5
Neighbor Status Codes: m - Under maintenance
  Neighbor      V  AS        MsgRcvd  MsgSent  InQ  OutQ  Up/Down State  PfxRcd PfxAcc
  192.168.100.201  4  65000.201    74581   74531   0     0 3d15h Estab   2     2
  192.168.100.202  4  65000.201    62397   62403   0     0 3d01h Estab   2     2

```

R-1

```

R-1#show bgp vpn-ipv4 summary
BGP summary information for VRF default
Router identifier 192.168.100.201, local AS number 65000.201
Neighbor Status Codes: m - Under maintenance
  Neighbor      V  AS        MsgRcvd  MsgSent  InQ  OutQ  Up/Down State  PfxRcd PfxAcc
  192.168.100.5  4  65000.5     73963   74019   0     0 3d15h Estab   4     4
  192.168.100.6  4  65000.5     62543   62535   0     0 3d01h Estab   4     4

```

show mpls ldp neighbor summary

Verify the LDP peering between SL-1 and R-1 and R-2 are established

SL-1

```
SL-1#show mpls ldp neighbor summary
Ldp summary information for local Ldp ID 192.168.100.5:0
Peer ID      State Uptime Peer IP      GR MsgRcvd MsgSent
----- -----
192.168.100.201:0 oper 3d18h 192.168.100.201 no 32552    32551
192.168.100.202:0 oper 3d04h 192.168.100.202 no 27664    27662
```

R-1

```
R-1#show mpls ldp neighbor summary
Ldp summary information for local Ldp ID 192.168.100.201:0
Peer ID      State Uptime Peer IP      GR MsgRcvd MsgSent
----- -----
192.168.100.5:0 oper 3d18h 192.168.100.5 no 32554    32554
192.168.100.6:0 oper 3d04h 192.168.100.6 no 27663    27664
```

show mpls route

Verify the MPLS routes on the service leaf switches and routers

SL-1

```
SL-1#show mpls route
MPLS forwarding table (Label [metric] Vias) - 4 routes
MPLS next-hop resolution allow default route: False
Metric Codes:
A - Active metric
Via Type Codes:
M - MPLS via, P - Pseudowire via,
I - IP lookup via, V - VLAN via,
VA - EVPN VLAN aware via, ES - EVPN ethernet segment via,
VF - EVPN VLAN flood via, AF - EVPN VLAN aware flood via,
NG - Nexthop group via

100005 A[1]
via M, 172.16.100.0, pop
EgressACL: apply
directly connected, Ethernet4
00:00:00:00:cc:c1, vlan 1007
100006 A[1]
via M, 172.16.100.4, pop
EgressACL: apply
directly connected, Ethernet5
00:00:00:00:cc:c2, vlan 1006
116384 [0]
via I, ipv4, vrf red
116385 [0]
via I, ipv4, vrf blue
```

R-1

```
R-1#show mpls route
MPLS forwarding table (Label [metric] Vias) - 4 routes
MPLS next-hop resolution allow default route: False
Metric Codes:
A - Active metric
Via Type Codes:
M - MPLS via, P - Pseudowire via,
I - IP lookup via, V - VLAN via,
VA - EVPN VLAN aware via, ES - EVPN ethernet segment via,
VF - EVPN VLAN flood via, AF - EVPN VLAN aware flood via,
NG - Nexthop group via

100000 A[1]
via M, 172.16.100.1, pop
EgressACL: apply
directly connected, Ethernet1
00:00:00:00:dd:d1, vlan 1008
100001 A[1]
via M, 172.16.100.3, pop
EgressACL: apply
directly connected, Ethernet2
00:00:00:00:dd:d2, vlan 1006
116384 [0]
via I, ipv4, vrf red
116385 [0]
via I, ipv4, vrf blue
```

show ip route vrf <vrf_name>

Verify a default route is presented in the VRF red and blue routing table on SL-1

Verify a default route is presented in the VRF red routing table on CL-1

Verify a default route is presented in the VRF blue routing table on CL-3

Verify only tenants routes are presented in the routing table on R-1 and R-2

SL-1	SL-1#show ip route vrf red VRF: red Codes: C - connected, S - static, K - kernel, O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1, E2 - OSPF external type 2, N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary, NG - Nexthop Group Static Route, V - VXLAN Control Service, DH - DHCP client installed default route, M - Martian, DP - Dynamic Policy Route, L - VRF Leaked, RC - Route Cache Route Gateway of last resort: B E 0.0.0.0/0 [20/0] via 192.168.100.201/32, LDP tunnel index 1, label 116384 via 172.16.100.0, Ethernet4, label imp-null(3) via 192.168.100.202/32, LDP tunnel index 2, label 116384 via 172.16.100.4, Ethernet5, label imp-null(3) B E 10.10.10.1/32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1 C 10.10.10.0/24 is directly connected, Vlan10 B E 10.10.20.2/32 [20/0] via VTEP 192.168.200.1 VNI 2000 router-mac 02:00:00:00:aa:a1 C 10.10.20.0/24 is directly connected, Vlan20
	SL-1#show ip route vrf blue VRF: blue Codes: C - connected, S - static, K - kernel, O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1, E2 - OSPF external type 2, N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary, NG - Nexthop Group Static Route, V - VXLAN Control Service, DH - DHCP client installed default route, M - Martian, DP - Dynamic Policy Route, L - VRF Leaked, RC - Route Cache Route Gateway of last resort: B E 0.0.0.0/0 [20/0] via 192.168.100.201/32, LDP tunnel index 1, label 116385 via 172.16.100.0, Ethernet4, label imp-null(3) via 192.168.100.202/32, LDP tunnel index 2, label 116385 via 172.16.100.4, Ethernet5, label imp-null(3) B E 10.10.30.3/32 [20/0] via VTEP 192.168.200.3 VNI 2001 router-mac 02:00:00:00:aa:a3 C 10.10.30.0/24 is directly connected, Vlan30 B E 10.10.40.4/32 [20/0] via VTEP 192.168.200.3 VNI 2001 router-mac 02:00:00:00:aa:a3 C 10.10.40.0/24 is directly connected, Vlan40
CL-1	CL-1#show ip route vrf red VRF: red Codes: C - connected, S - static, K - kernel, O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1, E2 - OSPF external type 2, N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary, NG - Nexthop Group Static Route, V - VXLAN Control Service, DH - DHCP client installed default route, M - Martian, DP - Dynamic Policy Route, L - VRF Leaked, RC - Route Cache Route Gateway of last resort: B E 0.0.0.0/0 [20/0] via VTEP 192.168.200.5 VNI 2000 router-mac 02:00:00:00:dd:d1 C 10.10.10.0/24 is directly connected, Vlan10 C 10.10.20.0/24 is directly connected, Vlan20
	CL-3#show ip route vrf blue VRF: blue Codes: C - connected, S - static, K - kernel, O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1, E2 - OSPF external type 2, N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary, NG - Nexthop Group Static Route, V - VXLAN Control Service, DH - DHCP client installed default route, M - Martian, DP - Dynamic Policy Route, L - VRF Leaked, RC - Route Cache Route Gateway of last resort: B E 0.0.0.0/0 [20/0] via VTEP 192.168.200.5 VNI 2001 router-mac 02:00:00:00:dd:d1 C 10.10.30.0/24 is directly connected, Vlan30

	<pre>C 10.10.40.0/24 is directly connected, Vlan400</pre>
	<pre>R-1#show ip route vrf red</pre>
	<pre>VRF: red Codes: C - connected, S - static, K - kernel, O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1, E2 - OSPF external type 2, N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary, NG - Nexthop Group Static Route, V - VXLAN Control Service, DH - DHCP client installed default route, M - Martian, DP - Dynamic Policy Route, L - VRF Leaked, RC - Route Cache Route</pre>
	<pre>Gateway of last resort: S 0.0.0.0/0 is directly connected, Null0</pre>
	<pre>C 172.16.0.0/30 is directly connected, Vlan4001 B E 10.10.10.0/24 [20/0] via 192.168.100.5/32, LDP tunnel index 1, label 116384 via 172.16.100.1, Ethernet1, label imp-null(3) via 192.168.100.6/32, LDP tunnel index 2, label 116384 via 172.16.100.3, Ethernet2, label imp-null(3) B E 10.10.20.0/24 [20/0] via 192.168.100.5/32, LDP tunnel index 1, label 116384 via 172.16.100.1, Ethernet1, label imp-null(3) via 192.168.100.6/32, LDP tunnel index 2, label 116384 via 172.16.100.3, Ethernet2, label imp-null(3) C 10.101.10.1/32 is directly connected, Loopback101 B I 10.101.10.2/32 [200/0] via 172.16.0.2, Vlan4001 C 10.101.20.0/24 is directly connected, Vlan10</pre>
R-1	<pre>R-1#show ip route vrf blue</pre>
	<pre>VRF: blue Codes: C - connected, S - static, K - kernel, O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1, E2 - OSPF external type 2, N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type2, B - BGP, B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1, I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate, A O - OSPF Summary, NG - Nexthop Group Static Route, V - VXLAN Control Service, DH - DHCP client installed default route, M - Martian, DP - Dynamic Policy Route, L - VRF Leaked, RC - Route Cache Route</pre>
	<pre>Gateway of last resort: S 0.0.0.0/0 is directly connected, Null0</pre>
	<pre>C 172.16.0.0/30 is directly connected, Vlan4002 B E 10.10.30.0/24 [20/0] via 192.168.100.5/32, LDP tunnel index 1, label 116385 via 172.16.100.1, Ethernet1, label imp-null(3) via 192.168.100.6/32, LDP tunnel index 2, label 116385 via 172.16.100.3, Ethernet2, label imp-null(3) B E 10.10.40.0/24 [20/0] via 192.168.100.5/32, LDP tunnel index 1, label 116385 via 172.16.100.1, Ethernet1, label imp-null(3) via 192.168.100.6/32, LDP tunnel index 2, label 116385 via 172.16.100.3, Ethernet2, label imp-null(3) C 10.102.10.1/32 is directly connected, Loopback102 B I 10.102.10.2/32 [200/0] via 172.16.0.2, Vlan4002</pre>

show bgp evpn route-type ip-prefix <prefix> vni <vnid> next-hop <vtep_ip> detail

Verify SL-1 and SL-2 advertise 0.0.0.0/0 via EVPN Type-5 to CL-1 and CL-3

	<pre>CL-1#show bgp evpn route-type ip-prefix 0.0.0.0/0 vni 2000 next-hop 192.168.200.5 detail BGP routing table information for VRF default Router identifier 192.168.100.1, local AS number 4259840001 BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.5:2000 Paths: 2 available 65000.65000 65000.5 65000.201 192.168.200.5 from 192.168.100.101 (192.168.100.101) Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1 VNI: 2000 65000.65000 65000.5 65000.201 192.168.200.5 from 192.168.100.102 (192.168.100.102) Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1 VNI: 2000 BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.6:2000 Paths: 2 available 65000.65000 65000.5 65000.201 192.168.200.5 from 192.168.100.101 (192.168.100.101) Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1 VNI: 2000</pre>
--	--

	<pre>65000.65000 65000.5 65000.201 192.168.200.5 from 192.168.100.102 (192.168.100.102) Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor Extended Community: Route-Target-AS:2000:2000 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1 VNI: 2000</pre>
CL-3	<pre>CL-3#show bgp evpn route-type ip-prefix 0.0.0.0/0 vni 2001 next-hop 192.168.200.5 detail BGP routing table information for VRF default Router identifier 192.168.100.3, local AS number 4259840003 BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.5:2001 Paths: 2 available 65000.65000 65000.5 65000.201 192.168.200.5 from 192.168.100.102 (192.168.100.102) Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1 VNI: 2001 65000.65000 65000.5 65000.201 192.168.200.5 from 192.168.100.101 (192.168.100.101) Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1 VNI: 2001 BGP routing table entry for ip-prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.6:2001 Paths: 2 available 65000.65000 65000.5 65000.201 192.168.200.5 from 192.168.100.102 (192.168.100.102) Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP head, ECMP, best, ECMP contributor Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1 VNI: 2001 65000.65000 65000.5 65000.201 192.168.200.5 from 192.168.100.101 (192.168.100.101) Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, ECMP, ECMP contributor Extended Community: Route-Target-AS:2001:2001 TunnelEncap:tunnelTypeVxlan EvpnRouterMac:02:00:00:00:dd:d1 VNI: 2001</pre>

show bgp vpn-ipv4 <prefix> detail

Verify SL-1 and SL-2 advertise tenant networks via VPN IPv4 routes to R-1 and R2
 Verify R-1 and R2 advertise the default route via VPN IPv4 routes to SL-1 and SL-2

SL-1	<pre>SL-1#show bgp vpn-ipv4 0.0.0.0/0 detail BGP routing table information for VRF default Router identifier 192.168.100.5, local AS number 4259840005 BGP routing table entry for IPv4 prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.201:2000 Paths: 1 available 65000.201 192.168.100.201 from 192.168.100.201 (192.168.100.201) Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, best Extended Community: Route-Target-AS:65000:2000 Remote MPLS label: 116384 BGP routing table entry for IPv4 prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.201:2001 Paths: 1 available 65000.201 192.168.100.201 from 192.168.100.201 (192.168.100.201) Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, best Extended Community: Route-Target-AS:65000:2001 Remote MPLS label: 116385 BGP routing table entry for IPv4 prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.202:2000 Paths: 1 available 65000.201 192.168.100.202 from 192.168.100.202 (192.168.100.202) Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, best Extended Community: Route-Target-AS:65000:2000 Remote MPLS label: 116384 BGP routing table entry for IPv4 prefix 0.0.0.0/0, Route Distinguisher: 192.168.100.202:2001 Paths: 1 available 65000.201 192.168.100.202 from 192.168.100.202 (192.168.100.202) Origin INCOMPLETE, metric -, localpref 100, weight 0, valid, external, best Extended Community: Route-Target-AS:65000:2001 Remote MPLS label: 116385</pre>
R-1	<pre>R-1#show bgp vpn-ipv4 10.10.10.0/24 detail BGP routing table information for VRF default Router identifier 192.168.100.201, local AS number 4259840201 BGP routing table entry for IPv4 prefix 10.10.10.0/24, Route Distinguisher: 192.168.100.5:2000 Paths: 1 available 65000.5 192.168.100.5 from 192.168.100.5 (192.168.100.5) Origin IGP, metric -, localpref 100, weight 0, valid, external, best Extended Community: Route-Target-AS:65000:2000 Remote MPLS label: 116384 BGP routing table entry for IPv4 prefix 10.10.10.0/24, Route Distinguisher: 192.168.100.6:2000 Paths: 1 available 65000.5 192.168.100.6 from 192.168.100.6 (192.168.100.6) Origin IGP, metric -, localpref 100, weight 0, valid, external, best</pre>

```

Extended Community: Route-Target-AS:65000:2000
Remote MPLS label: 116384

R-1#show bgp vpnv4 10.10.30.0/24 detail
BGP routing table information for VRF default
Router identifier 192.168.100.201, local AS number 4259840201
BGP routing table entry for IPv4 prefix 10.10.30.0/24, Route Distinguisher: 192.168.100.5:2001
Paths: 1 available
  65000.5
    192.168.100.5 from 192.168.100.5 (192.168.100.5)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, best
      Extended Community: Route-Target-AS:65000:2001
      Remote MPLS label: 116385
BGP routing table entry for IPv4 prefix 10.10.30.0/24, Route Distinguisher: 192.168.100.6:2001
Paths: 1 available
  65000.5
    192.168.100.6 from 192.168.100.6 (192.168.100.6)
      Origin IGP, metric -, localpref 100, weight 0, valid, external, best
      Extended Community: Route-Target-AS:65000:2001
      Remote MPLS label: 116385

```

ping <remote_host_ip>

Verify connectivity between Host-1 and Host-3 with R-1 and R-2

<pre> HOST-1#ping 10.101.10.1 PING 10.101.10.1 (10.101.10.1) 72(100) bytes of data. 80 bytes from 10.101.10.1: icmp_seq=1 ttl=63 time=39.1 ms 80 bytes from 10.101.10.1: icmp_seq=2 ttl=63 time=39.0 ms 80 bytes from 10.101.10.1: icmp_seq=3 ttl=63 time=61.4 ms 80 bytes from 10.101.10.1: icmp_seq=4 ttl=63 time=55.2 ms 80 bytes from 10.101.10.1: icmp_seq=5 ttl=63 time=43.6 ms --- 10.101.10.1 ping statistics --- 5 packets transmitted, 5 received, 0% packet loss, time 72ms rtt min/avg/max/mdev = 39.034/47.718/61.429/9.062 ms, pipe 4, ipg/ewma 18.217/43.621 ms </pre>
--

Host-1

```

HOST-1#ping 10.101.10.2
PING 10.101.10.2 (10.101.10.2) 72(100) bytes of data.
80 bytes from 10.101.10.2: icmp_seq=1 ttl=63 time=26.6 ms
80 bytes from 10.101.10.2: icmp_seq=2 ttl=63 time=34.8 ms
80 bytes from 10.101.10.2: icmp_seq=3 ttl=63 time=41.6 ms
80 bytes from 10.101.10.2: icmp_seq=4 ttl=63 time=40.6 ms
80 bytes from 10.101.10.2: icmp_seq=5 ttl=63 time=29.8 ms

--- 10.101.10.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 88ms
rtt min/avg/max/mdev = 26.665/34.734/41.687/5.885 ms, pipe 3, ipg/ewma 22.247/30.712 ms

```

<pre> HOST-3#ping 10.102.10.1 PING 10.102.10.1 (10.102.10.1) 72(100) bytes of data. 80 bytes from 10.102.10.1: icmp_seq=1 ttl=63 time=36.2 ms 80 bytes from 10.102.10.1: icmp_seq=2 ttl=63 time=34.2 ms 80 bytes from 10.102.10.1: icmp_seq=3 ttl=63 time=31.2 ms 80 bytes from 10.102.10.1: icmp_seq=4 ttl=63 time=40.4 ms 80 bytes from 10.102.10.1: icmp_seq=5 ttl=63 time=28.0 ms --- 10.102.10.1 ping statistics --- 5 packets transmitted, 5 received, 0% packet loss, time 91ms rtt min/avg/max/mdev = 28.082/34.049/40.405/4.225 ms, pipe 3, ipg/ewma 22.800/35.045 ms </pre>
--

Host-3

```

HOST-3#ping 10.102.10.2
PING 10.102.10.2 (10.102.10.2) 72(100) bytes of data.
80 bytes from 10.102.10.2: icmp_seq=1 ttl=63 time=28.8 ms
80 bytes from 10.102.10.2: icmp_seq=2 ttl=63 time=34.3 ms
80 bytes from 10.102.10.2: icmp_seq=3 ttl=63 time=37.7 ms
80 bytes from 10.102.10.2: icmp_seq=4 ttl=63 time=39.8 ms
80 bytes from 10.102.10.2: icmp_seq=5 ttl=63 time=31.2 ms

--- 10.102.10.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 86ms
rtt min/avg/max/mdev = 28.824/34.391/39.865/4.054 ms, pipe 3, ipg/ewma 21.686/31.643 ms

```

Appendix A - Additional configuration to enable VxLAN Routing per platform

EVPN IRB requires VxLAN Routing; some platforms need additional configuration to enable VxLAN Routing.

- For Jericho/Jericho+ make sure the VxLAN routing profile is enabled

```

hardware tcam
system profile vxlan-routing

```

- Make sure recirculation is enabled for the platforms requiring recirculation: Trident2, Tomahawk, etc.

```
service interface unconnected expose
switch scheduler oversubscribed

interface Recirc-Channel1
  no switchport
  switchport recirculation features vxlan

interface UnconnectedEthernet1-14 // check number of unconnected interfaces since this is platform dependent
  traffic-loopback source system device mac
  channel-group recirculation 1
```

More information can be found in the following TOI

- [Vxlan Routing on 7050X, 7060X and 7260X](#)
- [Vxlan Routing on 7280R](#)
- [Recirculation-channel](#)
- [Unconnected-ethernet](#)