Troubleshoot EVPN VXLANv6 on Catalyst 9000 Series Switches

Contents

Introduction

This document describes how to troubleshoot EVPN VXLANv6 on Catalyst 9000 Series Switches.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Unicast EVPN VxLAN feature, BGP and MVPN (Multicast Virtual Private Network).
- IPv4 and IPv6 Unicast
- Multicast concepts and how multicast operates

Components Used

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

- Catalyst 9000 Series Switches

Note: The 9200, 9500X, and 9600X do not support VXLANv6

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Terminology

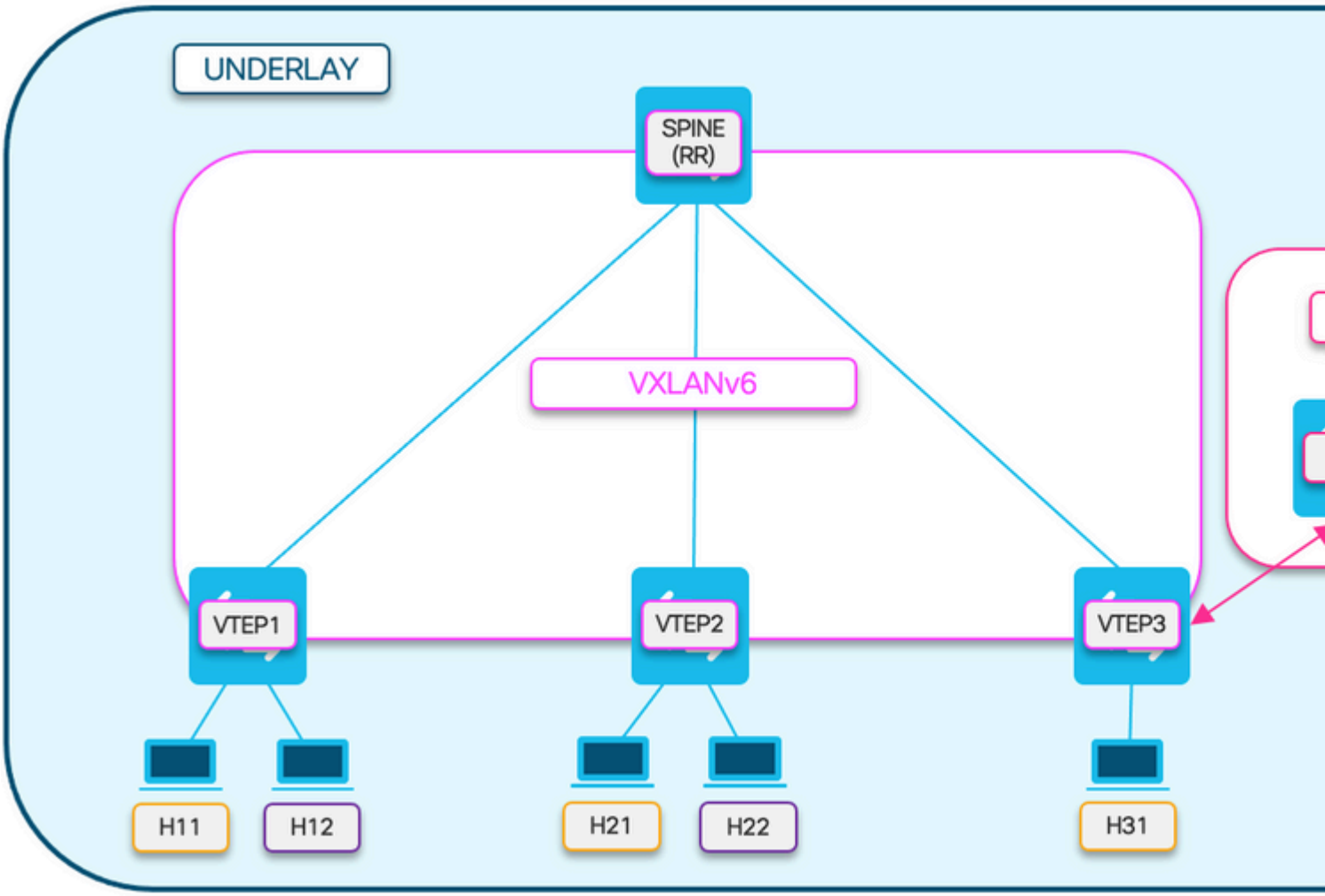
EVPN	Ethernet Virtual Private Network	Extension that allows BGP to transport Layer 2 MAC and Layer 3 IP information is EVPN and uses Multi-Protocol Border Gateway Protocol (MP-BGP) as the protocol to distribute reachability information that pertains to the VXLAN overlay network.
VXLAN	Virtual Extensible LAN (Local Area Network)	VXLAN is designed to overcome the inherent limitations of VLANs and STP. It is a proposed IETF standard [RFC 7348] to provide the same Ethernet Layer 2 network services as VLANs do, but with greater flexibility. Functionally, it is a MAC-in- UDP encapsulation protocol that runs as a virtual overlay on a Layer 3 underlay network.
VTEP	Virtual Tunnel Endpoint	This is the device that does the encapsulation and de-encapsulation
EVI	EVPN Instance	The EVPN instance (EVI) is represented by the virtual network identifier (VNI). An EVI represents a VPN on a PE router. It serves the same role of an IP VPN Routing and Forwarding (VRF), and EVIs are assigned import/export Route Targets (RTs)
NVE	Network Virtual Interface	Logical interface where the encapsulation and de-encapsulation occur

VNI	VXLAN network identifier	Uniquely identifies each Layer 2 subnet or segment. There are two types of VNI: Symmetric (L2VNI): VTEPs have same VNI Asymmetric (L3VNI): VTEPs do not have same VNI and are routed via a single common VNI.
BUM	Broadcast, Unknown Unicast, Multicast	BUM traffic is sent via the Mcast group tied to the VNI under the NVE configuration.
TRM	Tenant Routed Multicast	BGP-EVPN based solution that enables multicast routing between sources and receivers connected on VTEPS in VxLAN fabric [RFC7432]. There are two types L2TRM (Layer 2 TRM) & L3TRM (Layer 3 TRM)
MDT	Multicast Distribution Tree	The multicast tree built between VTEPs for encapsulation and tunnelling of Tenant Multicast Traffic.
PVLAN	Private VLAN	Partitions the Ethernet broadcast domain of a VLAN into subdomains, which allows you to isolate the ports on the switch from each other.
MIB	Management Information Base	A Simple Network Management Protocol (SNMP) monitor object
PIM-BIDIR	Protocol Independent Multicast Bi-Directional	A type of PIM where traffic is only forwarded along a shared tree that is rooted at the rendezvous point (RP) for the group.
VFI	Virtual Forwarding Instance	A virtual bridge port that is capable of performing native bridging functions, such as forwarding, based on the destination MAC address, source MAC address learning and aging, and so forth.
IRB	Integrated Routing and Bridging	enables a Layer 2 VPN and an Layer 3 VPN overlay that allows end hosts across the overlay to communicate with each other within the same subnet and across different subnets within the VPN.
IMET	Inclusive Multicast Ethernet Tag	also called BGP Route Type 3 (RT3), for the auto-discovery of remote peers in order to set up the BUM tunnels over VXLAN. IMET routes carry the remote (egress) VNIs advertised from the remote peers, which can be different from the local VNI. These remote VNIs are called Downstream Assigned VNIs.

DAG	Distributed Anycast Gateway	Default gateway function on all VTEPs. The same gateway IP lives on all VTEPs and allows for mobility in the fabric.
IR(B)	Integrated Routing (& Bridging)	Enables a Layer 2 VPN and an Layer 3 VPN overlay that allows end hosts across the overlay to communicate with each other within the same subnet and across different subnets within the VPN.
RNH	Remote Next Hop	The remote VTEP
RPF	Reverse Path Forwarding	The Unicast path back to the Source. Incoming multicast packets are not accepted/forwarded unless they are received the same path as the unicast routing table. ('ip multicast multipath' use cases excluded).
RP	Rendezvous Point	A role that a device performs when in PIM Sparse Mode. The common meeting point for Multicast sources and Receivers.

Network Diagram

Greenfield EVPN VXLANv6 Topology



Verify (Greenfield or Dual-stack)

Before performing per traffic flow troubleshooting, EVPN VXLANv6 topology level information must be verified first to ensure proper operation. This section shows verification commands for both deployments, choose applicable verification commands based on your deployment.

Underlay Connectivity

Verify IPv6 underlay connectivity between VTEPs and Spines (for Greenfield VXLANv6 you only need to verify IPv6 underlay connectivity).

<#root>

VTEP1#

show ipv6 route

```
IPv6 Routing Table - default - 9 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
       I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
       EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE - Destination
       NDr - Redirect, O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1
       OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       la - LISP alt, lr - LISP site-registrations, ld - LISP dyn-eid
       lA - LISP away, le - LISP extranet-policy, lp - LISP publications
       ls - LISP destinations-summary
LC  2001:DB8:1::1/128 [0/0]
     via Loopback0, receive
LC  2001:DB8:1::2/128 [0/0]
     via Loopback1, receive
O
```

2001:DB8:2::1

/128 [110/2]

<-- VTEP2 BGP update source

```
     via FE80::250:56FF:FE9A:EE12, GigabitEthernet1/0/3
O
```

2001:DB8:2::2

/128 [110/2]

<-- VTEP2 VTEP IP

```
     via FE80::250:56FF:FE9A:EE12, GigabitEthernet1/0/3
O
```

2001:DB8:3::1

/128 [110/2]

<-- VTEP3 BGP update source

```
     via FE80::250:56FF:FE9A:EE12, GigabitEthernet1/0/3
```

```
O
```

2001:DB8:3::2

```
/128 [110/2]
```

<-- VTEP3 VTEP IP

```
     via FE80::250:56FF:FE9A:EE12, GigabitEthernet1/0/3
O
```

2001:DB8:99::99

```
/128 [110/1]
```

<-- SPINE BGP update source

```
     via FE80::250:56FF:FE9A:EE12, GigabitEthernet1/0/3
```

Verify both IPv4 and IPv6 underlay connectivity (For Dual-stack you must verify both IPv4 and IPv6 underlay connectivity).

<#root>

```
VTEP1#
```

show ip route

```
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, m - OMP
       n - NAT, Ni - NAT inside, No - NAT outside, Nd - NAT DIA
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       H - NHRP, G - NHRP registered, g - NHRP registration summary
       o - ODR, P - periodic downloaded static route, l - LISP
       a - application route
       + - replicated route, % - next hop override, p - overrides from PfR
       & - replicated local route overrides by connected

Gateway of last resort is not set

      10.0.0.0/8 is variably subnetted, 14 subnets, 3 masks
C        10.0.1.0/30 is directly connected, GigabitEthernet1/0/3
L        10.0.1.2/32 is directly connected, GigabitEthernet1/0/3
O        10.0.2.0/30 [110/2] via 10.0.1.1, 02:20:01, GigabitEthernet1/0/3
O        10.0.3.0/30 [110/2] via 10.0.1.1, 02:20:01, GigabitEthernet1/0/3
C        10.1.1.1 is directly connected, Loopback0
C        10.1.1.2 is directly connected, Loopback1
O E2     10.1.1.3 [110/20] via 10.0.1.1, 02:19:24, GigabitEthernet1/0/3
O
```

10.2.2.1

```
 [110/3] via 10.0.1.1, 02:19:34, GigabitEthernet1/0/3
```

<-- VTEP2 BGP update source

O

10.2.2.2

[110/3] via 10.0.1.1, 02:19:34, GigabitEthernet1/0/3

<-- VTEP2 VTEP IP

O

10.3.3.1

[110/3] via 10.0.1.1, 02:19:24, GigabitEthernet1/0/3

<-- VTEP3 BGP update source

O

10.3.3.2

[110/3] via 10.0.1.1, 02:19:24, GigabitEthernet1/0/3

<-- VTEP3 VTEP IP

O E2 10.5.0.0/24 [110/20] via 10.0.1.1, 02:19:24, GigabitEthernet1/0/3
O E2 10.5.0.1/32 [110/20] via 10.0.1.1, 02:19:24, GigabitEthernet1/0/3
O

10.99.99.99

[110/2] via 10.0.1.1, 02:20:01, GigabitEthernet1/0/3

<-- SPINE BGP update source

VTEP1#

show ipv6 route

IPv6 Routing Table - default - 8 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE - Destination
NDr - Redirect, O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1
OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
la - LISP alt, lr - LISP site-registrations, ld - LISP dyn-eid
lA - LISP away, le - LISP extranet-policy, lp - LISP publications
ls - LISP destinations-summary192.
LC 2001:DB8:1::1/128 [0/0]
via Loopback0, receive
LC 2001:DB8:1::2/128 [0/0]
via Loopback1, receive
O

2001:DB8:2::1

/128 [110/2]

<-- VTEP2 BGP update source

```
     via FE80::250:56FF:FE9A:EE12, GigabitEthernet1/0/3
0
2001:DB8:2::2
/128 [110/2]
<-- VTEP2 VTEP IP

     via FE80::250:56FF:FE9A:EE12, GigabitEthernet1/0/3
0
2001:DB8:3::1
/128 [110/2]
<-- VTEP3 BGP update source

     via FE80::250:56FF:FE9A:EE12, GigabitEthernet1/0/3
0
2001:DB8:3::2
/128 [110/2]
<-- VTEP3 VTEP IP

     via FE80::250:56FF:FE9A:EE12, GigabitEthernet1/0/3
0
2001:DB8:99::99
/128 [110/1]
<-- SPINE BGP update

     via FE80::250:56FF:FE9A:EE12, GigabitEthernet1/0/3
```

BGP L2VPN EVPN Neighbors

Confirm neighbors are established on all VTEPs and Spines

<#root>

```
VTEP1#
show ip bgp l2vpn evpn neighbors


BGP neighbor is 2001:DB8:99::99
,  remote AS 100, internal link
<-- BGP neighbor session with SPINE

  BGP version 4, remote router ID 10.99.99.99
```

BGP state = Established

, up for 3d17h

<-- BGP neighbor is established

```
  Last read 00:00:27, last write 00:00:50, hold time is 180, keepalive interval is 60 seconds
  Last update received: 3d12h
  Neighbor sessions:
    1 active, is not multisession capable (disabled)
  Neighbor capabilities:
    Route refresh: advertised and received(new)
    Four-octets ASN Capability: advertised and received
    Address family L2VPN Evpn: advertised and received
    Graceful Restart Capability: advertised and received
      Remote Restart timer is 120 seconds
      Address families advertised by peer:
        L2VPN Evpn (was not preserved)
    Enhanced Refresh Capability: advertised and received
    Multisession Capability:
    Stateful switchover support enabled: NO for session 1
  Message statistics:
    InQ depth is 0
    OutQ depth is 0

                         Sent       Rcvd
    Opens:                  1          1
    Notifications:          0          0
    Updates:               20         39
    Keepalives:          5896       5893
    Route Refresh:          0          0
    Total:               5917       5935
  Do log neighbor state changes (via global configuration)
  Default minimum time between advertisement runs is 0 seconds
```

NVE Interface Status

Verify Greenfield VXLANv6

<#root>

VTEP1#

show nve interface nve1 detail

Interface: nve1, State: Admin Up, Oper Up

Encapsulation: Vxlan IPv6 **<--**

VXLAN encapsulation is set to IPv6

Multicast BUM encapsulation: Vxlan IPv6 **<--**

encap for Multicast Replication is also set to IPv6

BGP host reachability: Enabled, VxLAN dport: 4789

```
VNI number: L3CP 1 L2CP 6 L2DP 0
source-interface: Loopback1 (
```

primary: 2001:DB8:1::2

```
 vrf: 0)
```

<-- VTEP IP

```
tunnel interface: Tunnel0
   Pkts In   Bytes In   Pkts Out  Bytes Out
         0          0          0          0
```

Verify Dual-stack

<#root>

```
VTEP1#
```

show nve interface nve1 detail

```
Interface: nve1, State: Admin Up, Oper Up
```

Encapsulation: Vxlan dual stack prefer IPv6 <--

VXLAN encapsulation is set to dual-stack prefer IPv6

Multicast BUM encapsulation: Vxlan IPv4 <--

encap for Multicast Replication is still IPv4

```
BGP host reachability: Enabled, VxLAN dport: 4789
VNI number: L3CP 1 L2CP 6 L2DP 0
source-interface: Loopback1 (
```

primary: 10.1.1.2 2001:DB8:1::2

```
 vrf: 0)
```

<-- Primary is IPv4, secondary IPv6

```
tunnel interface:
```

Tunnel0 Tunnel1 <--

Two tunnels are created for both VXLANv4 and VXLANv6

```
   Pkts In   Bytes In   Pkts Out  Bytes Out
         0          0          0          0
```

VXLAN Tunnel Interface Status

Verify Greenfield VXLANv6 (only VXLANv6 tunnel is created for this deployment)

<#root>

VTEP1#

show interface Tunnel0

Tunnel0 is up, line protocol is up <-- Tunnel is up/up

  Hardware is Tunnel
  MTU 9216 bytes, BW 100 Kbit/sec, DLY 50000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation TUNNEL, loopback not set
  Keepalive not set
  Tunnel linestate evaluation up

Tunnel source 2001:DB8:1::2

Tunnel protocol/transport MUDP/IPV6 <--

VXLANv6 tunnel

    TEID 0x0, sequencing disabled
    Checksumming of packets disabled
    source_port:4789, destination_port:0
 <...snip...>

Verify Dual-stack (both VXLANv4 and VXLANv6 tunnels are created for this deployment)

<#root>

VTEP1#

show interface Tunnel0

Tunnel0 is up, line protocol is up <-- Tunnel is up/up

  Hardware is Tunnel
  Interface is unnumbered. Using address of Loopback1 (10.1.1.2)
  MTU 17864 bytes, BW 100 Kbit/sec, DLY 50000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation TUNNEL, loopback not set
  Keepalive not set
  Tunnel linestate evaluation up

Tunnel source 10.1.1.2

Tunnel protocol/transport MUDP/IP <--

VXLANv4 tunnel

```
    TEID 0x0, sequencing disabled
    Checksumming of packets disabled
    source_port:4789, destination_port:0
<...snip...>

VTEP1#
```

show interface Tunnel1

```
Tunnel1 is up, line protocol is up        <-- Tunnel is up/up


  Hardware is Tunnel
  MTU 9216 bytes, BW 100 Kbit/sec, DLY 50000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation TUNNEL, loopback not set
  Keepalive not set
  Tunnel linestate evaluation up


Tunnel source 2001:DB8:1::2



  Tunnel protocol/transport MUDP/IPV6    <--

 VXLANv6 tunnel


    TEID 0x0, sequencing disabled
    Checksumming of packets disabled
    source_port:4789, destination_port:0
<...snip...>
```

L2VNI Status in NVE

Verify Greenfield VXLANv6 L2VNI in NVE

<#root>

```
VTEP1#
```

show nve vni 20011 detail

```
Interface  VNI        Multicast-group  VNI state  Mode  VLAN  cfg vrf
nve1       20011      N/A              Up         L2CP  11    CLI red

L2CP VNI IRB state: IPv4 up, IPv6 up

L2CP VNI local VTEP info:
VLAN: 11
SVI if handler: 0x1A

Local VTEP: 2001:DB8:1::2


Local routing: Disabled
```

```
Core IRB info:
L3VNI: 30000
VRF name: red
VLAN: 3
V4TopoID: 0x2
V6TopoID: 0x1E000002
```

Local VTEP: 2001:DB8:1::2

```
SVI if handler: 0x19
SVI MAC: 0050.569A.A8BF
IPv4 TRM mdt group: N/A
IPv6 TRM mdt group: N/A

VNI Detailed statistics:
   Pkts In   Bytes In   Pkts Out  Bytes Out

         0          0          0          0
```

Verify Dual-stack L2VNI in NVE

<#root>

VTEP1#

show nve vni 20011 detail

```
Interface  VNI        Multicast-group  VNI state  Mode  VLAN  cfg vrf
nve1       20011      N/A              Up         L2CP  11    CLI red

L2CP VNI IRB state: IPv4 up, IPv6 up

L2CP VNI local VTEP info:
VLAN: 11
SVI if handler: 0x1A
```

Local VTEP: 10.1.1.2 2001:DB8:1::2 <--

Local primary and secondary VTEP IP

```
Local routing: Disabled

Core IRB info:
L3VNI: 30000
VRF name: red
VLAN: 3
V4TopoID: 0x2
V6TopoID: 0x1E000002
```

Local VTEP: 10.1.1.2 2001:DB8:1::2

```
SVI if handler: 0x19
SVI MAC: 0050.569A.A8BF
IPv4 TRM mdt group: N/A
IPv6 TRM mdt group: N/A

VNI Detailed statistics:
```

```
   Pkts In   Bytes In   Pkts Out  Bytes Out

         0          0          0          0
```

L3VNI Status in NVE

Verify Greenfield VXLANv6 L3VNI status in NVE

<#root>

```
VTEP1#
```

show nve vni 30000 detail

```
Interface  VNI        Multicast-group  VNI state  Mode  VLAN  cfg vrf
nve1       30000      N/A              Up         L3CP  3     CLI red

L3CP VNI IRB state: IPv4 up, IPv6 up

L3CP VNI TRM state: IPv4 down, IPv6 down

L3CP VNI local VTEP info:
VRF name: red
VLAN: 3
V4TopoID: 0x2
V6TopoID: 0x1E000002
```

Local VTEP: 2001:DB8:1::2

```
SVI if handler: 0x19
SVI MAC: 0050.569A.A8BF
IPv4 TRM mdt group: N/A
IPv6 TRM mdt group: N/A

VNI Detailed statistics:
   Pkts In   Bytes In   Pkts Out  Bytes Out

         0          0          0          0
```

Verify Dual-stack L3VNI in NVE

<#root>

```
VTEP1#
```

show nve vni 30000 detail

```
Interface  VNI        Multicast-group  VNI state  Mode  VLAN  cfg vrf
nve1       30000      N/A              Up         L3CP  3     CLI red

L3CP VNI IRB state: IPv4 up, IPv6 up

L3CP VNI TRM state: IPv4 down, IPv6 down
```

```
L3CP VNI local VTEP info:
VRF name: red
VLAN: 3
V4TopoID: 0x2
V6TopoID: 0x1E000002
```

Local VTEP: 10.1.1.2 2001:DB8:1::2

```
SVI if handler: 0x19
SVI MAC: 0050.569A.A8BF
IPv4 TRM mdt group: N/A
IPv6 TRM mdt group: N/A

VNI Detailed statistics:
   Pkts In   Bytes In   Pkts Out  Bytes Out

         0          0          0          0
```

NVE Peer Information

Verify the NVE peers with these commands

<#root>

```
VTEP1#
```

show nve peers

```
'M' - MAC entry download flag  'A' - Adjacency download flag
'4' - IPv4 flag  '6' - IPv6 flag

Interface  VNI      Type
```

Peer-IP

```
          RMAC/Num_RTs   eVNI     state flags UP time
nve1       30000    L3CP
```

2001:DB8:3::2

```
        0050.569a.1db3 30000      UP  A/-/4 04:06:28
nve1       30000    L3CP
```

2001:DB8:2::2

```
        0050.569a.89d8 30000      UP  A/-/4 04:07:50
nve1       30000    L3CP
```

2001:DB8:3::2

```
        0050.569a.1db3 30000      UP  A/M/6 04:06:28
nve1       30000    L3CP
```

2001:DB8:2::2

```
        0050.569a.89d8 30000      UP  A/M/6 04:07:50
nve1       20011    L2CP
```

2001:DB8:2::2

```
        6               20011      UP   N/A  04:07:50
nve1       20011    L2CP
```

2001:DB8:3::2

```
        4               20011      UP   N/A  04:06:28
nve1       20012    L2CP
```

2001:DB8:2::2

```
        7               20012      UP   N/A  04:07:50
```

NVE peer is detected based on remote EVPN routes received from that peer.

- For peers on L2VNI, you can use this show command to get more information from EVPN Manager:

<#root>

VTEP1#

show l2vpn evpn peers vxlan detail

```
Interface:        nve1
Local VNI:        20011
Peer VNI:         20011
Peer IP Address:  2001:DB8:2::2
UP time:          3d19h
Number of routes
  EAD per-EVI:    0
  MAC:            2
  MAC/IP:         4
  IMET:           1
  Total:          7

Interface:        nve1
Local VNI:        20011
Peer VNI:         20011
Peer IP Address:  2001:DB8:3::2
UP time:          3d19h
Number of routes
  EAD per-EVI:    0
  MAC:            1
  MAC/IP:         2
  IMET:           1
  Total:          4

Interface:        nve1
Local VNI:        20012
Peer VNI:         20012
Peer IP Address:  2001:DB8:2::2
UP time:          3d19h
Number of routes
  EAD per-EVI:    0
  MAC:            2
  MAC/IP:         4
  IMET:           0
  Total:          6
```

Peer information on L3VNI are coming directly from BGP. These BGP show commands can be used to get more information on L3VNI peers:

```
show ip bgp l2vpn evpn route-type 5
show bgp vpnv4 unicast vrf <vrfname> <prefix>
show bgp vpnv6 unicast vrf <vrfname> <prefix>
show bgp l2vpn evpn rnh vrf <vrfname>
```

EVPN Instance in EVPN Manager

Verify Greenfield VXLANv6

<#root>

VTEP1#

show l2vpn evpn evi 1 detail

```
EVPN instance:       1 (VLAN Based)
  RD:                10.1.1.3:1 (auto)
  Import-RTs:        100:1
  Export-RTs:        100:1
  Per-EVI Label:     none
  State:             Established
  Replication Type:  Ingress
  Encapsulation:     vxlan
  IP Local Learn:    Enabled (global)
  Adv. Def. Gateway: Enabled (global)
  Re-originate RT5:  Disabled
  Adv. Multicast:    Enabled (global)
  Vlan:              11
    Protected:       False
    Ethernet-Tag:    0
    State:           Established
    Flood Suppress:  Attached
    Core If:         Vlan3
    Access If:       Vlan11
    NVE If:          nve1
    RMAC:            0050.569a.a8bf
    Core Vlan:       3
    L2 VNI:          20011
    L3 VNI:          30000
```

VTEP IP: 2001:DB8:1::2   <--

VTEP IP from NVE Manager

```
    VRF:             red
    IPv4 IRB:        Enabled
    IPv6 IRB:        Enabled
    Pseudoports:
      GigabitEthernet1/0/1 service instance 11
        Routes: 1 MAC, 2 MAC/IP
    Peers:
```

```
      2001:DB8:2::2
        Routes: 2 MAC, 3 MAC/IP, 1 IMET, 0 EAD
      2001:DB8:3::2
        Routes: 1 MAC, 2 MAC/IP, 1 IMET, 0 EAD
```

Verify Dual-stack

<#root>

```
VTEP1#
```

```
show l2vpn evpn evi 1 detail
```

```
EVPN instance:       1 (VLAN Based)
  RD:                10.1.1.3:1 (auto)
  Import-RTs:        100:1
  Export-RTs:        100:1
  Per-EVI Label:     none
  State:             Established
  Replication Type:  Ingress
  Encapsulation:     vxlan
  IP Local Learn:    Enabled (global)
  Adv. Def. Gateway: Enabled (global)
  Re-originate RT5:  Disabled
  Adv. Multicast:    Enabled (global)
  Vlan:              11
    Protected:       False
    Ethernet-Tag:    0
    State:           Established
    Flood Suppress:  Attached
    Core If:         Vlan3
    Access If:       Vlan11
    NVE If:          nve1
    RMAC:            0050.569a.a8bf
    Core Vlan:       3
    L2 VNI:          20011
    L3 VNI:          30000
```

```
VTEP IP:         10.1.1.2        <--
```

```
 Primary VTEP IP from NVE Manager
```

```
    Sec. VTEP IP:    2001:DB8:1::2   <--
```

```
Secondary VTEP IP from NVE Manager
```

```
    VRF:             red
    IPv4 IRB:        Enabled
    IPv6 IRB:        Enabled
    Pseudoports:
      GigabitEthernet1/0/1 service instance 11
        Routes: 1 MAC, 2 MAC/IP
    Peers:
      2001:DB8:2::2
        Routes: 2 MAC, 3 MAC/IP, 1 IMET, 0 EAD
      2001:DB8:3::2
```

```
        Routes: 1 MAC, 2 MAC/IP, 1 IMET, 0 EAD
```

Topology in L2RIB

Verify Greenfield VXLANv6

<#root>

VTEP1#

show l2rib topologies topology 1 detail

```
Topology ID              :       100000000
EVI                      :               1
ETAG                     :               0
Topology Name            :           BD-11
Type                     :           VxLAN
Producer                 :           L2VPN
BD/VLAN-Id               :              11
Layer-2 VNI              :           20011
Downstream VNI           :         Enabled
```

VTEP Address   :   2001:DB8:1::2

```
Mcast Address            :         UNKNOWN
Layer-3 VNI              :           30000
Core BD/VLAN-Id          :               3
Router MAC               :  0050.569a.a8bf
VRF Name                 :             red
Access IRB Interface     :          Vlan11
Core IRB Interface       :           Vlan3
IPv4 IRB                 :         Enabled
IPv6 IRB                 :         Enabled
Re-originate RT5         :        Disabled
```

VerifyDual-stack

<#root>

VTEP1#

show l2rib topologies topology 1 detail

```
Topology ID              :       100000000
EVI                      :               1
ETAG                     :               0
Topology Name            :           BD-11
Type                     :           VxLAN
Producer                 :           L2VPN
BD/VLAN-Id               :              11
Layer-2 VNI              :           20011
Downstream VNI           :         Enabled
```

VTEP Address   :   10.1.1.2

```
Secondary VTEP Address   :       2001:DB8:1::2


Mcast Address            :         UNKNOWN
Layer-3 VNI              :           30000
Core BD/VLAN-Id          :               3
Router MAC               :  0050.569a.a8bf
VRF Name                 :             red
Access IRB Interface     :          Vlan11
Core IRB Interface       :           Vlan3
IPv4 IRB                 :         Enabled
IPv6 IRB                 :         Enabled
Re-originate RT5         :        Disabled
```

Local VTEP Information in BGP

Verify Greenfield VXLANv6

<#root>

```
VTEP1#
```

```
show bgp l2vpn evpn local-vtep vrf red
```

```
 Local VTEP vrf red:

  Protocol: IPv4
    RMAC Address: 0050.569A.A8BF

VTEP-IP:2001:DB8:1::2

    SEC-VTEP-IP:UNKNOWN

    VNI: 30000
    BDI:Vlan3

  Protocol: IPv6
    RMAC Address: 0050.569A.A8BF

VTEP-IP:2001:DB8:1::2

    SEC-VTEP-IP:UNKNOWN

    VNI: 30000
    BDI:Vlan3
```

Verify Dual-stack

<#root>

VTEP1#

show bgp l2vpn evpn local-vtep vrf red

 Local VTEP vrf red:

  Protocol: IPv4
    RMAC Address: 0050.569A.A8BF

VTEP-IP:10.1.1.2

    SEC-VTEP-IP:2001:DB8:1::2

    VNI: 30000
    BDI:Vlan3

  Protocol: IPv6
    RMAC Address: 0050.569A.A8BF

VTEP-IP:10.1.1.2

    SEC-VTEP-IP:2001:DB8:1::2

    VNI: 30000
    BDI:Vlan3

Remote RNH Information in BGP

<#root>

VTEP1#

show bgp l2vpn evpn rnh vrf red

Remote VTEP entries for vrf red:

 Protocol: ipv4
[VNI / RMAC ADDRESS /

VTEP-IP

 / Installed]
[30000 / 0050.569A.89D8 /

2001:DB8:2::2

 / yes]
[30000 / 0050.569A.1DB3 /

```
2001:DB8:3::2

 / yes]

 Protocol: ipv6
[VNI / RMAC ADDRESS / VTEP-IP / Installed]
[30000 / 0050.569A.1DB3 /

2001:DB8:3::2

 / yes]
[30000 / 0050.569A.89D8 /

2001:DB8:2::2

 / yes]
```

Troubleshoot

BUM Traffic Forwarding (Ingress Replication)

This section provides an example to troubleshoot BUM traffic from VTEP1 to VTEP2 in EVI 1 where replication type is configured as ingress.

Verify Replication Type is set to Ingress for the EVI in EVPN Manager on both VTEPs

<#root>

```
VTEP1#

show l2vpn evpn evi 1 detail


EVPN instance:       1 (VLAN Based)
  RD:                10.1.1.3:1 (auto)
  Import-RTs:        100:1
  Export-RTs:        100:1
  Per-EVI Label:     none
  State:             Established


Replication Type:  Ingress


  <...snip...>
```

Verify L2RIB has the local IMET route for the EVI from EVPN Manager on egress VTEP

<#root>

```
VTEP2#

show l2route evpn imet topology 1 producer L2VPN detail


EVPN Instance:            1
```

```
Ethernet Tag:             0
Producer Name:            L2VPN
```

Router IP Addr: **10.2.2.3**

```
Route Ethernet Tag:       0
Tunnel Flags:             0
```

Tunnel Type: **Ingress Replication**

Tunnel Labels: **20011**

Tunnel ID: **2001:DB8:2::2**

```
Multicast Proxy:          IGMP,MLD
Next Hop(s):              N/A
```

Verify local IMET route in BGP on egress VTEP

Greenfield VXLANv6

<#root>

VTEP2#

show ip bgp l2vpn evpn route-type 3 0 10.2.2.3

```
BGP routing table entry for [3][10.2.2.3:1][0][32][10.2.2.3]/17, version 15
Paths: (1 available, best #1, table evi_1)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  Local
    :: (via default) from 0.0.0.0 (10.2.2.1)
      Origin incomplete, localpref 100, weight 32768, valid, sourced, local, best
      Extended Community: RT:100:1 ENCAP:8 EVPN Mcast Flags:3
      PMSI Attribute: Flags:0x0, Tunnel type:IR, length 16, vni:20011 tunnel identifier: 0000 0000
      Local irb vxlan vtep:
        vrf:red, l3-vni:30000
        local router mac:0050.569A.89D8
        core-irb interface:Vlan3
        vtep-ip:2001:DB8:2::2
        sec-vtep-ip:UNKNOWN
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 7 2022 23:37:11 UTC
```

Dual-stack

<#root>

VTEP2#

show ip bgp l2vpn evpn route-type 3 0 10.2.2.3

```
show ip bgp l2vpn evpn route-type 3 0 10.2.2.3
BGP routing table entry for [3][10.2.2.3:1][0][32][10.2.2.3]/17, version 9
Paths: (1 available, best #1, table evi_1)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  Local
    :: (via default) from 0.0.0.0 (10.2.2.1)
      Origin incomplete, localpref 100, weight 32768, valid, sourced, local, best
      Extended Community: RT:100:1 ENCAP:8 EVPN Mcast Flags:3
```

Tunnel Encapsulation Attribute: <--

Tunnel encap attribute added with secondary VTEP IP

Encap type: 8

Secondary nexthop address 2001:DB8:2::2(active)

```
      PMSI Attribute: Flags:0x0, Tunnel type:IR, length 4, vni:20011 tunnel identifier: 0000 0000
      Local irb vxlan vtep:
        vrf:red, l3-vni:30000
        local router mac:0050.569A.89D8
        core-irb interface:Vlan3
        vtep-ip:10.2.2.2
        sec-vtep-ip:2001:DB8:2::2
      rx pathid: 0, tx pathid: 0x0
```

Verify remote IMET route is received and imported to EVI table in BGP on ingress VTEP

Greenfield VXLANv6

<#root>

VTEP1#

show ip bgp l2vpn evpn route-type 3 0 10.2.2.3

```
BGP routing table entry for [3][10.1.1.3:1][0][32][10.2.2.3]/17, version 30
Paths: (1 available, best #1, table evi_1)
  Flag: 0x100
  Not advertised to any peer
  Refresh Epoch 1
  Local, imported path from [3][10.2.2.3:1][0][32][10.2.2.3]/17 (global)
    2001:DB8:2::2 (metric 2) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      Extended Community: RT:100:1 ENCAP:8 EVPN Mcast Flags:3
      Originator: 10.2.2.1, Cluster list: 10.99.99.99
      PMSI Attribute: Flags:0x0, Tunnel type:IR, length 16, vni:20011 tunnel identifier: < Tunnel Endpoi
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 7 2022 23:37:17 UTC
```

```
BGP routing table entry for [3][10.2.2.3:1][0][32][10.2.2.3]/17, version 23
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Flag: 0x100
  Not advertised to any peer
  Refresh Epoch 1
  Local
    2001:DB8:2::2 (metric 2) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      Extended Community: RT:100:1 ENCAP:8 EVPN Mcast Flags:3
      Originator: 10.2.2.1, Cluster list: 10.99.99.99
      PMSI Attribute: Flags:0x0, Tunnel type:IR, length 16, vni:20011 tunnel identifier: < Tunnel Endpoi
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 7 2022 23:37:17 UTC
```

Dual-stack

<#root>

```
VTEP1#
```

show ip bgp l2vpn evpn route-type 3 0 10.2.2.3

```
BGP routing table entry for [3][10.2.2.3:1][0][32][10.2.2.3]/17, version 22
Paths: (1 available, best #1,
```

table EVPN-BGP-Table

```
)
  Flag: 0x100
  Not advertised to any peer
  Refresh Epoch 1
  Local
```

10.2.2.2

```
 (metric 3) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      Extended Community: RT:100:1 ENCAP:8 EVPN Mcast Flags:3
      Originator: 10.2.2.1, Cluster list: 10.99.99.99
```

Tunnel Encapsulation Attribute:

Encap type: 8

Secondary nexthop address 2001:DB8:2::2(active)

```
      PMSI Attribute: Flags:0x0, Tunnel type:IR, length 4, vni:20011 tunnel identifier: <
```

Tunnel Endpoint: 10.2.2.2

```
 >
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 18 2022 18:03:49 UTC

BGP routing table entry for [3][10.1.1.3:1][0][32][10.2.2.3]/17, version 31
```

```
Paths: (1 available, best #1,
table evi_1
)
  Flag: 0x100
  Not advertised to any peer
  Refresh Epoch 1
  Local, imported path from [3][10.2.2.3:1][0][32][10.2.2.3]/17 (global)
2001:DB8:2::2
 (metric 2) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      Extended Community: RT:100:1 ENCAP:8 EVPN Mcast Flags:3
      Originator: 10.2.2.1, Cluster list: 10.99.99.99
Tunnel Encapsulation Attribute:                          <--
 Tunnel encap attribute received from remote dual-stack VTEP
        Encap type: 8
          Secondary nexthop address 2001:DB8:2::2
      PMSI Attribute: Flags:0x0, Tunnel type:IR, length 4, vni:20011 tunnel identifier: <
Tunnel Endpoint: 10.2.2.2
 >
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 18 2022 18:03:49 UTC
```

Note: Note: In the case of dual-nexthop IMET routes, PMSI tunnel attribute in the EVI imported route has its primary nexthop address as Tunnel identifier. BGP replaces that with secondary nexthop address from the Tunnel encap attribute if the local preference is that of the tunnel encap nexthop address-family. In this example, though BGP shows Tunnel Endpoint as 10.2.2.2, while installing into L2RIB, it replaces with 2001:DB8:2::2. This is done because BGP does not change the attribute entry in the attribute table.

Verify remote IMET route is received in L2RIB on ingress VTEP

<#root>

```
VTEP1#
show l2route evpn imet topology 1 producer bgp origin-rtr 10.2.2.3 detail
EVPN Instance:            1
Ethernet Tag:             0
Producer Name:            BGP
```

Router IP Addr: **10.2.2.3**

Route Ethernet Tag: 0
Tunnel Flags: 0

Tunnel Type: **Ingress Replication**

Tunnel Labels: **20011**

Tunnel ID: **2001:DB8:2::2**

Multicast Proxy: IGMP,MLD
Next Hop(s): V:0 2001:DB8:2::2

Verify entry for the egress VTEP is in the flood list in L2FIB on ingress VTEP

<#root>

VTEP1#

show l2fib bridge-domain 11 detail

Bridge Domain : 11
  Reference Count : 12
  Replication ports count : 3
  Unicast Address table size : 2
  IP Multicast Prefix table size : 1

  Flood List Information :

Olist: 1035

, Ports: 3

<-- Use this value in the output-list command

  Port Information :
    BD_PORT   Gi1/0/1:11

VXLAN_REP PL:2(1) T:VXLAN_REP [IR]20011:2001:DB8:2::2

    VXLAN_REP PL:9(1) T:VXLAN_REP [IR]20011:2001:DB8:3::2

  Unicast Address table information :
    aabb.0000.0021 VXLAN_UC PL:1(1) T:VXLAN_UC [MAC]20011:2001:DB8:2::2
    aabb.0000.0031 VXLAN_UC PL:12(1) T:VXLAN_UC [MAC]20011:2001:DB8:3::2

  IP Multicast Prefix table information :
    Source: *, Group: 239.21.21.21, IIF: Null, Adjacency: Olist: 6156, Ports: 1

VTEP1#

show l2fib output-list 1035 <-- From the previous command

```
ID                            : 1035
Bridge Domain                 : 11
Reference Count               : 1
Flags                         : flood list
Port Count                    : 3
Port(s)                       : BD_PORT   Gi1/0/1:11
                              :
```

VXLAN_REP PL:2(1) T:VXLAN_REP [IR]20011:2001:DB8:2::2

```
                              : VXLAN_REP PL:9(1) T:VXLAN_REP [IR]20011:2001:DB8:3::2

VTEP1#
```

show l2fib path-list 2 detail

```
VXLAN_REP Pathlist 2: topo 11, 1 paths, none
  ESI: 0000.0000.0000.0000.0000
  Originator: 10.2.2.3
  path 2001:DB8:2::2, type VXLAN, evni 20011, vni 20011, source IR
    forwarding oce 0x7F262ED39BF8 type adjacency, IPV6 midchain out of Tunnel0, addr 2001:DB8:2::2, cid:
  output chain:
    oce type: evpn_vxlan_encap, sw_handle 0x7F262F4849D0
      forwarding oce 0x7F262ED39BF8 type adjacency, IPV6 midchain out of Tunnel0, addr 2001:DB8:2::2, ci
```

Verify Platform Dependent (PD) adjacency on ingress VTEP

<#root>

VTEP1#

show platform software fed switch active matm adjacencies vlan 11

```
VLAN   ADJ_ID      ADJ_KEY          Encap  Link   siHandle         riHandle         l3mriHandle      diH
-------------------------------------------------------------------------------------------------------
11     15          0x30000000f      VXLAN  V6     0x7fb4687f45f8   0x7fb4687e9be8   0x0              0x0
11     18          0x300000012      VXLAN  V6     0x7fb4687ee058   0x7fb4687ee7a8   0x0              0x0
11     148         0x200000094      VXLAN  V6     0x0
```

0x7fb4687eb9e8

```
   0x0              0x0
```

IR

```
         No
11     149         0x200000095      VXLAN  V6     0x0
```

0x7fb4687eb158

```
   0x0              0x0
```

IR

```
        No
```

VTEP1#

show platform software fed switch active matm adjacencies vlan 11 | inc IR

11   148   0x200000094   VXLAN V6   0x0

0x7fb4687eb9e8

   0x0   0x0   IR   No
11   149   0x200000095   VXLAN V6   0x0

0x7fb4687eb158

   0x0   0x0   IR   No

VTEP1#

show plat hard fed sw active fwd abs print 0x7fb4687eb9e8 1 <-- first Value from matm adjacencies comma

Handle:0x7fb4687eb9e8 Res-Type:ASIC_RSC_RI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_L2_WIRELESS
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: index0:0x36 mtu_index/l3u_ri_index0:0x0 index1:
Features sharing this resource:58 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 0b 00 00 00 00 00 00 00 00 00 00 00 07 00 94 00 00 00 00 00 00 00 00 00 00 00 00

Detailed Resource Information

(ASIC_INSTANCE# 0)

<-- First ASIC instance

ASIC#:0 RI:54 Rewrite_type:AL_RRM_REWRITE_L2_PAYLOAD_BRIDGING_EPG_MCAST_IPV6_ENCAP(234) Mapped_rii:LVX_E

Src IPv6:   2001:DB8:1::2   <-- Source VTEP in hardware

Dst IPv6:   2001:DB8:2::2   <-- Dest VTEP in hardware

iVxlan dstMac: 0x00:0x00:0x00
iVxlan srcMac: 0x00:0x00:0x00
IPv6 hlim: 0
iid present: 0
lisp iid: 20011
lisp flags: 0
dst Port: 4789
update only l3if: 0
is Sgt: 0
is TTL Prop: 0
L3if LE: 43 (0)
Port LE: 286 (0)
Vlan LE: 12 (0)

Detailed Resource Information

(ASIC_INSTANCE# 1)

<-- Second ASIC instance

ASIC#:1 RI:54 Rewrite_type:AL_RRM_REWRITE_L2_PAYLOAD_BRIDGING_EPG_MCAST_IPV6_ENCAP(234) Mapped_rii:LVX_E

Src IPv6: 2001:DB8:1::2 <-- Source VTEP in hardware

Dst IPv6: 2001:DB8:2::2 <-- Dest VTEP in hardware

iVxlan dstMac: 0x00:0x00:0x00
iVxlan srcMac: 0x00:0x00:0x00
IPv6 hlim: 0
iid present: 0
lisp iid: 20011
lisp flags: 0
dst Port: 4789
update only l3if: 0
is Sgt: 0
is TTL Prop: 0
L3if LE: 43 (0)
Port LE: 286 (0)
Vlan LE: 12 (0)

==========

VTEP1#

show plat hard fed sw active fwd abs print 0x7fb4687eb158 1 <-- Second Value from matm adjacencies co

Handle:0x7fb4687eb158 Res-Type:ASIC_RSC_RI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_L2_WIRELESS
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: index0:0x24 mtu_index/l3u_ri_index0:0x0 index1:
Features sharing this resource:58 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 0b 00 00 00 00 00 00 00 00 00 00 07 00 95 00 00 00 00 00 00 00 00 00 00 00 00

Detailed Resource Information

(ASIC_INSTANCE# 0)

<-- First ASIC instance

ASIC#:0 RI:36 Rewrite_type:AL_RRM_REWRITE_L2_PAYLOAD_BRIDGING_EPG_MCAST_IPV6_ENCAP(234) Mapped_rii:LVX_E

Src IPv6: 2001:DB8:1::2 <-- Source VTEP in hardware

Dst IPv6: 2001:DB8:3::2

<-- Dest VTEP in hardware

iVxlan dstMac: 0x00:0x00:0x00
iVxlan srcMac: 0x00:0x00:0x00
IPv6 hlim: 0

```
 iid present:    0
 lisp iid:       20011
 lisp flags:     0
 dst Port:       4789
 update only l3if:       0
 is Sgt:         0
 is TTL Prop:    0
 L3if LE:        43 (0)
 Port LE:        286 (0)
 Vlan LE:        12 (0)

Detailed Resource Information
```

(ASIC_INSTANCE# 1)

<-- First ASIC instance

```
---------------------------------------
ASIC#:1 RI:36 Rewrite_type:AL_RRM_REWRITE_L2_PAYLOAD_BRIDGING_EPG_MCAST_IPV6_ENCAP(234) Mapped_rii:LVX_E
```

Src IPv6: 2001:DB8:1::2 <-- Source VTEP in hardware

Dst IPv6: 2001:DB8:3::2 <-- Dest VTEP in hardware

```
 iVxlan dstMac:  0x00:0x00:0x00
 iVxlan srcMac:  0x00:0x00:0x00
 IPv6 hlim:      0
 iid present:    0
 lisp iid:       20011
 lisp flags:     0
 dst Port:       4789
 update only l3if:       0
 is Sgt:         0
 is TTL Prop:    0
 L3if LE:        43 (0)
 Port LE:        286 (0)
 Vlan LE:        12 (0)

============================================================
```

Verify PD Flood list on ingress VTEP

<#root>

```
VTEP1#
```

show plat hard fed sw act vlan 11 ingress

```
VLAN STP State in hardware
```

vlan id is:: 11 <-- Vlan 11

Interfaces in forwarding state: : Gi1/0/1(Tagged)

flood list: : Gi1/0/1   <-- port present in flood list

REP RI Handle: :

0x00007fb4687ea3c8 <-- Replication Index (used to replicate/flood)

VTEP1#

show plat hard fed sw act fwd abs print 0x00007fb4687ea3c8 1

Handle:0x7fb4687ea3c8 Res-Type:ASIC_RSC_RI_REP Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_LISP LK
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: index0:0x10 mtu_index/l3u_ri_index0:0x0 index1:
Cookie length: 56
00 00 00 00 00 00 00 00 0b 00 00 00 00 00 00 00 00 00 00 00 07 00 00 00 00 00 00 00 00 00 00 00 00 00

Detailed Resource Information

(ASIC_INSTANCE# 0) <-- first ASIC instance

```
---------------------------------------
Replication list RI handle = 7fb4687ea3c8
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
ASIC [0] Replication Expansion Handle [0x7fb4687ea7c8]
Replication list :
Number of RIs    = 6
Start RI         = 16
Common rewrite   = Yes

Replication REP_RI 0x10 [elements = 2]
[0] ri[0]=2 RI_L2 port=78 ri_ref_count:1 dirty=0
[1] ri_list[1]=4 RI_MCAST_BRIDGE_V6 port=88 ri_ref_count:1 dirty=0

RIL first:4 last:4 start:4 ril_total:4 ref_count:0
RI list this:4 num_pairs:4 free:3 next:0 prev:0 ---->
```

uri1:36 ri_ref_count_1:1 uri0:54

```
 ri_ref_count_0:1 ptr_type:0 last:1 dirty:1
uri1:49151 ri_ref_count_1:0 uri0:49151 ri_ref_count_0:0 ptr_type:1 last:1 dirty:0
uri1:49151 ri_ref_count_1:0 uri0:49151 ri_ref_count_0:0 ptr_type:1 last:1 dirty:0
uri1:49151 ri_ref_count_1:0 uri0:49151 ri_ref_count_0:0 ptr_type:1 last:1 dirty:0
```

<-- URI represents multiple copies are made with different encap. URI0 always indicate encap index which

â€œshow plat hard fed sw active fwd-asic resource asic 0 rewrite-index range <uri value> <uri value>â€

URI1 also indicates a encap index if â€œlastâ€ value is 1. If â€œlastâ€ value is zero, then URI1 jus

Detailed Resource Information

(ASIC_INSTANCE# 1) <-- second ASIC instance (if port is on first instance this may not be programmed)

```
---------------------------------------
Replication list RI handle = 7fb4687ea3c8
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
ASIC [1] Replication Expansion Handle [0x7fb4687ea838]
Replication list :
Number of RIs    = 6
Start RI         = 16
Common rewrite   = Yes

Replication REP_RI 0x10 [elements = 1]
[0] ri[0]=2 RI_L2 port=78 ri_ref_count:1 dirty=0
```

Verify Decap programming on egress VTEP

- There is one tunnel decap entry per NVE interface programmed on the platform. **Entry must have vxlan port â€œ0x12b5â€ (port 4789) and UDP protocol â€œ0x11â€.**

<#root>

VTEP2#

show platform software fed switch active fwd-asic resource tcam table tunnel | inc 12b5

V: 00110000 000012b5 00000000 00000000 00000000 00000000 00000000

Value:

00000000000000000000000000000000

12b5

000

11

0 0 00 00 0

<-- ASIC 0

V: 00000000 00000000 000012b5 00000000 00000000
Value: 00000000 00000000 12b5 000 00 0 0 00 00 0

V: 00000000 000012b5 00000000 00000000 00000000 00000000 00000000
Value: 00000000000000000000000000000000 12b5 000 00 0 0 00 00

<-- ASIC 1

One VNI-VLAN translation entry per VNI programmed on the platform

<#root>

VTEP2#

show platform hardware fed switch active fwd-asic resource tcam table vnid_trans

```
Printing entries for region LISP_INST_TRANS (407) type 6 asic 0
=======================================================
TAQ-3 Index-512 (A:0,C:0) Valid StartF-1 StartA-1 SkipF-0 SkipA-0
Labels  Port   Vlan   L3If   Group
M:      0000   0000   0000   0000
V:      0000   0000   0000   0000

M: 00ff0000 0000ffff ffffff00 00000000
V: 00110000 000012b5 004e8500 00000000

 Lisp    VRF     L3P
```

DPort

```
   InstId
 Mask    000     ff      ffff    ffffff00
 Value   000     11
```

12b5

004e8500 <-- hex = UDP port 4789 & VNI 5145856

```
Action: 00000001 00000000 00000000 00000000 00650000 00000006 000000ed 00000000
        00000000 00000000
lvxTranslationValid: 1
lvxTranslatedInstanceIsL3if: 0
l3if_l3_handle: 0
```

lvxTranslatedInstanceId: 0x065 <- for L2 VNI, this value is the vlan that is mapped to VNI. For L3 vni,

```
priority: 6
SI: 0xed
```

BUM Traffic Forwarding (Multicast Replication)

This section provides an example to troubleshoot BUM traffic from VTEP1 to VTEP2 in EVI 2 where replication type is configured as static.

Verify Replication Type is set to Static for the EVI in EVPN Manager on both VTEPs

- Both VTEPs must be configured with the same underlay multicast group for the same EVI. The underlay multicast group information comes from NVE. Check NVE interface configuration if it is not set properly.

<#root>

VTEP1#

show l2vpn evpn evi 2 detail

```
EVPN instance:       2 (VLAN Based)
  RD:                10.1.1.3:2 (auto)
  Import-RTs:        100:2
  Export-RTs:        100:2
  Per-EVI Label:     none
```

```
  State:             Established

Replication Type:  Static

  Encapsulation:     vxlan
  IP Local Learn:    Enabled (global)
  Adv. Def. Gateway: Enabled (global)
  Re-originate RT5:  Disabled
  Adv. Multicast:    Enabled (global)
  Vlan:              12
    Protected:       False
    Ethernet-Tag:    0
    State:           Established
    Flood Suppress:  Attached
    Core If:         Vlan3
    Access If:       Vlan12
    NVE If:          nve1
    RMAC:            0050.569a.a8bf
    Core Vlan:       3
    L2 VNI:          20012
    L3 VNI:          30000
    VTEP IP:         2001:DB8:1::2

MCAST IP:        FF0E::11

    VRF:             red
    IPv4 IRB:        Enabled
    IPv6 IRB:        Enabled
    Pseudoports:
      GigabitEthernet1/0/2 service instance 12
        Routes: 1 MAC, 1 MAC/IP

 Peers:

      2001:DB8:2::2

        Routes: 2 MAC, 3 MAC/IP, 0 IMET, 0 EAD
```

Verify L2RIB has the local IMET route for the EVI from producer Static on ingress VTEP

<#root>

```
VTEP1#
show l2route evpn imet topology 2 producer static detail

EVPN Instance:           2
Ethernet Tag:            0
Producer Name:           Static

Router IP Addr:          10.1.1.3
```

```
Route Ethernet Tag:       0
Tunnel Flags:             0
Tunnel Type:              No tunnel information present
Tunnel Labels:            20012
```

Tunnel ID: **FF0E::11**

```
Multicast Proxy:          IGMP,MLD
Next Hop(s):              N/A
```

Verify entry for the underlay multicast group is in the flood list in L2FIB on ingress VTEP

<#root>

VTEP1#

show l2fib bridge-domain 12 detail

```
Bridge Domain : 12
  Reference Count : 13
  Replication ports count : 2
  Unicast Address table size : 1
  IP Multicast Prefix table size : 3

  Flood List Information :
```

Olist: 1036

, Ports: 2

<-- Use in the next output-list command

```
  Port Information :
    BD_PORT   Gi1/0/2:12
```

VXLAN_REP PL:12(1) T:VXLAN_REP [SMC]20012:FF0E::11

```
  Unicast Address table information :
    aabb.0000.0022  VXLAN_UC  PL:26(1) T:VXLAN_UC [MAC]20012:2001:DB8:2::2

  IP Multicast Prefix table information :
    Source: *, Group: *, IIF: Null, Adjacency: Olist: 6157, Ports: 1
    Source: *, Group: 239.21.21.21, IIF: Null, Adjacency: Olist: 6159, Ports: 2
    Source: ::, Group: ::, IIF: Null, Adjacency: Olist: 6158, Ports: 1
```

VTEP1#

show l2fib output-list 1036 **<-- From the bridge-domain command**

```
ID                          : 1036
Bridge Domain               : 12
Reference Count             : 1
```

```
Flags                         : flood list
Port Count                    : 2
Port(s)                       : BD_PORT   Gi1/0/2:12
                              :
```

VXLAN_REP PL:12(1) T:VXLAN_REP [SMC]20012:FF0E::11

```
VTEP1#
```

show l2fib path-list 12 detail

```
VXLAN_REP Pathlist 12: topo 12, 1 paths, none
  ESI: 0000.0000.0000.0000.0000
  Originator: 10.1.1.3
```

path FF0E::11

```
, type VXLAN, evni 20012, vni 20012, source SMC
    forwarding oce 0x7FA987EC3F48 type adjacency, IPV6 midchain out of Tunnel0, addr FF0E::11, cid: 1
  output chain:
    oce type: evpn_vxlan_encap, sw_handle 0x7FA988938778
      forwarding oce 0x7FA987EC3F48 type adjacency, IPV6 midchain out of Tunnel0, addr FF0E::11, cid: 1
```

Verify PIM neighbor on Spine

- In this output the first entry denotes pim neighborship with VTEP1 & the second entry denotes pim neighborship with VTEP2

<#root>

```
SPINE#
```

show ipv6 pim neighbor

```
PIM Neighbor Table
Mode: B - Bidir Capable, G - GenID Capable
Neighbor Address           Interface          Uptime    Expires  Mode DR pri
```

FE80::822D:BFFF:FE9B:84C6 Te1/1/2

```
           00:50:50  00:01:19 B G  DR 1
```

<-- VTEP1

FE80::C214:FEFF:FEC6:D7C6 Gi1/0/1

```
            00:52:32  00:01:34 B G  DR 1
```

<-- VTEP2

Verify PIM neighbor on ingress VTEP

- In this output, the entry denotes pim neighborship with Spine

<#root>

VTEP1#

show ipv6 pim neighbor

```
PIM Neighbor Table
Mode: B - Bidir Capable, G - GenID Capable
Neighbor Address           Interface          Uptime    Expires  Mode DR pri

FE80::822D:BFFF:FE7B:1DC8  Te1/1/1
           00:53:06  00:01:32 B G     1
<-- SPINE
```

Verify PIM neighbor on egress VTEP

- In this output, the entry denotes pim neighborship with Spine

<#root>

VTEP2#

show ipv6 pim neighbor

```
PIM Neighbor Table
Mode: B - Bidir Capable, G - GenID Capable
Neighbor Address           Interface          Uptime    Expires  Mode DR pri

FE80::822D:BFFF:FE7B:1DE4  Te1/1/1
            00:55:03  00:01:26 B G     1
<-- SPINE
```

Verify the rpf interface toward the RP on Spine

<#root>

SPINE#

show ipv6 rpf 2001:DB8::99:99

```
RPF information for 2001:DB8::99:99

RPF interface: Loopback0

  RPF neighbor: 2001:DB8::99:99- local
```

```
  RPF route/mask: 2001:DB8::99:99/128
  RPF type: Unicast
  RPF recursion count: 0
  Metric preference: 0
  Metric: 0
```

Verify the rpf interface toward the RP on ingress VTEP

<#root>

```
VTEP1#
```

show ipv6 rpf 2001:DB8::99:99

```
RPF information for 2001:DB8::99:99
```

RPF interface: TenGigabitEthernet1/1/1

RPF neighbor: FE80::822D:BFFF:FE7B:1DC8

```
  RPF route/mask: 2001:DB8::99:99/128
  RPF type: Unicast
  RPF recursion count: 0
  Metric preference: 110
  Metric: 1
```

Verify the rpf interface toward the RP on egress VTEP

<#root>

```
VTEP2#
```

show ipv6 rpf 2001:DB8::99:99

```
RPF information for 2001:DB8::99:99
```

RPF interface: TenGigabitEthernet1/1/1

RPF neighbor: FE80::822D:BFFF:FE7B:1DE4

```
  RPF route/mask: 2001:DB8::99:99/128
  RPF type: Unicast
  RPF recursion count: 0
  Metric preference: 110
  Metric: 1
```

Verify PIM topology entry for the underlay multicast BUM group on the ingress VTEP

<#root>

VTEP1#

show ipv6 pim topology ff05::1

IP PIM Multicast Topology Table
Entry state: (*/S,G)[RPT/SPT] Protocol Uptime Info Upstream Mode
Entry flags: KAT - Keep Alive Timer, AA - Assume Alive, PA - Probe Alive,
    RA - Really Alive, LH - Last Hop, DSS - Don't Signal Sources,
    RR - Register Received, SR - Sending Registers, E - MSDP External,
    DCC - Don't Check Connected, Y - Joined MDT-data group,
    y - Sending to MDT-data group
    BGS - BGP Signal Sent, !BGS - BGP signal suppressed
    SAS - BGP Src-Act Sent, SAR - BGP Src-Act Received
    PFA - PFP-SA announced, PFC - PFP-SA cache created
Interface state: Name, Uptime, Fwd, Info
Interface flags: LI - Local Interest, LD - Local Disinterest,
    II - Internal Interest, ID - Internal Disinterest,
    LH - Last Hop, AS - Assert, AB - Admin Boundary, BS - BGP Signal,
    BP - BGP Shared-Tree Prune, BPT - BGP Prune Time

(*,FF05::1)

SM UP: 00:20:56 JP: Join(now) Flags: LH

RP: 2001:DB8::99:99

RPF: TenGigabitEthernet1/1/1

,FE80::822D:BFFF:FE7B:1DC8
  Tunnel0   , 00:20:56 fwd   LI II LH

(2001:DB8::1:1,FF05::1)

SM SPT

 UP: 00:20:24

JP: Join

(never) Flags: KAT(00:00:55) RA SR
RPF:

Loopback0

,FE80::822D:BFFF:FE9B:8480*

Te1/1/1

            , 00:16:37

fwd

Join(00:03:01)

Verify the mroute entry for the underlay multicast BUM group on the ingress VTEP

<#root>

VTEP1#

show ipv6 mroute ff05::2

```
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, I - Received Source Specific Host Report,
       P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
       J - Join SPT, Y - Joined MDT-data group,
       y - Sending to MDT-data group
       g - BGP signal originated, G - BGP Signal received,
       N - BGP Shared-Tree Prune received, n - BGP C-Mroute suppressed,
       q - BGP Src-Active originated, Q - BGP Src-Active received
       E - Extranet
Timers: Uptime/Expires
Interface state: Interface, State
```

(*,

FF05::2

), 00:04:17/never,

RP 2001:DB8::99:99

, flags: SCLJ
  Incoming interface:

TenGigabitEthernet1/1/1

  RPF nbr: FE80::822D:BFFF:FE7B:1DC8
  Immediate Outgoing interface list:

Tunnel0

, Forward, 00:04:17/never

(2001:DB8::1:1, FF05::2)

, 00:01:25/00:02:04, flags: SFJT
  Incoming interface:

Loopback0

  RPF nbr: FE80::822D:BFFF:FE9B:8480
  Immediate Outgoing interface list:

TenGigabitEthernet1/1/1

,

Forward

, 00:01:25/00:03:10
  Inherited Outgoing interface list:

```
    Tunnel0, Forward, 00:04:17/never
```

Verify the mrib entry for the underlay multicast BUM group on ingress VTEP

<#root>

```
VTEP1#
```

show ipv6 mrib route ff05::1

```
IP Multicast Routing Information Base
Entry flags: L - Domain-Local Source, E - External Source to the Domain,
    C - Directly-Connected Check, S - Signal, IA - Inherit Accept, D - Drop
    ET - Data Rate Exceeds Threshold,K - Keepalive,DDE - Data Driven Event
    ME - MoFRR ECMP Flow based, MNE - MoFRR Non-ECMP Flow based,
    MP - Primary MoFRR Non-ECMP Flow based entry,
    e  - Encap helper tunnel flag
Interface flags: F - Forward, A - Accept, IC - Internal Copy,
    NS - Negate Signal, DP - Don't Preserve, SP - Signal Present,
    II - Internal Interest, ID - Internal Disinterest, LI - Local Interest,
    LD - Local Disinterest, MD - mCAC Denied, MI - mLDP Interest
    A2 - MoFRR ECMP Backup Accept
```

(*,FF05::1)

```
RPF nbr: FE80::822D:BFFF:FE7B:1DC8 Flags: C
```

TenGigabitEthernet1/1/1

```
 Flags: A NS
  Tunnel0 Flags: F IC II LI NS
```

(2001:DB8::1:1,FF05::1)

```
 RPF nbr: FE80::822D:BFFF:FE9B:8480 Flags:
```

Null0 Flags: A

TenGigabitEthernet1/1/1 Flags: F

```
 NS
```

Verify the mfib entry for the underlay multicast BUM group on the ingress VTEP

<#root>

```
VTEP1#
```

show ipv6 mfib ff05::1

```
Entry Flags:    C - Directly Connected, S - Signal, IA - Inherit A flag,
                ET - Data Rate Exceeds Threshold, K - Keepalive
                DDE - Data Driven Event, HW - Hardware Installed
                ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
                MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
                MS  - MoFRR  Entry in Sync, MC - MoFRR entry in MoFRR Client,
                e   - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,
                A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                MA - MFIB Accept, A2 - Accept backup,
                RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:   HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default

(*,FF05::1)

 Flags: C HW
   SW Forwarding: 0/0/0/0, Other: 0/0/0
   HW Forwarding:   1/0/146/0, Other: 0/0/0
   TenGigabitEthernet1/1/1 Flags: A NS
   Tunnel0, VXLAN v6 Decap Flags: F IC NS
     Pkts: 0/0/0    Rate: 0 pps

(2001:DB8::1:1,FF05::1)

 Flags: HW
   SW Forwarding: 1/0/116/0, Other: 571/571/0


HW Forwarding:   632/1/175/1

, Other: 0/0/0


Null0 Flags: A



 TenGigabitEthernet1/1/1 Flags: F

 NS
     Pkts: 0/0/0    Rate: 0 pps
```

Verify the PIM topology entry for the underlay multicast BUM group on the egress VTEP

<#root>

```
VTEP2#

show ipv6 pim topology ff05::1


IP PIM Multicast Topology Table
Entry state: (*/S,G)[RPT/SPT] Protocol Uptime Info Upstream Mode
Entry flags: KAT - Keep Alive Timer, AA - Assume Alive, PA - Probe Alive,
    RA - Really Alive, LH - Last Hop, DSS - Don't Signal Sources,
    RR - Register Received, SR - Sending Registers, E - MSDP External,
```

```
    DCC - Don't Check Connected, Y - Joined MDT-data group,
    y - Sending to MDT-data group
    BGS - BGP Signal Sent, !BGS - BGP signal suppressed
    SAS - BGP Src-Act Sent, SAR - BGP Src-Act Received
    PFA - PFP-SA announced, PFC - PFP-SA cache created
Interface state: Name, Uptime, Fwd, Info
Interface flags: LI - Local Interest, LD - Local Disinterest,
    II - Internal Interest, ID - Internal Disinterest,
    LH - Last Hop, AS - Assert, AB - Admin Boundary, BS - BGP Signal,
    BP - BGP Shared-Tree Prune, BPT - BGP Prune Time
```

(*,FF05::1)

SM UP: 00:00:42 JP: Join(00:00:16) Flags: LH

RP: 2001:DB8::99:99

RPF: TenGigabitEthernet1/1/1

,FE80::822D:BFFF:FE7B:1DE4

Tunnel0

, 00:00:42

fwd

LI II LH

(2001:DB8::1:1,FF05::1)

```
SM SPT UP: 00:00:42 JP: Join(00:00:16) Flags: KAT(00:02:47) RA
RPF: TenGigabitEthernet1/1/1,FE80::822D:BFFF:FE7B:1DE4
  No interfaces in immediate olist
```

Verify the mroute entry for the underlay multicast BUM group on the egress VTEP

<#root>

VTEP2#

show ipv6 mroute ff05::1

```
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, I - Received Source Specific Host Report,
       P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
       J - Join SPT, Y - Joined MDT-data group,
       y - Sending to MDT-data group
       g - BGP signal originated, G - BGP Signal received,
       N - BGP Shared-Tree Prune received, n - BGP C-Mroute suppressed,
       q - BGP Src-Active originated, Q - BGP Src-Active received
       E - Extranet
Timers: Uptime/Expires
Interface state: Interface, State
```

(*, FF05::1)

, 00:00:47/never,

RP 2001:DB8::99:99

, flags: SCLJ
  Incoming interface:

TenGigabitEthernet1/1/1

  RPF nbr: FE80::822D:BFFF:FE7B:1DE4
  Immediate Outgoing interface list:

Tunnel0

, Forward, 00:00:47/never

(2001:DB8::1:1, FF05::1), 00:00:47/00:02:42, flags: SJT
  Incoming interface:

TenGigabitEthernet1/1/1

  RPF nbr: FE80::822D:BFFF:FE7B:1DE4
  Inherited Outgoing interface list:

Tunnel0

, Forward, 00:00:47/never

Verify the mrib entry for the underlay multicast BUM group on the egress VTEP

<#root>

VTEP2#

show ipv6 mrib route ff05::1

IP Multicast Routing Information Base
Entry flags: L - Domain-Local Source, E - External Source to the Domain,
    C - Directly-Connected Check, S - Signal, IA - Inherit Accept, D - Drop
    ET - Data Rate Exceeds Threshold,K - Keepalive,DDE - Data Driven Event
    ME - MoFRR ECMP Flow based, MNE - MoFRR Non-ECMP Flow based,
    MP - Primary MoFRR Non-ECMP Flow based entry,
    e - Encap helper tunnel flag
Interface flags: F - Forward, A - Accept, IC - Internal Copy,
    NS - Negate Signal, DP - Don't Preserve, SP - Signal Present,
    II - Internal Interest, ID - Internal Disinterest, LI - Local Interest,
    LD - Local Disinterest, MD - mCAC Denied, MI - mLDP Interest
    A2 - MoFRR ECMP Backup Accept

(*,FF05::1)

 RPF nbr: FE80::822D:BFFF:FE7B:1DE4 Flags: C

Tunnel0 Flags: F

IC II LI NS

TenGigabitEthernet1/1/1 Flags: A

NS

(2001:DB8::1:1,FF05::1)

RPF nbr: FE80::822D:BFFF:FE7B:1DE4 Flags:

TenGigabitEthernet1/1/1 Flags: A

Tunnel0 Flags: F

IC NS

Verify mfib entry for the underlay multicast BUM group on egress VTEP

<#root>

VTEP2#

show ipv6 mfib ff05::1

```
Entry Flags:    C - Directly Connected, S - Signal, IA - Inherit A flag,
                ET - Data Rate Exceeds Threshold, K - Keepalive
                DDE - Data Driven Event, HW - Hardware Installed
                ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
                MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
                MS  - MoFRR  Entry in Sync, MC - MoFRR entry in MoFRR Client,
                e   - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,
                A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                MA - MFIB Accept, A2 - Accept backup,
                RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:   HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
```

(*,FF05::1)

```
 Flags: C HW
   SW Forwarding: 0/0/0/0, Other: 0/0/0
   HW Forwarding:   0/0/0/0, Other: 0/0/0
```

TenGigabitEthernet1/1/1 Flags: A

NS

Tunnel0, VXLAN v6 Decap Flags: F

 IC NS
     Pkts: 0/0/0   Rate: 0 pps

(2001:DB8::1:1,FF05::1)

 Flags: HW
   SW Forwarding: 0/0/0/0, Other: 0/0/0

HW Forwarding: 74/1/170/1

, Other: 0/0/0

TenGigabitEthernet1/1/1 Flags: A

Tunnel0, VXLAN v6 Decap Flags: F

 IC NS
     Pkts: 0/0/0   Rate: 0 pps

Verify the pim topolog' entry for the underlay multicast BUM group on the Spine

<#root>

SPINE#

show ipv6 pim topology ff05::1

IP PIM Multicast Topology Table
Entry state: (*/S,G)[RPT/SPT] Protocol Uptime Info Upstream Mode
Entry flags: KAT - Keep Alive Timer, AA - Assume Alive, PA - Probe Alive,
    RA - Really Alive, LH - Last Hop, DSS - Don't Signal Sources,
    RR - Register Received, SR - Sending Registers, E - MSDP External,
    DCC - Don't Check Connected, Y - Joined MDT-data group,
    y - Sending to MDT-data group
    BGS - BGP Signal Sent, !BGS - BGP signal suppressed
    SAS - BGP Src-Act Sent, SAR - BGP Src-Act Received
    PFA - PFP-SA announced, PFC - PFP-SA cache created
Interface state: Name, Uptime, Fwd, Info
Interface flags: LI - Local Interest, LD - Local Disinterest,
    II - Internal Interest, ID - Internal Disinterest,
    LH - Last Hop, AS - Assert, AB - Admin Boundary, BS - BGP Signal,
    BP - BGP Shared-Tree Prune, BPT - BGP Prune Time

(*,FF05::1)

SM UP: 00:09:33 JP: Join(00:00:27) Flags:

RP: 2001:DB8::99:99

*
RPF: Tunnel1,2001:DB8::99:99*

 Te1/1/2

```
            , 00:09:33
```

fwd

```
Join(00:02:58)
```

Gi1/0/1

```
            , 00:09:24
```

fwd

```
Join(00:03:09)

(2001:DB8::1:1,FF05::1)
SM RPT UP: 00:09:33 JP: Prune(never) Flags: KAT(00:03:29) RA RR
RP: 2001:DB8::99:99*
RPF: Tunnel1,2001:DB8::99:99*
  Te1/1/2            , 00:09:33  off     Prune(00:02:58)
```

(2001:DB8::1:1,FF05::1)

```
SM SPT UP: 00:09:33 JP: Join(00:00:38) Flags: KAT(00:03:29) RA RR
RPF:
```

TenGigabitEthernet1/1/2

```
,FE80::822D:BFFF:FE9B:84C6
```

Gi1/0/1

```
            , 00:09:24
```

fwd

```
Join(00:03:09)
```

Verify the mroute entry for the underlay multicast BUM group on the Spine

<#root>

```
SPINE#
```

show ipv6 mroute ff05::1

```
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, I - Received Source Specific Host Report,
       P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
       J - Join SPT, Y - Joined MDT-data group,
       y - Sending to MDT-data group
       g - BGP signal originated, G - BGP Signal received,
       N - BGP Shared-Tree Prune received, n - BGP C-Mroute suppressed,
       q - BGP Src-Active originated, Q - BGP Src-Active received
       E - Extranet
Timers: Uptime/Expires
Interface state: Interface, State
```

(*, FF05::1)

```
, 00:09:43/00:03:00,
RP 2001:DB8::99:99
, flags: S
  Incoming interface: Tunnel1

  RPF nbr: 2001:DB8::99:99
  Immediate Outgoing interface list:

TenGigabitEthernet1/1/2
, Forward, 00:09:43/00:02:49

GigabitEthernet1/0/1
, Forward, 00:09:34/00:03:00

(2001:DB8::1:1, FF05::1),
 00:09:42/00:03:29, RP 2001:DB8::99:99, flags: SR
 Incoming interface: Tunnel1

  RPF nbr: 2001:DB8::99:99

  Immediate Outgoing interface list:
    TenGigabitEthernet1/1/2, Null, 00:09:42/00:02:49
  Inherited Outgoing interface list:

GigabitEthernet1/0/1, Forward
, 00:09:34/00:03:00

(2001:DB8::1:1, FF05::1)
, 00:09:42/00:03:29, flags: ST
  Incoming interface: TenGigabitEthernet1/1/2

  RPF nbr: FE80::822D:BFFF:FE9B:84C6
  Immediate Outgoing interface list:

GigabitEthernet1/0/1, Forward
, 00:09:33/00:03:00
```

Verify the mrib entry for the underlay multicast BUM group on the Spine

```
<#root>
SPINE#
```

show ipv6 mrib route ff05::1

```
IP Multicast Routing Information Base
Entry flags: L - Domain-Local Source, E - External Source to the Domain,
    C - Directly-Connected Check, S - Signal, IA - Inherit Accept, D - Drop
    ET - Data Rate Exceeds Threshold,K - Keepalive,DDE - Data Driven Event
    ME - MoFRR ECMP Flow based, MNE - MoFRR Non-ECMP Flow based,
    MP - Primary MoFRR Non-ECMP Flow based entry,
    e  - Encap helper tunnel flag
Interface flags: F - Forward, A - Accept, IC - Internal Copy,
    NS - Negate Signal, DP - Don't Preserve, SP - Signal Present,
    II - Internal Interest, ID - Internal Disinterest, LI - Local Interest,
    LD - Local Disinterest, MD - mCAC Denied, MI - mLDP Interest
    A2 - MoFRR ECMP Backup Accept
```

(*,FF05::1) RPF nbr: 2001:DB8::99:99

Flags: C

GigabitEthernet1/0/1 Flags: F

NS

TenGigabitEthernet1/1/2 Flags: F

NS
Tunnel1 Flags: A

(2001:DB8::1:1,FF05::1)

RPF nbr: FE80::822D:BFFF:FE9B:84C6 Flags: L

TenGigabitEthernet1/1/2 Flags: A

GigabitEthernet1/0/1 Flags: F NS

Verify the mfib entry for the underlay multicast BUM group on the Spine

<#root>

SPINE#

show ipv6 mfib ff05::1

```
Entry Flags:    C - Directly Connected, S - Signal, IA - Inherit A flag,
                ET - Data Rate Exceeds Threshold, K - Keepalive
                DDE - Data Driven Event, HW - Hardware Installed
                ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
                MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
                MS  - MoFRR  Entry in Sync, MC - MoFRR entry in MoFRR Client,
                e   - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,
                A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                MA - MFIB Accept, A2 - Accept backup,
```

```
                RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:   HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
```

(*,FF05::1)

```
 Flags: C HW
   SW Forwarding: 0/0/0/0, Other: 0/0/0
   HW Forwarding:   0/0/0/0, Other: 0/0/0
```

Tunnel1 Flags: A

```
NP
```

TenGigabitEthernet1/1/2 Flags: F

```
 NS
     Pkts: 0/0/0    Rate: 0 pps
```

GigabitEthernet1/0/1 Flags: F

```
 NS
     Pkts: 0/0/0    Rate: 0 pps
```

(2001:DB8::1:1,FF05::1)

```
 Flags: HW
   SW Forwarding: 0/0/0/0, Other: 0/0/0
```

HW Forwarding: 591/1/170/1

```
, Other: 0/0/0
```

TenGigabitEthernet1/1/2 Flags: A

GigabitEthernet1/0/1 Flags: F

```
 NS
     Pkts: 0/0/591    Rate: 0 pps
```

Verify the PD adjacency on the ingress VTEP

<#root>

```
VTEP1#
```

show platform software fed switch active matm adjacencies vlan 12 | inc UM

```
12     124         0x20000007c      VXLAN  V6     0x0
```

0x7fb4688f8808

```
   0x0              0x0              UM         No

VTEP1#
```

show plat hard fed sw active fwd abs print 0x7fb4688f8808 1

```
Handle:0x7fb4688f8808 Res-Type:ASIC_RSC_RI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_L2_WIRELESS
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles
```

: index0:0x32

```
  mtu_index/l3u_ri_index0:0x0  index1:0x32  mtu_index/l3u_ri_index1:0x0
Features sharing this resource:58 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 0c 00 00 00 00 00 00 00 00 00 00 07 00 7c 00 00 00 00 00 00 00 00 00 00 00 00

Detailed Resource Information
```

(ASIC_INSTANCE# 0) <-- the first ASIC instance

```
----------------------------------------
ASIC#:0 RI:50 Rewrite_type:AL_RRM_REWRITE_L2_PAYLOAD_BRIDGING_EPG_MCAST_IPV6_ENCAP(234) Mapped_rii:LVX_E
```

Src IPv6:   2001:DB8:1::2

Dst IPv6:   ff0e::11

```
 iVxlan dstMac:  0x00:0x00:0x00
 iVxlan srcMac:  0x00:0x00:0x00
 IPv6 hlim:      0
 iid present:    0
 lisp iid:       20012
 lisp flags:     0
```

dst Port: 4789

```
 update only l3if:       0
 is Sgt:         0
 is TTL Prop:    0
 L3if LE:        44 (0)
 Port LE:        290 (0)
 Vlan LE:        13 (0)

Detailed Resource Information
```

(ASIC_INSTANCE# 1) <-- the second ASIC instance

```
----------------------------------------
ASIC#:1 RI:50 Rewrite_type:AL_RRM_REWRITE_L2_PAYLOAD_BRIDGING_EPG_MCAST_IPV6_ENCAP(234) Mapped_rii:LVX_E
```

Src IPv6:   2001:DB8:1::2

Dst IPv6:   ff0e::11

```
 iVxlan dstMac:  0x00:0x00:0x00
 iVxlan srcMac:  0x00:0x00:0x00
 IPv6 hlim:      0
```

```
 iid present:    0
 lisp iid:       20012
 lisp flags:     0
```

`dst Port:       4789`

```
 update only l3if:       0
 is Sgt:         0
 is TTL Prop:    0
 L3if LE:        44 (0)
 Port LE:        290 (0)
 Vlan LE:        13 (0)
```

Verify the PD flood list on the ingress VTEP

<#root>

VTEP1#

`show plat har fed sw active vlan 12 ingress`

VLAN STP State in hardware

vlan id is:: 12

Interfaces in forwarding state: : Gi1/0/2(Tagged)

`flood list: : Gi1/0/2  <-- port in flood list`

REP RI Handle: :

`0x00007fb4689be2d8`

VTEP1#

`show plat hard fed sw active fwd abs print 0x00007fb4689be2d8 1`

```
Handle:0x7fb4689be2d8 Res-Type:ASIC_RSC_RI_REP Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_LISP Lk
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: index0:0xc  mtu_index/l3u_ri_index0:0x0  index1:0
Cookie length: 56
00 00 00 00 00 00 00 00 0c 00 00 00 00 00 00 00 00 00 00 07 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

Detailed Resource Information

`(ASIC_INSTANCE# 0)`

```
----------------------------------------
Replication list RI handle = 7fb4689be2d8
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
ASIC [0] Replication Expansion Handle [0x7fb4689be738]
Replication list :
Number of RIs    = 6
Start RI         = 12
```

```
Common rewrite   = Yes

Replication REP_RI 0xc [elements = 2]
[0] ri[0]=2 RI_L2 port=78 ri_ref_count:1 dirty=0
[1]
```

ri[1]=50

```
 Dynamic port=88 ri_ref_count:1 dirty=0
```

<-- replication (RI) index

```
Detailed Resource Information
```

(ASIC_INSTANCE# 1)

```
---------------------------------------
Replication list RI handle = 7fb4689be2d8
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
ASIC [1] Replication Expansion Handle [0x7fb4689be7a8]
Replication list :
Number of RIs    = 6
Start RI         = 12
Common rewrite   = Yes

Replication REP_RI 0xc [elements = 1]
[0] ri[0]=2 RI_L2 port=78 ri_ref_count:1 dirty=0

============================================================
```

Unicast Forwarding Between VTEPs (Same VLAN via L2VNI)

This section provides an example for troubleshooting unicast traffic:

- **from host H11** connected to VTEP1 on VLAN 11 (with MAC address aabb.0000.0011 and IP 192.168.11.11)
- **to host H31** connected to VTEP3 on VLAN 11 (with MAC address aabb.0000.0031 and IP address 192.168.11.31).

Verify ARP for destination IP address is resolved on source host

- ARP packets are handled as part of BUM traffic in EVPN fabric. If ARP is not resolved on a host, use the troubleshooting steps for EVPN BUM traffic forwarding for the appropriate configured replication type used in your network.

<#root>

```
H11#
```

show arp

```
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  192.168.11.11           -   aabb.0000.0011  ARPA   GigabitEthernet2.11
```

Internet 192.168.11.31   95   aabb.0000.0031 ARPA   GigabitEthernet2.11

Verify the host MAC is learned MAC table on the egress VTEP

<#root>

```
VTEP3#
```

```
show mac address-table dynamic address aabb.0000.0031 vlan 11
```

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

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
  11    aabb.0000.0031    DYNAMIC     Gi1/0/1
Total Mac Addresses for this criterion: 1
```

Verify the local MAC route is created in EVPN Manager on the egress VTEP

<#root>

```
VTEP3#
```

```
show l2vpn evpn mac address aabb.0000.0031 detail
```

```
MAC Address:                aabb.0000.0031
EVPN Instance:              1
Vlan:                       11
Ethernet Segment:           0000.0000.0000.0000.0000
Ethernet Tag ID:            0
```

```
Next Hop(s):                V:20011 GigabitEthernet1/0/1 service instance 11
```

```
Sequence Number:            0
MAC only present:           Yes
MAC Duplication Detection:  Timer not running
```

Verify the local MAC route is created in L2RIB on egress VTEP

<#root>

```
VTEP3#
```

```
show l2route evpn mac mac-address aabb.0000.0031 detail
```

```
EVPN Instance:            1
Ethernet Tag:             0
```

```
Producer Name:            L2VPN       <-- Installed from L2VPN
```

```
MAC Address:              aabb.0000.0031
Num of MAC IP Route(s):   2
```

```
Sequence Number:          0
ESI:                      0000.0000.0000.0000.0000
Flags:                    B()
```

Next Hop(s): **Gi1/0/1:11**

Verify the local MAC route is created in BGP on the egress VTEP

Greenfield VXLANv6

<#root>

```
VTEP3#
```

show ip bgp l2vpn evpn route-type 2 0 aabb.0000.0031 *

```
BGP routing table entry for [2][10.3.3.3:1][0][48][AABB00000031][0][*]/20, version 17
Paths: (1 available, best #1, table evi_1)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  Local
    :: (via default) from 0.0.0.0 (10.3.3.1)
      Origin incomplete, localpref 100, weight 32768, valid, sourced, local, best
      EVPN ESI: 00000000000000000000, Label1 20011
      Extended Community: RT:100:1 ENCAP:8
      Local irb vxlan vtep:
        vrf:red, l3-vni:30000
        local router mac:0050.569A.1DB3
        core-irb interface:Vlan3
        vtep-ip:2001:DB8:3::2
        sec-vtep-ip:UNKNOWN
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 7 2022 23:38:35 UTC
```

Dual-stack

<#root>

```
VTEP3#
```

show ip bgp l2vpn evpn route-type 2 0 aabb.0000.0031 *

```
BGP routing table entry for [2][10.3.3.3:1][0][48][AABB00000031][0][*]/20, version 51
Paths: (1 available, best #1, table evi_1)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  Local
    :: (via default) from 0.0.0.0 (10.3.3.1)
      Origin incomplete, localpref 100, weight 32768, valid, sourced, local, best
      EVPN ESI: 00000000000000000000, Label1 20011
      Extended Community: RT:100:1 ENCAP:8
```

```
Tunnel Encapsulation Attribute:       <--

 Tunnel encap attribute added with secondary VTEP IP


        Encap type: 8


          Secondary nexthop address 2001:DB8:3::2(active)


      Local irb vxlan vtep:
        vrf:red, l3-vni:30000
        local router mac:0050.569A.1DB3
        core-irb interface:Vlan3
        vtep-ip:10.3.3.2
        sec-vtep-ip:2001:DB8:3::2
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 18 2022 18:04:13 UTC
```

Verify the remote MAC route is received and import in EVI table in BGP on the ingress VTEP

Greenfield VXLANv6

<#root>

```
VTEP1#

show ip bgp l2vpn evpn route-type 2 0 aabb.0000.0031 *


BGP routing table entry for [2][10.1.1.3:1][0][48][AABB00000031][0][*]/20, version 34
Paths: (1 available, best #1, table evi_1)
  Not advertised to any peer
  Refresh Epoch 2
  Local, imported path from [2][10.3.3.3:1][0][48][AABB00000031][0][*]/20 (global)
    2001:DB8:3::2 (metric 2) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Label1 20011
      Extended Community: RT:100:1 ENCAP:8
      Originator: 10.3.3.1, Cluster list: 10.99.99.99
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 8 2022 14:28:15 UTC
BGP routing table entry for [2][10.3.3.3:1][0][48][AABB00000031][0][*]/20, version 10
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Not advertised to any peer
  Refresh Epoch 2
  Local
    2001:DB8:3::2 (metric 2) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Label1 20011
      Extended Community: RT:100:1 ENCAP:8
      Originator: 10.3.3.1, Cluster list: 10.99.99.99
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 8 2022 14:28:14 UTC
```

Dual-stack

<#root>

VTEP1#

show ip bgp l2vpn evpn route-type 2 0 aabb.0000.0031 *

BGP routing table entry for [2][10.1.1.3:1][0][48][AABB00000031][0][*]/20, version 57
Paths: (1 available, best #1,

table evi_1

)
  Not advertised to any peer
  Refresh Epoch 1
  Local, imported path from [2][10.3.3.3:1][0][48][AABB00000031][0][*]/20 (global)

2001:DB8:3::2

 (metric 2) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Label1 20011
      Extended Community: RT:100:1 ENCAP:8
      Originator: 10.3.3.1, Cluster list: 10.99.99.99

Tunnel Encapsulation Attribute: <--

 Tunnel encap attribute received from remote dual-stack VTEP

Encap type: 8

Secondary nexthop address 2001:DB8:3::2

      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 18 2022 18:04:13 UTC
BGP routing table entry for [2][10.3.3.3:1][0][48][AABB00000031][0][*]/20, version 56
Paths: (1 available, best #1,

table EVPN-BGP-Table

)
  Not advertised to any peer
  Refresh Epoch 1
  Local

10.3.3.2

 (metric 3) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Label1 20011
      Extended Community: RT:100:1 ENCAP:8
      Originator: 10.3.3.1, Cluster list: 10.99.99.99

Tunnel Encapsulation Attribute:

```
        Encap type: 8


          Secondary nexthop address 2001:DB8:3::2(active)


      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 18 2022 18:04:13 UTC
```

Verify the remote MAC route is received and installed in L2RIB

<#root>

```
VTEP1#
```

```
show l2route evpn mac mac-address aabb.0000.0031 detail
```

```
EVPN Instance:            1
Ethernet Tag:             0
```

```
Producer Name:            BGP      <-- Installed from BGP
```

```
MAC Address:              aabb.0000.0031
Num of MAC IP Route(s):   2
Sequence Number:          0
ESI:                      0000.0000.0000.0000.0000
Flags:                    B()
```

```
Next Hop(s):              V:20011 2001:DB8:3::2
```

Verify the remote MAC is in the L2FIB forwarding table

<#root>

```
VTEP1#
```

```
show l2fib bridge-domain 11 detail
```

```
Bridge Domain : 11
  Reference Count : 12
  Replication ports count : 3
  Unicast Address table size : 2
  IP Multicast Prefix table size : 1

  Flood List Information :
    Olist: 1035, Ports: 3

  Port Information :
    BD_PORT   Gi1/0/1:11
    VXLAN_REP PL:22(1) T:VXLAN_REP [IR]20011:2001:DB8:2::2
    VXLAN_REP PL:18(1) T:VXLAN_REP [IR]20011:2001:DB8:3::2

  Unicast Address table information :
```

```
    aabb.0000.0021  VXLAN_UC  PL:21(1) T:VXLAN_UC [MAC]20011:2001:DB8:2::2
```

aabb.0000.0031 VXLAN_UC PL:17(1) T:VXLAN_UC [MAC]20011:2001:DB8:3::2 <-- PL = Path-list. use this valu

```
  IP Multicast Prefix table information :
    Source: *, Group: 239.21.21.21, IIF: Null, Adjacency: Olist: 6160, Ports: 1

VTEP1#
```

show l2fib path-list 17 detail

VXLAN_UC Pathlist 17

:

topo 11

```
, 1 paths, none
  ESI: 0000.0000.0000.0000.0000
```

path 2001:DB8:3::2, type VXLAN, evni 20011, vni 20011, source MAC

```
    oce type: vxlan_header, sw_handle 0x7FA98894B318
      forwarding oce 0x7FA988AAE538 type adjacency, IPV6 midchain out of Tunnel0, addr 2001:DB8:3::2, ci
  output chain:
    oce type: evpn_vxlan_encap, sw_handle 0x7FA988938728
      oce type: vxlan_header, sw_handle 0x7FA98894B380
        forwarding oce 0x7FA988AAE538 type adjacency, IPV6 midchain out of Tunnel0, addr 2001:DB8:3::2,
```

Verify the remote MAC is programmed in the PD Mac table

<#root>

```
VTEP1#
```

show platform software fed switch active matm macTable vlan 11 mac aabb.0000.0031 detail

```
VLAN   MAC                 Type  Seq#    EC_Bi  Flags  machandle          siHandle
```

riHandle

```
            diHandle              *a_time  *e_time  ports
-------------------------------------------------------------------------------------------------------
11     aabb.0000.0031  0x1000001       0      0     64  0x7fb4687eefb8      0x7fb4687ee058
```

0x7fb4687ee7a8

```
     0x0                        0        4
```

<-- riHandle = rewrite index handle. This value holds the info on how the ASIC treats this address

```
Detailed Resource Information (ASIC_INSTANCE# 0)
----------------------------------------
Number of HTM Entries: 1
```

```
Entry 0: (handle 0x7fb4687f20b8)

Absolute Index: 2546
Time Stamp: 4
KEY - vlan:12 mac:0xaabb00000031 l3_if:0 gpn:0 epoch:0 static:0 flood_en:0 vlan_lead_wless_flood_en: 0 c
MASK - vlan:0 mac:0x0 l3_if:0 gpn:0 epoch:0 static:0 flood_en:0 vlan_lead_wless_flood_en: 0 client_home_
SRC_AD - need_to_learn:0 lrn_v:0 catchall:0 static_mac:0 chain_ptr_v:0 chain_ptr: 0 static_entry_v:0 aut
DST_AD - si:0xbf bridge:0 replicate:0 blk_fwd_o:0 v4_rmac:0 v6_rmac:0 catchall:0 ign_src_lrn:0 port_mask

==============================================================
Detailed Resource Information
```

(ASIC_INSTANCE# 0)

```
---------------------------------------

Station Index (SI) [0xbf]
RI = 0x34
DI = 0x5012
stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0
rcpServiceId = 0
dejaVuPreCheckEn = 0
Replication Bitmap: LD

Detailed Resource Information
```

(ASIC_INSTANCE# 1)

```
---------------------------------------

Station Index (SI) [0xbf]
RI = 0x34
DI = 0x5013
stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0
rcpServiceId = 0
dejaVuPreCheckEn = 0
Replication Bitmap: LD

==============================================================

VTEP1#
```

show plat hard fed sw active fwd abs print 0x7fb4687ee7a8 1

```
Handle:0x7fb4687ee7a8 Res-Type:ASIC_RSC_RI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_L2_WIRELESS
priv_ri/priv_si Handle: 0x7fb4687ee358Hardware Indices/Handles: index0:0x34  mtu_index/l3u_ri_index0:0x0
Features sharing this resource:58 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 0b 00 00 00 00 00 00 00 00 00 00 00 07 00 12 00 00 00 00 00 00 00 00 00 00 00 00

Detailed Resource Information
```

(ASIC_INSTANCE# 0)

```
---------------------------------------
```

```
ASIC#:0 RI:52 Rewrite_type:AL_RRM_REWRITE_LVX_IPV6_L2_PAYLOAD_ENCAP_EPG(233) Mapped_rii:LVX_L3_ENCAP_L2_
 Src IPv6:       2001:DB8:1::2
 Dst IPv6:       2001:DB8:3::2

 iVxlan dstMac:  0x120:0x00:0x00
 iVxlan srcMac:  0x00:0x00:0x00
 IPv6 hlim:      0
 iid present:    0
 lisp iid:       20011
 lisp flags:     0
 dst Port:       4789
 update only l3if:       0
 is Sgt:         0
 is TTL Prop:    0
 L3if LE:        54 (0)
 Port LE:        286 (0)
 Vlan LE:        12 (0)

Detailed Resource Information
(ASIC_INSTANCE# 1)

----------------------------------------
ASIC#:1 RI:52 Rewrite_type:AL_RRM_REWRITE_LVX_IPV6_L2_PAYLOAD_ENCAP_EPG(233) Mapped_rii:LVX_L3_ENCAP_L2_
 Src IPv6:       2001:DB8:1::2
 Dst IPv6:       2001:DB8:3::2
 iVxlan dstMac:  0x120:0x00:0x00
 iVxlan srcMac:  0x00:0x00:0x00
 IPv6 hlim:      0
 iid present:    0
 lisp iid:       20011
 lisp flags:     0
 dst Port:       4789
 update only l3if:       0
 is Sgt:         0
 is TTL Prop:    0
 L3if LE:        54 (0)
 Port LE:        286 (0)
 Vlan LE:        12 (0)

============================================================
```

Unicast Forwarding Between VTEPs (Different VLANs via L3VNI)

This section provides an example to troubleshoot unicast traffic

- **from host H11** connected to VTEP1 on VLAN 11 (with MAC address aabb.0000.0011 and IP 192.168.11.11)
- **to host H22** connected to VTEP2 on VLAN 12 (with MAC address aabb.0000.0022 and IP address 192.168.12.22)

Verify ARP for the default gateway is resolved on the host

<#root>

```
H11#
```

show arp

```
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  192.168.11.11           -   aabb.0000.0011  ARPA   GigabitEthernet2.11
Internet  192.168.11.254         14   0011.0011.0011  ARPA   GigabitEthernet2.11
```

Verify ARP for the destination IP address is resolved in tenant VRF on the egress VTEP

<#root>

VTEP2#

show arp vrf red

```
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  192.0.2.2              -   0050.569a.89d8  ARPA   Vlan3
Internet  192.168.12.22         27   aabb.0000.0022  ARPA   Vlan12  <-- H22 remote host
```

Verify the static entry for gateway MAC address is in MAC table on the ingress VTEP

<#root>

VTEP1#

show mac address-table static vlan 11

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

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

11    0011.0011.0011    STATIC      Vl11

Total Mac Addresses for this criterion: 1
```

Verify the host MAC is learned in MAC table on the egress VTEP

<#root>

VTEP2#

show mac address-table dynamic address aabb.0000.0022 vlan 12

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

Vlan    Mac Address       Type        Ports
```

```
----    -----------       --------    -----
  12    aabb.0000.0022    DYNAMIC     Gi1/0/2
Total Mac Addresses for this criterion: 1
```

Verify the host MAC/IP is learned in device-tracking database on egress VTEP

<#root>

VTEP2#

show device-tracking database address 192.168.12.22

Codes: L - Local, S - Static, ND - Neighbor Discovery,

ARP - Address Resolution Protocol

, DH4 - IPv4 DHCP, DH6 - IPv6 DHCP, PKT - Other Packet, API - API created
Preflevel flags (prlvl):

0001:MAC and LLA match

0002:Orig trunk

0004:Orig access

0008:Orig trusted trunk 0010:Orig trusted access 0020:DHCP assigned
0040:Cga authenticated 0080:Cert authenticated 0100:Statically assigned

Network Layer Address Link Layer Address Interface vlan

prlvl

age state Time left

ARP

192.168.12.22 aabb.0000.0022 Gi1/0/2 12

0005

31mn STALE try 0 265 s

Verify the local MAC/IP route is created in EVPN Manager on the egress VTEP

<#root>

VTEP2#

show l2vpn evpn mac ip mac aabb.0000.0022 address 192.168.12.22 detail

IP Address: 192.168.12.22
EVPN Instance: 2
Vlan: 12
MAC Address: aabb.0000.0022
Ethernet Segment: 0000.0000.0000.0000.0000
Ethernet Tag ID: 0

Next Hop(s): V:20012 GigabitEthernet1/0/2 service instance 12

```
Sequence Number:           0
IP Duplication Detection:  Timer not running
Label2 included:           Yes
```

Verify the local MAC/IP route is created in L2RIB on the egress VTEP

<#root>

```
VTEP2#
```

show l2route evpn mac ip host-ip 192.168.12.22 mac-address aabb.0000.0022 detail

```
EVPN Instance:            2
Ethernet Tag:             0
```

Producer Name: L2VPN

```
MAC Address:              aabb.0000.0022
Host IP:                  192.168.12.22
Sequence Number:          0
Label 2:                  30000
ESI:                      0000.0000.0000.0000.0000
MAC Route Flags:          B()
```

Next Hop(s):   Gi1/0/2:12

Verify the local MAC/IP route is created in BGP on the egress VTEP

Greenfield VXLANv6

<#root>

```
VTEP2#
```

show ip bgp l2vpn evpn route-type 2 0 aabb.0000.0022 192.168.12.22

```
BGP routing table entry for [2][10.2.2.3:2][0][48][AABB00000022][32][192.168.12.22]/24, version 198
Paths: (1 available, best #1, table evi_2)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  Local
    :: (via default) from 0.0.0.0 (10.2.2.1)
      Origin incomplete, localpref 100, weight 32768, valid, sourced, local, best
      EVPN ESI: 00000000000000000000, Label1 20012, Label2 30000
      Extended Community: RT:100:2 RT:100:100 ENCAP:8
        Router MAC:0050.569A.89D8
      Local irb vxlan vtep:
        vrf:red, l3-vni:30000
        local router mac:0050.569A.89D8
        core-irb interface:Vlan3
```

vtep-ip:2001:DB8:2::2

```
        sec-vtep-ip:UNKNOWN


      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 8 2022 19:15:58 UTC
```

Dual-stack

<#root>

```
VTEP2#
show ip bgp l2vpn evpn route-type 2 0 aabb.0000.0022 192.168.12.22


BGP routing table entry for [2][10.2.2.3:2][0][48][AABB00000022][32][192.168.12.22]/24, version 63
Paths: (1 available, best #1, table evi_2)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  Local
    :: (via default) from 0.0.0.0 (10.2.2.1)
      Origin incomplete, localpref 100, weight 32768, valid, sourced, local, best
      EVPN ESI: 00000000000000000000, Label1 20012, Label2 30000
      Extended Community: RT:100:2 RT:100:100 ENCAP:8
        Router MAC:0050.569A.89D8


Tunnel Encapsulation Attribute:    <--

 Tunnel encap attribute added with secondary VTEP IP


        Encap type: 8


          Secondary nexthop address 2001:DB8:2::2(active)


      Local irb vxlan vtep:
        vrf:red, l3-vni:30000
        local router mac:0050.569A.89D8
        core-irb interface:Vlan3


vtep-ip:10.2.2.2


        sec-vtep-ip:2001:DB8:2::2


      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 19 2022 00:01:58 UTC
```

Verify the remote MAC/IP route is received and import in EVI table in BGP on the

ingress VTEP

Greenfield VXLANv6

<#root>

VTEP1#

show ip bgp l2vpn evpn route-type 2 0 aabb.0000.0022 192.168.12.22

BGP routing table entry for [2][10.1.1.3:2][0][48][AABB00000022][32][192.168.12.22]/24, version 44
Paths: (1 available, best #1,

table evi_2

)
  Flag: 0x100
  Not advertised to any peer
  Refresh Epoch 2
  Local, imported path from [2][10.2.2.3:2][0][48][AABB00000022][32][192.168.12.22]/24 (global)

2001:DB8:2::2

 (metric 2) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Label1 20012, Label2 30000
      Extended Community: RT:100:2 RT:100:100 ENCAP:8
        Router MAC:0050.569A.89D8
      Originator: 10.2.2.1, Cluster list: 10.99.99.99
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 8 2022 19:25:52 UTC
BGP routing table entry for [2][10.2.2.3:2][0][48][AABB00000022][32][192.168.12.22]/24, version 42
Paths: (1 available, best #1,

table EVPN-BGP-Table

)
  Flag: 0x100
  Not advertised to any peer
  Refresh Epoch 2
  Local

2001:DB8:2::2

 (metric 2) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Label1 20012, Label2 30000
      Extended Community: RT:100:2 RT:100:100 ENCAP:8
        Router MAC:0050.569A.89D8
      Originator: 10.2.2.1, Cluster list: 10.99.99.99
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 8 2022 19:25:52 UTC

Dual-stack

<#root>

```
VTEP1#
```

show ip bgp l2vpn evpn route-type 2 0 aabb.0000.0022 192.168.12.22

```
BGP routing table entry for [2][10.1.1.3:2][0][48][AABB00000022][32][192.168.12.22]/24, version 87
Paths: (1 available, best #1,
```

table evi_2

```
)
  Not advertised to any peer
  Refresh Epoch 1
  Local, imported path from [2][10.2.2.3:2][0][48][AABB00000022][32][192.168.12.22]/24 (global)
```

2001:DB8:2::2

```
 (metric 2) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 000000000000000000, Label1 20012, Label2 30000
      Extended Community: RT:100:2 RT:100:100 ENCAP:8
        Router MAC:0050.569A.89D8
      Originator: 10.2.2.1, Cluster list: 10.99.99.99
```

Tunnel Encapsulation Attribute: <--

Tunnel encap attribute received from remote dual-stack VTEP

Encap type: 8

Secondary nexthop address 2001:DB8:2::2

```
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 19 2022 00:03:18 UTC
BGP routing table entry for [2][10.2.2.3:2][0][48][AABB00000022][32][192.168.12.22]/24, version 67
Paths: (1 available, best #1,
```

table EVPN-BGP-Table

```
)
  Not advertised to any peer
  Refresh Epoch 1
  Local
```

10.2.2.2

```
 (metric 3) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 000000000000000000, Label1 20012, Label2 30000
      Extended Community: RT:100:2 RT:100:100 ENCAP:8
        Router MAC:0050.569A.89D8
      Originator: 10.2.2.1, Cluster list: 10.99.99.99
```

Tunnel Encapsulation Attribute:

Encap type: 8

```
          Secondary nexthop address 2001:DB8:2::2(active
)
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 19 2022 00:01:59 UTC
```

Verify the host IP address is in BGP VPNv4 table for tenant VRF

Greenfield VXLANv6

<#root>

```
VTEP1#
show ip bgp vpnv4 vrf red 192.168.12.22/32


BGP routing table entry for 100:101:192.168.12.22/32, version 6
Paths: (1 available, best #1, table red)
Multipath: eiBGP
  Flag: 0x100
  Not advertised to any peer
  Refresh Epoch 2
  Local, imported path from [2][10.2.2.3:2][0][48][AABB00000022][32][192.168.12.22]/24 (global)


2001:DB8:2::2

 (metric 2) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      Extended Community: RT:100:2 RT:100:100 ENCAP:8
        Router MAC:0050.569A.89D8
      Originator: 10.2.2.1, Cluster list: 10.99.99.99
      Local vxlan vtep:
        vrf:red, vni:30000
        local router mac:0050.569A.A8BF
        encap:3


vtep-ip:2001:DB8:1::2



        sec-vtep-ip:UNKNOWN


        bdi:Vlan3
      Remote VxLAN:
        Topoid 0x2(vrf red)
        Remote Router MAC:0050.569A.89D8
        Encap 8
        Egress VNI 30000


RTEP 2001:DB8:2::2


      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 8 2022 19:25:52 UTC
```

Dual-stack

<#root>

VTEP1#

show ip bgp vpnv4 vrf red 192.168.12.22/32

BGP routing table entry for 100:101:192.168.12.22/32, version 11
Paths: (1 available, best #1, table red)
Multipath: eiBGP
  Not advertised to any peer
  Refresh Epoch 1
  Local, imported path from [2][10.2.2.3:2][0][48][AABB00000022][32][192.168.12.22]/24 (global)

2001:DB8:2::2

 (metric 2) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      Extended Community: RT:100:2 RT:100:100 ENCAP:8
        Router MAC:0050.569A.89D8
      Originator: 10.2.2.1, Cluster list: 10.99.99.99

Tunnel Encapsulation Attribute:

Encap type: 8

Secondary nexthop address 2001:DB8:2::2

      Local vxlan vtep:
        vrf:red, vni:30000
        local router mac:0050.569A.A8BF
        encap:4

vtep-ip:10.1.1.2

sec-vtep-ip:2001:DB8:1::2

        bdi:Vlan3
      Remote VxLAN:
        Topoid 0x2(vrf red)
        Remote Router MAC:0050.569A.89D8
        Encap 8
        Egress VNI 30000

RTEP 2001:DB8:2::2

      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 19 2022 00:01:59 UTC

Verify the IP-Prefix route for the access gateway for the local (imported from vrf) and remote is in the BGP EVPN global table

Greenfield VXLANv6

<#root>

```
VTEP1#
```

```
show bgp l2vpn evpn route-type 5 0 192.168.12.0 24
```

```
BGP routing table entry for [5][100:101][0][24][192.168.12.0]/17, version 9
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  Local, imported path from base
    0.0.0.0 (via vrf red) from 0.0.0.0 (10.1.1.1)
      Origin incomplete, metric 0, localpref 100, weight 32768, valid, external, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, local vtep: 0.0.0.0, VNI Label 30000, MP
      Extended Community: RT:100:100 ENCAP:8 Router MAC:0050.569A.A8BF
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 8 2022 19:25:41 UTC
BGP routing table entry for [5][100:102][0][24][192.168.12.0]/17, version 50
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Flag: 0x100
  Not advertised to any peer
  Refresh Epoch 2
  Local
    2001:DB8:2::2 (metric 2) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 30000, MPLS VPN Label 0
      Extended Community: RT:100:100 ENCAP:8 Router MAC:0050.569A.89D8
      Originator: 10.2.2.1, Cluster list: 10.99.99.99
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 8 2022 19:25:52 UTC
```

Dual-stack

<#root>

```
VTEP1#
```

```
show bgp l2vpn evpn route-type 5 0 192.168.12.0 24
```

```
BGP routing table entry for [5][100:101][0][24][192.168.12.0]/17, version 10
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  Local, imported path from base
    0.0.0.0 (via vrf red) from 0.0.0.0 (10.1.1.1)
      Origin incomplete, metric 0, localpref 100, weight 32768, valid, external, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, local vtep: 0.0.0.0, VNI Label 30000, MP
      Extended Community: RT:100:100 ENCAP:8 Router MAC:0050.569A.A8BF
```

Tunnel Encapsulation Attribute:

Encap type: 8

Secondary nexthop address 2001:DB8:1::2

```
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 18 2022 18:03:27 UTC
BGP routing table entry for [5][100:102][0][24][192.168.12.0]/17, version 24
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Flag: 0x100
  Not advertised to any peer
  Refresh Epoch 1
  Local
```

10.2.2.2

```
 (metric 3) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 30000, MPLS VPN Label 0
      Extended Community: RT:100:100 ENCAP:8 Router MAC:0050.569A.89D8
      Originator: 10.2.2.1, Cluster list: 10.99.99.99
```

Tunnel Encapsulation Attribute:

Encap type: 8

Secondary nexthop address 2001:DB8:2::2(active)

```
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 18 2022 18:03:49 UTC
```

Verify the local and remote (imported) IP-Prefix route is in the VRF table in BGP on the ingress VTEP

Greenfield VXLANv6

<#root>

VTEP1#

show bgp vpnv4 unicast vrf red 192.168.12.0

```
BGP routing table entry for 100:101:192.168.12.0/24, version 4
Paths: (2 available, best #2, table red)
Multipath: eiBGP
  Not advertised to any peer
  Refresh Epoch 2
  Local, imported path from [5][100:102][0][24][192.168.12.0]/17 (global)
    2001:DB8:2::2 (metric 2) (via default) from 2001:DB8:99::99 (10.99.99.99)
```

```
      Origin incomplete, metric 0, localpref 100, valid, internal
      Extended Community: RT:100:100 ENCAP:8 Router MAC:0050.569A.89D8
      Originator: 10.2.2.1, Cluster list: 10.99.99.99
      Local vxlan vtep:
        vrf:red, vni:30000
        local router mac:0050.569A.A8BF
        encap:3
```

vtep-ip:2001:DB8:1::2

sec-vtep-ip:UNKNOWN

```
        bdi:Vlan3
      Remote VxLAN:
        Topoid 0x2(vrf red)
        Remote Router MAC:0050.569A.89D8
        Encap 8
        Egress VNI 30000
```

RTEP 2001:DB8:2::2

```
      mpls labels in/out 20/nolabel
      rx pathid: 0, tx pathid: 0
      Updated on Apr 8 2022 19:25:52 UTC
  Refresh Epoch 1
  Local
    0.0.0.0 (via vrf red) from 0.0.0.0 (10.1.1.1)
      Origin incomplete, metric 0, localpref 100, weight 32768, valid, sourced, best
      Extended Community: RT:100:100
      Local vxlan vtep:
        vrf:red, vni:30000
        local router mac:0050.569A.A8BF
        encap:3
```

vtep-ip:2001:DB8:1::2

sec-vtep-ip:UNKNOWN

```
        bdi:Vlan3
      mpls labels in/out 20/nolabel(red)
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 8 2022 19:25:41 UTC
```

Dual-stack

<#root>

VTEP1#

show bgp vpnv4 unicast vrf red 192.168.12.0

```
BGP routing table entry for 100:101:192.168.12.0/24, version 4
Paths: (2 available, best #2, table red)
Multipath: eiBGP
  Not advertised to any peer
  Refresh Epoch 1
  Local, imported path from [5][100:102][0][24][192.168.12.0]/17 (global)


2001:DB8:2::2

 (metric 2) (via default) from 2001:DB8:99::99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal
      Extended Community: RT:100:100 ENCAP:8 Router MAC:0050.569A.89D8
      Originator: 10.2.2.1, Cluster list: 10.99.99.99


Tunnel Encapsulation Attribute:



        Encap type: 8



          Secondary nexthop address 2001:DB8:2::2


      Local vxlan vtep:
        vrf:red, vni:30000
        local router mac:0050.569A.A8BF
        encap:4


vtep-ip:10.1.1.2



        sec-vtep-ip:2001:DB8:1::2


        bdi:Vlan3
      Remote VxLAN:
        Topoid 0x2(vrf red)
        Remote Router MAC:0050.569A.89D8
        Encap 8
        Egress VNI 30000


RTEP 2001:DB8:2::2


      mpls labels in/out 20/nolabel
      rx pathid: 0, tx pathid: 0
      Updated on Apr 18 2022 18:03:49 UTC
  Refresh Epoch 1
  Local
    0.0.0.0 (via vrf red) from 0.0.0.0 (10.1.1.1)
      Origin incomplete, metric 0, localpref 100, weight 32768, valid, sourced, best
      Extended Community: RT:100:100
      Local vxlan vtep:
        vrf:red, vni:30000
        local router mac:0050.569A.A8BF
        encap:4


vtep-ip:10.1.1.2
```

```
        sec-vtep-ip:2001:DB8:1::2


        bdi:Vlan3
      mpls labels in/out 20/nolabel(red)
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 18 2022 18:03:27 UTC
```

Verify the adjacency for the core VLAN

- The adjacency for the core VLAN is created by L3EVPN

<#root>

VTEP1#

show adjacency vlan 3 detail

```
Protocol Interface                 Address
IP       Vlan3                     225.0.0.0(5)
                                   0 packets, 0 bytes
                                   epoch 0
                                   sourced in sev-epoch 1
                                   Encap length 14
                                   01005E0000000050569AA8BF0800
                                   L2 destination address byte offset 0
                                   L2 destination address byte length 6
                                   Link-type after encap: ip
                                   Multicast
IP       Vlan3                     227.0.0.0(3)
                                   connectionid 1
                                   0 packets, 0 bytes
                                   epoch 0
                                   sourced in sev-epoch 1
                                   Encap length 14
                                   01005E0000000050569AA8BF0800
                                   L2 destination address byte offset 0
                                   L2 destination address byte length 6
                                   Link-type after encap: ip
                                   Inject p2mp Multicast
```

IP   Vlan3   2001:DB8:2::2

(8)

```
                                   0 packets, 0 bytes
                                   epoch 0
                                   sourced in sev-epoch 4
                                   Encap length 14
                                   0050569A89D80050569AA8BF0800
```

VXLAN Transport tunnel

IPV6   Vlan3   2001:DB8:2::2

(8)

```
                                    0 packets, 0 bytes
                                    epoch 0
                                    sourced in sev-epoch 4
                                    Encap length 14
                                    0050569A89D80050569AA8BF86DD
```

VXLAN Transport tunnel

IP   Vlan3   2001:DB8:3::2

```
(11)
                                    0 packets, 0 bytes
                                    epoch 0
                                    sourced in sev-epoch 4
                                    Encap length 14
                                    0050569A1DB30050569AA8BF0800
```

VXLAN Transport tunnel

IPV6   Vlan3   2001:DB8:3::2

```
(11)
                                    0 packets, 0 bytes
                                    epoch 0
                                    sourced in sev-epoch 4
                                    Encap length 14
                                    0050569A1DB30050569AA8BF86DD
```

VXLAN Transport tunnel

```
IPV6     Vlan3                    FFFF::(3)
                                    connectionid 1
                                    0 packets, 0 bytes
                                    epoch 0
                                    sourced in sev-epoch 1
                                    Encap length 14
                                    333300000000050569AA8BF86DD
                                    L2 destination address byte offset 0
                                    L2 destination address byte length 6
                                    Link-type after encap: ipv6
                                    Inject p2mp Multicast
```

Verify the L2FIB unicast entry in the core VLAN

<#root>

VTEP1#

show l2fib bridge-domain 3 detail

```
Bridge Domain : 3
  Reference Count : 7
  Replication ports count : 0
```

```
  Unicast Address table size : 2
  IP Multicast Prefix table size : 0

  Flood List Information :
    Olist: 1027, Ports: 0

  Unicast Address table information :
    0050.569a.1db3  VXLAN_UC
```

PL:11

```
(1) T:VXLAN_UC [MAC]30000:
```

2001:DB8:3::2 <-- PL = path-list. Use these values in the next path-list command

```
    0050.569a.89d8  VXLAN_UC
```

PL:7

```
(1) T:VXLAN_UC [MAC]30000:
```

2001:DB8:2::2

```
VTEP1#
```

show l2fib path-list 11 detail

```
VXLAN_UC
```

Pathlist 11

```
: topo 3, 1 paths, none
  ESI: 0000.0000.0000.0000.0000
  path
```

2001:DB8:3::2

```
, type VXLAN, evni 30000, vni 30000, source MAC
    oce type: vxlan_header, sw_handle 0x7F262F466920
      forwarding oce 0x7F262F50A448 type adjacency, IPV6 midchain out of Tunnel0, addr
```

2001:DB8:3::2

```
, cid: 1
  output chain:
    oce type: evpn_vxlan_encap, sw_handle 0x7F262F484840
      oce type: vxlan_header, sw_handle 0x7F262F466988
        forwarding oce 0x7F262F50A448 type adjacency, IPV6 midchain out of Tunnel0, addr
```

2001:DB8:3::2

```
, cid: 1

VTEP1#
```

show l2fib path-list 7 detail

```
VXLAN_UC
```

Pathlist 7

```
: topo 3, 1 paths, none
```

```
  ESI: 0000.0000.0000.0000.0000
  path
```

2001:DB8:2::2

```
, type VXLAN, evni 30000, vni 30000, source MAC
    oce type: vxlan_header, sw_handle 0x7F262F466B90
      forwarding oce 0x7F262ED39BF8 type adjacency, IPV6 midchain out of Tunnel0, addr
```

2001:DB8:2::2

```
, cid: 1
  output chain:
    oce type: evpn_vxlan_encap, sw_handle 0x7F262F484930
      oce type: vxlan_header, sw_handle 0x7F262F466BF8
        forwarding oce 0x7F262ED39BF8 type adjacency, IPV6 midchain out of Tunnel0, addr
```

2001:DB8:2::2

```
, cid: 1
```

Verify the host route is installed in IP routing table for the tenant VRF on the ingress VTEP

<#root>

```
VTEP1#
```

show ip route vrf red 192.168.12.22

```
Routing Table: red
Routing entry for 192.168.12.22/32
  Known via "bgp 100", distance 200, metric 0, type internal
  Last update from
```

2001:DB8:2::2

```
 on Vlan3, 00:37:49 ago
  Routing Descriptor Blocks:
  *
```

2001:DB8:2::2

(red:ipv6),

```
 from 2001:DB8:99::99, 00:37:49 ago, via Vlan3
      opaque_ptr 0x7FC009408C68
      Route metric is 0, traffic share count is 1
      AS Hops 0
      MPLS label: none
      MPLS Flags: NSF
```

Verify the CEF forwarding chain is built properly for the host route in the tenant VRF on the ingress VTEP

<#root>

```
VTEP1#
```

show ip cef vrf red 192.168.12.22 internal

```
192.168.12.22/32, epoch 1, flags [rnolbl, rlbls], RIB[B], refcnt 6, per-destination sharing
  sources: RIB
  feature space:
    IPRM: 0x00018000
    Broker: linked, distributed at 3rd priority
  ifnums:
    Vlan3(25):
```

2001:DB8:2::2

```
  path list 7FC008D9C400, 5 locks, per-destination, flags 0x249 [shble, rif, hwcn, bgp]
    path 7FC00874B5D8, share 1/1, type attached nexthop, for IPv4
```

nexthop 2001:DB8:2::2 Vlan3

```
, IP adj out of Vlan3,
```

addr 2001:DB8:2::2

```
 7FC009A11360
  output chain:
```

IP adj out of Vlan3

```
,
```

addr 2001:DB8:2::2

```
 7FC009A11360
```

Verify the route in the PD forwarding table on the ingress VTEP

<#root>

```
VTEP1#
```

show platform software fed swith active ip route vrf red 192.168.12.22/32 detail

```
vrf   dest                                        htm            flags   SGT   DGID MPLS Last-modifiec
---   ----                                        ---            -----   ---   ---- ---- -------------
2     192.168.12.22/32                            0x7fb4687e5e68 0x0     0     0         2022/04/08 19
  FIB: prefix_hdl:0xd8000042, mpls_ecr_prefix_hdl:0, sgtOverWrite: 0
  ========== OCE chain =====
  ADJ:
```

objid:138

```
 {link_type:IP ifnum:0x19, adj:0x8c000041, si: 0x7fb4687e1c18  IPv4:     2.0.205.171 }
  ===============
  MPLS info: mpls_ecr_scale_prefix_adj:0, mpls_lspa_hdl:0
  ===============

Hardware entry details
----------------------
```

```
Handle:0x7fb4687e5e68 Res-Type:ASIC_RSC_HASH_TCAM Res-Switch-Num:0 Asic-Num:255 Feature-ID:AL_FID_L3_UNI
priv_ri/priv_si Handle:(nil) Hardware Indices/Handles: handle0:0x7fb4687e6078
Features sharing this resource:

Brief Resource Information
```

(ASIC_INSTANCE# 0)

```
---------------------------------------
Number of HTM Entries: 1

Entry #0: (handle 0x7fb4687e6078)
KEY - vrf:2 mtr:0 prefix:192.168.12.22 rcp_redirect_index:0x0
MASK - vrf:0 mtr:0 prefix:0.0.0.0 rcp_redirect_index:0x0
FWD-AD = afd_label_flag:0 icmp_redir_enable:1 lvx_smr_enabled:0, dstNatType:0 priority:5 afdLabelOrDestC
SRC-AD:learning_violation:0 need_to_learn:0  locally_connected:0 staticentryViolation:0
rpfValid:1 rpfLe:45 rpfLePointer:0 rpfForcePass:0 rpfForceFail:0 reachableviaSome:1 rpfCheckIncomplete:0
sgtValid:0 sgtOverwrite:0 sgt:0 ipClientLabel:0
 src_rloc_trusted:0, sgtCacheControl1:0, sgtCacheControl0:0
port_label:0x0 port_mask:0x0 vlan_label:0x0 vlan_mask:0x0 l3if_label:0x0 l3if_mask:0x0 group_label:0x0 g

============================================================

Asic       SI-Index             DI-Index
----       --------             -------
0          190                  0x5012
Detailed Resource Information
```

(ASIC# 0)

```
---------------------------------------

Station Index (SI) [0xbe]
```

RI = 0x3e

```
DI = 0x5012
Replication Bitmap: LD

Destination index   = 0x5012 DI_RCP_PORT1
pmap                = 0x00000000 0x00000000
rcp_pmap            = 0x1
Asic       SI-Index             DI-Index
----       --------             -------
1          190                  0x5012
Detailed Resource Information (ASIC# 1)
---------------------------------------

Station Index (SI) [0xbe]
RI = 0x3e
DI = 0x5013
Replication Bitmap: LD

Destination index   = 0x5012 DI_RCP_PORT1
pmap                = 0x00000000 0x00000000

VTEP1#
```

show plat sof fed sw active ip adj | inc 0x8a

2001:DB8:2::2

Vlan3 0050.569a.89d8 0x7fb4687e1c18

0x7fb4687e2008

0x0 0x8a 2022/04/08 19:25:53.068

VTEP1#

show plat hard fed sw active fwd abs print 0x7fb4687e2008 1

Handle:0x7fb4687e2008 Res-Type:ASIC_RSC_RI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_L3_UNICAST_
priv_ri/priv_si Handle: 0x7fb4687e52c8Hardware Indices/Handles: index0:0x3e mtu_index/l3u_ri_index0:0x2

index1:0x3e

mtu_index/l3u_ri_index1:0x23
Features sharing this resource:66 (1)]
67 (1)]
58 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 03 00 00 00 00 00 00 00 00 00 00 00 07 00 00 50 56 9a 89 d8 00 00 00 00 00 00 00

Detailed Resource Information (ASIC_INSTANCE# 0)

ASIC#:0 RI:62 Rewrite_type:AL_RRM_REWRITE_LVX_IPV6_L2_PAYLOAD_ENCAP_EPG(233) Mapped_rii:LVX_L3_ENCAP_L2_

Src IPv6: 2001:DB8:1::2

Dst IPv6: 2001:DB8:2::2

iVxlan dstMac: 0x050:0x569a:0x89d8

<-- MAC dest address 0050.569a.89d8

iVxlan srcMac: 0x00:0x00:0x00
IPv6 hlim: 0
iid present: 0
lisp iid: 30000
lisp flags: 0
dst Port: 4789
update only l3if: 0
is Sgt: 0
is TTL Prop: 0
L3if LE: 52 (0)
Port LE: 284 (0)
Vlan LE: 5 (0)

Detailed Resource Information

(ASIC_INSTANCE# 1)

ASIC#:1 RI:62 Rewrite_type:AL_RRM_REWRITE_LVX_IPV6_L2_PAYLOAD_ENCAP_EPG(233) Mapped_rii:LVX_L3_ENCAP_L2_

Src IPv6: 2001:DB8:1::2

```
 Dst IPv6:       2001:DB8:2::2


 iVxlan dstMac:  0x050:0x569a:0x89d8  <-- MAC dest address 0050.569a.89d8


 iVxlan srcMac:  0x00:0x00:0x00
 IPv6 hlim:      0
 iid present:    0
 lisp iid:       30000
 lisp flags:     0
 dst Port:       4789
 update only l3if:       0
 is Sgt:         0
 is TTL Prop:    0
 L3if LE:        52 (0)
 Port LE:        284 (0)
 Vlan LE:        5 (0)

============================================================
```

EVPN Handoff Between Border Leaf and MPLS VPN Router

This section is applicable for both L3VPN handoff and Multi VRF handoff (VRF lite/PE-CE)

Verify the IP Prefix on remote VPN Router(R1) advertised to Border-Leaf(vtep3) in the EVPN fabric

- VPN Node R1 has an MPLS underlay, it is a single stack. The Border-leaf node Leaf3 and rest of the EVPN fabric can be in either single stack or dual-stack mode,

Check these things if there is a traffic issue with **EVPN Route-type 5 (RT5):**

Step 1. **Confirm** RT5 route is in EVPN global table

Step 2. **Verify** the route is imported into VRF

- Must have the import RT configured for the VRF.
- Stitching Route-Target (RT) for a handoff scenario on border-leaf/border-spine
- Ensure BGP EVPN config â€œadvertise l2vpn evpnâ€ is present in the address-family vrf
- Ensure correct import configuration is done on the address-family l2vpn evpn and vpnv4/vpnv6 ror L3VPN handoff (on border node) as shown here:

<#root>

```
vrf definition red
 rd 100:103
 !
 address-family ipv4
  route-target export 10:100


  route-target import 10:100
```

```
  route-target export 100:100 stitching


  route-target import 100:100 stitching


 exit-address-family
 !
 address-family ipv6
  route-target export 10:200


  route-target import 10:200


  route-target export 100:200 stitching


  route-target import 100:200 stitching


 exit-address-family
!
router bgp 100
 neighbor 10.5.0.1 remote-as 10
 neighbor 10.99.99.99 remote-as 100
 neighbor 10.99.99.99 update-source Loopback0
 neighbor 2001:DB8:99::99 remote-as 100
 neighbor 2001:DB8:99::99 update-source Loopback0
 !
 address-family vpnv4
  import l2vpn evpn re-originate


  neighbor 10.5.0.1 activate
  neighbor 10.5.0.1 send-community both
 exit-address-family
 !
 address-family vpnv6
  import l2vpn evpn re-originate


  neighbor 10.5.0.1 activate
  neighbor 10.5.0.1 send-community both
 exit-address-family
 !
 address-family l2vpn evpn
 import vpnv4 unicast re-originate


  import vpnv6 unicast re-originate


  neighbor 10.99.99.99 activate
  neighbor 10.99.99.99 send-community both
  neighbor 2001:DB8:99::99 activate
```

```
 neighbor 2001:DB8:99::99 send-community both
exit-address-family
!
address-family ipv4 vrf red
advertise l2vpn evpn


redistribute connected
exit-address-family
!
address-family ipv6 vrf red
redistribute connected


advertise l2vpn evpn
exit-address-family
```

Step 3. **Check** the local VTEP status with this command

<#root>

VTEP3

#show bgp l2vpn evpn local-vtep vrf red

```
Local VTEP vrf red:

 Protocol: IPv4
   RMAC Address: AABB.CC81.F700
   VTEP-IP:10.3.3.2


   SEC-VTEP-IP:2001:DB8:3::2


   VNI: 30000
   BDI:Vlan3

 Protocol: IPv6
   RMAC Address: AABB.CC81.F700
   VTEP-IP:10.3.3.2


   SEC-VTEP-IP:2001:DB8:3::2


   VNI: 30000
   BDI:Vlan3
```

Step 4. **Check** the Remote Nexthop (RNH) is installed for the VRF.

- RNH ensures the adjacency for the route installed in the RIB.

- BGP installs the RT5 route in the BGP VPN table, which is then installed in the corresponding VRF IP table.
    - The installed nexthopâ€™s adjacency is ensured by the remote VTEPâ€™s parameters (such as RMAC, eVNI and RTEP). RTEP would be same as the nexthop address of the route.
    - BGP installs the RNH in the L3-EVPN/NVE directly.

When RNH is not correct, CEF entry for the routes would have incomplete adjacency.

- In a dual-stack scenario, you need to check whether the nexthop for the Route and RNH RTEP (remote tunnel endpoint) are the same.

When a route is not installed or installed route has incomplete adjacency, check for the RNH parameters and correlate with configuration in the local node and the value of the parameters in the route.

<#root>

VTEP3#

show bgp l2vpn evpn rnh vrf red

Remote VTEP entries for vrf red:

Protocol: ipv4

[VNI / RMAC ADDRESS / VTEP-IP / Installed]
[30000 / AABB.CC81.F500 /

2001:DB8:1::2

/ yes]
[30000 / AABB.CC81.F600 /

2001:DB8:2::2

/ yes]

Protocol: ipv6

[VNI / RMAC ADDRESS / VTEP-IP / Installed]
[30000 / AABB.CC81.F600 /

2001:DB8:2::2

/ yes]
[30000 / AABB.CC81.F500 /

2001:DB8:1::2

/ yes]

Step 5: **Check** the NVE peer status

- NVE peer status is up when BGP receives a route from the remote peer and is installed correctly into the RIB and L3-EVPN/NVE subsystem.

<#root>

VTEP3#

show nve peers

'M' - MAC entry download flag 'A' - Adjacency download flag
'4' - IPv4 flag '6' - IPv6 flag

Interface VNI   Type Peer-IP   RMAC/Num_RTs   eVNI

state

 flags UP time
nve1   30000   L3CP 2001:DB8:1::2   aabb.cc81.f500 30000

UP

  A/M/4 08:52:46
nve1   30000   L3CP 2001:DB8:2::2   aabb.cc81.f600 30000

UP

  A/-/4 08:51:41
nve1   30000   L3CP 2001:DB8:1::2   aabb.cc81.f500 30000

UP

  A/-/6 08:52:46
nve1   30000   L3CP 2001:DB8:2::2   aabb.cc81.f600 30000

UP

  A/M/6 08:51:41
nve1   20011   L2CP 2001:DB8:1::2   6   20011

UP

   N/A 08:52:09
nve1   20011   L2CP 2001:DB8:2::2   5   20011

UP

   N/A 08:52:09

Verify prefix is in VPNv4 table

<#root>

R1#

show ip route vrf red 10.10.10.0   <-- prefix in Routing table

Routing Table: red
Routing entry for 10.10.10.0/24
  Known via "connected", distance 0, metric 0 (connected, via interface)
  Redistributing via ospfv3 1, bgp 10
  Advertised by bgp 10
  Routing Descriptor Blocks:
  * directly connected, via Loopback0

```
      Route metric is 0, traffic share count is 1

R1#
```

`show bgp vpnv4 unicast vrf red 10.10.10.0/24  <-- prefix added to VPNv4 table`

```
BGP routing table entry for 10:100:10.10.10.0/24, version 34
Paths: (1 available, best #1, table red)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  Local
    0.0.0.0 (via vrf red) from 0.0.0.0 (10.5.1.1)
      Origin incomplete, metric 0, localpref 100, weight 32768, valid, sourced, best
      Extended Community: RT:10:100 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0
      mpls labels in/out 18/nolabel(red)
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 4 2022 16:54:32 PST
```

Verify prefix is in VPNv6 table

<#root>

```
R1#
```

`show ipv6 route vrf red 2001:DB8:10::/128         <-- prefix is in Routing table`

```
Routing entry for 2001:DB8:10::/128
  Known via "connected", distance 0, metric 0, type receive, connected
  Redistributing via ospf 1, bgp 10
  Route count is 1/1, share count 0
  Routing paths:
    receive via Loopback0
      Route metric is 0, traffic share count is 1
      Last updated 06:59:56 ago

R1#
```

`show bgp vpnv6 unicast vrf red 2001:DB8:10::/128 <-- Prefix added to VPNv6 table`

```
BGP routing table entry for [10:100]2001:DB8:10::/128, version 2
Paths: (1 available, best #1, table red)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  Local
    :: (via vrf red) from 0.0.0.0 (10.5.1.1)
      Origin incomplete, metric 0, localpref 100, weight 32768, valid, sourced, best
      Extended Community: RT:10:200 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0
      mpls labels in/out 17/nolabel(red)
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 25 2022 04:16:12 PST
```

Verify IP Prefix on Border-Leaf (VTEP3) in the EVPN fabric

(Greenfield: VxLANv6) **verify** prefix is in VPNv4 table

<#root>

VTEP3#

show bgp vpnv4 unicast vrf red 10.10.10.0/24

BGP routing table entry for 100:103:10.10.10.0/24, version 31
Paths: (1 available, best #1,

table red

)
  Not advertised to any peer
  Refresh Epoch 1
  10, imported path from 10:100:10.10.10.0/24 (global)

10.5.0.1

(via default) from 10.5.0.1 (10.5.1.1)
      Origin incomplete, metric 0, localpref 100, valid, external, best
      Extended Community: RT:10:100 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0
      Local vxlan vtep:
        vrf:red, vni:30000
        local router mac:AABB.CC81.F700
        encap:5

vtep-ip:2001:DB8:3::2

sec-vtep-ip:UNKNOWN

bdi:Vlan3
      mpls labels in/out nolabel/18
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 4 2022 16:54:50 PST

(Dual-stack: Prefer IPv6) **verify** prefix is in VPNv4 table

<#root>

VTEP3#

show bgp vpnv4 unicast vrf red 10.10.10.0/24

BGP routing table entry for 100:103:10.10.10.0/24, version 30

```
Paths: (1 available, best #1, table red)
  Not advertised to any peer
  Refresh Epoch 1
  10, imported path from 10:100:10.10.10.0/24 (global)
    10.5.0.1 (via default) from 10.5.0.1 (10.5.1.1)
      Origin incomplete, metric 0, localpref 100, valid, external, best
      Extended Community: RT:10:100 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0
      Local vxlan vtep:
        vrf:red, vni:30000
        local router mac:AABB.CC81.F700
        encap:4
        vtep-ip:10.3.3.2
        sec-vtep-ip:2001:DB8:3::2
        bdi:Vlan3
      mpls labels in/out nolabel/18
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 25 2022 04:30:45 PST
```

Verify prefix is in VPNv6 table

<#root>

```
VTEP3#
show bgp vpnv6 unicast vrf red 2001:DB8:10::/128

BGP routing table entry for [100:103]2001:DB8:10::/128, version 12
Paths: (1 available, best #1, table red)
  Not advertised to any peer
  Refresh Epoch 1
  10, imported path from [10:100]2001:DB8:10::/128 (global)
    ::FFFF:10.5.0.1 (via default) from 10.5.0.1 (10.5.1.1)
      Origin incomplete, metric 0, localpref 100, valid, external, best
      Extended Community: RT:10:200 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0
      Local vxlan vtep:
        vrf:red, vni:30000
        local router mac:AABB.CC81.F700
        encap:4
        vtep-ip:10.3.3.2
        sec-vtep-ip:2001:DB8:3::2
        bdi:Vlan3
      mpls labels in/out nolabel/17
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 25 2022 04:17:32 PST
```

Verify IP Prefix is imported from VPN into EVPN on Border-Leaf (VTEP3)

<#root>

```
VTEP3#
show bgp l2vpn evpn rnh vrf red


Remote VTEP entries for vrf red:


 Protocol: ipv4


[VNI / RMAC ADDRESS / VTEP-IP / Installed]
[30000 / AABB.CC81.F500 /
2001:DB8:1::2
 / yes]
[30000 / AABB.CC81.F600 /
2001:DB8:2::2
 / yes]


 Protocol: ipv6


[VNI / RMAC ADDRESS / VTEP-IP / Installed]
[30000 / AABB.CC81.F600 /
2001:DB8:2::2
 / yes]
[30000 / AABB.CC81.F500 /
2001:DB8:1::2
 / yes]
```

(Greenfield: VxLANv6) **verify** prefix is in EVPNv4 table

<#root>

```
VTEP3#
show bgp l2vpn evpn route-type 5 0 10.10.10.0 24


BGP routing table entry for [5][100:103][0][24][10.10.10.0]/17, version 167
Paths: (1 available, best #1,
table EVPN-BGP-Table
)
  Advertised to update-groups:
     2
  Refresh Epoch 1
  10, imported path from base


10.5.0.1
 (via default) from 10.5.0.1 (10.5.1.1)
```

```
      Origin incomplete, metric 0, localpref 100, valid, external, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, local vtep: 0.0.0.0, VNI Label 30000, MP
      Extended Community: RT:100:100 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 4 2022 16:54:50 PST
```

(Dual-stack: Prefer IPv6) **verify** prefix is in EVPNv4 table

<#root>

```
VTEP3#show bgp l2vpn evpn route-type 5 0 10.10.10.0 24


BGP routing table entry for [5][100:103][0][24][10.10.10.0]/17, version 132
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  10, imported path from base
    10.5.0.1 (via default) from 10.5.0.1 (10.5.1.1)
      Origin incomplete, metric 0, localpref 100, valid, external, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, local vtep: 0.0.0.0, VNI Label 30000, MP
      Extended Community: RT:100:100 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
      Tunnel Encapsulation Attribute:


        Encap type: 8


          Secondary nexthop address 2001:DB8:3::2(inaccessible)


      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 25 2022 04:30:45 PST
```

Verify prefix is in EVPNv6 table

<#root>

```
VTEP3#show bgp l2vpn evpn route-type 5 0 2001:DB8:10::128


BGP routing table entry for [5][100:103][0][128][2001:DB8:10::]/29, version 74
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  10, imported path from base
    ::FFFF:10.5.0.1 (via default) from 10.5.0.1 (10.5.1.1)
      Origin incomplete, metric 0, localpref 100, valid, external, best
      EVPN ESI: 00000000000000000000, Gateway Address: ::, local vtep: 0.0.0.0, VNI Label 30000, MPLS VP
      Extended Community: RT:100:200 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
```

```
      Tunnel Encapsulation Attribute:
        Encap type: 8
```

Secondary nexthop address 2001:DB8:3::2(inaccessible)

```
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 25 2022 04:17:52 PST
```

Verify IP Prefix imported from VPN into EVPN on Border-Leaf (VTEP 3)

<#root>

VTEP3#show bgp l2vpn evpn rnh vrf red

```
Remote VTEP entries for vrf red:
```

Protocol: ipv4

```
[VNI / RMAC ADDRESS / VTEP-IP / Installed]
[30000 / AABB.CC81.F500 /
```

2001:DB8:1::2

```
 / yes]
[30000 / AABB.CC81.F600 /
```

2001:DB8:2::2

```
 / yes]
```

Protocol: ipv6

```
[VNI / RMAC ADDRESS / VTEP-IP / Installed]
[30000 / AABB.CC81.F600 /
```

2001:DB8:2::2

```
 / yes]
[30000 / AABB.CC81.F500 /
```

2001:DB8:1::2

```
/ yes]
```

(Greenfield: VxLANv6) **verify** prefix is in EVPNv4 table

<#root>

VTEP3#show bgp l2vpn evpn route-type 5 0 10.10.10.0 24

```
BGP routing table entry for [5][100:103][0][24][10.10.10.0]/17, version 167
```

```
Paths: (1 available, best #1,
```

table EVPN-BGP-Table

```
)
  Advertised to update-groups:
     2
  Refresh Epoch 1
  10, imported path from base
```

10.5.0.1

```
 (via default) from 10.5.0.1 (10.5.1.1)
      Origin incomplete, metric 0, localpref 100, valid, external, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, local vtep: 0.0.0.0, VNI Label 30000, MP
      Extended Community: RT:100:100 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 4 2022 16:54:50 PST
```

(Dual-stack: Prefer IPv6) **verify** prefix is in EVPNv4 table

<#root>

VTEP3#show bgp l2vpn evpn route-type 5 0 10.10.10.0 24

```
BGP routing table entry for [5][100:103][0][24][10.10.10.0]/17, version 132
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  10, imported path from base
    10.5.0.1 (via default) from 10.5.0.1 (10.5.1.1)
      Origin incomplete, metric 0, localpref 100, valid, external, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, local vtep: 0.0.0.0, VNI Label 30000, MP
      Extended Community: RT:100:100 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
```

Tunnel Encapsulation Attribute:

Encap type: 8

Secondary nexthop address 2001:DB8:3::2(inaccessible)

```
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 25 2022 04:30:45 PST
```

Verify prefix is in EVPNv6 table

<#root>

```
VTEP3#
```

show bgp l2vpn evpn route-type 5 0 2001:10:: 128

```
BGP routing table entry for [5][100:103][0][128][2001:10::]/29, version 74
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  10, imported path from base
    ::FFFF:10.5.0.1 (via default) from 10.5.0.1 (10.5.1.1)
      Origin incomplete, metric 0, localpref 100, valid, external, best
      EVPN ESI: 00000000000000000000, Gateway Address: ::, local vtep: 0.0.0.0, VNI Label 30000, MPLS VP
      Extended Community: RT:100:200 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
      Tunnel Encapsulation Attribute:
        Encap type: 8
          Secondary nexthop address 2001:DB8:3::2(inaccessible)
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 25 2022 04:17:52 PST
```

Verify EVPN IP Prefix Received From Border Leaf and Advertised to Other VTEPs

(Greenfield: VxLANv6) **verify** prefix is in EVPNv4 table

<#root>

SPINE#

show bgp l2 evpn route-type 5 0 10.10.10.0 24

```
BGP routing table entry for [5][100:103][0][24][10.10.10.0]/17, version 45
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Advertised to update-groups:
     2
  Refresh Epoch 1
  10, (Received from a RR-client)
```

2001:DB8:3::2

```
 (metric 10) (via default) from 10.3.3.1 (10.3.3.1)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 30000, MPLS VPN Label 0
      Extended Community: RT:100:100 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 4 2022 19:36:59 EST
```

(Dual-stack: Prefer IPv6) **verify** prefix is in EVPNv4 table

<#root>

SPINE#

show bgp l2 evpn route-type 5 0 10.10.10.0 24

```
BGP routing table entry for [5][100:103][0][24][10.10.10.0]/17, version 103
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  10, (Received from a RR-client)
    10.3.3.2 (metric 11) (via default) from 10.3.3.1 (10.3.3.1)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 30000, MPLS VPN Label 0
      Extended Community: RT:100:100 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
      Tunnel Encapsulation Attribute:
        Encap type: 8
          Secondary nexthop address 2001:DB8:3::2(active)
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 25 2022 07:30:45 EST
```

Verify prefix is in EVPNv6 table

<#root>

```
SPINE#
show bgp l2 ev route 5 0 2001:10::128

BGP routing table entry for [5][100:103][0][128][2001:10::]/29, version 70
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  10, (Received from a RR-client)
    10.3.3.2 (metric 11) (via default) from 10.3.3.1 (10.3.3.1)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Gateway Address: ::, VNI Label 30000, MPLS VPN Label 0
      Extended Community: RT:100:200 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
      Tunnel Encapsulation Attribute:
        Encap type: 8
          Secondary nexthop address 2001:DB8
:3::2(active)
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 25 2022 07:17:53 EST
```

Verify EVPN IP Prefix in the Remote VTEP Global Table

<#root>

VTEP1#

show bgp l2vpn evpn rnh vrf red

Remote VTEP entries for vrf red:

Protocol: ipv4

[VNI / RMAC ADDRESS / VTEP-IP / Installed]
[30000 / AABB.CC81.F600 /

2001:DB8:2::2

 / yes]
[30000 / AABB.CC81.F700 /

2001:DB8:3::2

 / yes]

Protocol: ipv6

[VNI / RMAC ADDRESS / VTEP-IP / Installed]
[30000 / AABB.CC81.F600 /

2001:DB8:2::2

 / yes]
[30000 / AABB.CC81.F700 /

2001:DB8:3::2

 / yes]

(Greenfield: VxLANv6) **verify** prefix is in EVPNv4 table

<#root>

VTEP1#

show bgp l2vpn evpn route-type 5 0 10.10.10.0 24

BGP routing table entry for [5][100:103][0][24][10.10.10.0]/17, version 219
Paths: (1 available, best #1,

table EVPN-BGP-Table

)
  Not advertised to any peer
  Refresh Epoch 1
  10

2001:DB8:3::2

```
 (metric 20) (via default) from 10.99.99.99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 30000, MPLS VPN Label 0
      Extended Community: RT:100:100 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
      Originator: 10.3.3.1, Cluster list: 10.99.99.99
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 4 2022 16:54:50 PST
```

(Dual-stack: Prefer IPv6) **verify** prefix is in EVPNv4 table

<#root>

VTEP1#

show bgp l2 ev route-type 5 0 10.10.10.0 24

```
BGP routing table entry for [5][100:103][0][24][10.10.10.0]/17, version 159
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Not advertised to any peer
  Refresh Epoch 1
  10
    10.3.3.2 (metric 21) (via default) from 10.99.99.99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 30000, MPLS VPN Label 0
      Extended Community: RT:100:100 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
      Originator: 10.3.3.1, Cluster list: 10.99.99.99
```

Tunnel Encapsulation Attribute:

Encap type: 8

Secondary nexthop address 2001:DB8

:3::2(active)

```
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 25 2022 04:30:45 PST
```

Verify prefix is in EVPNv6 table

<#root>

VTEP1#

show bgp l2 ev route-type 5 0 2001:10:: 128

```
BGP routing table entry for [5][100:103][0][128][2001:10::]/29, version 105
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Not advertised to any peer
  Refresh Epoch 1
  10
    10.3.3.2 (metric 21) (via default) from 10.99.99.99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Gateway Address: ::, VNI Label 30000, MPLS VPN Label 0
      Extended Community: RT:100:200 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
      Originator: 10.3.3.1, Cluster list: 10.99.99.99
      Tunnel Encapsulation Attribute:
        Encap type: 8
          Secondary nexthop address 2001:DB8:3::2(active)
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 25 2022 04:17:53 PST
```

Verify Imported VPN Prefix in Remote VTEP VPN/VRF Table

(Greenfield: VxLANv6) **verify** prefix is in VPNv4 table

<#root>

```
VTEP1#
show bgp vpnv4 unicast vrf red 10.10.10.0/24

BGP routing table entry for 100:101:10.10.10.0/24, version 64
Paths: (1 available, best #1,
table red
)
  Not advertised to any peer
  Refresh Epoch 1
  10,
imported path from [5][100:103][0][24][10.10.10.0]/17
 (global)
    2001:DB8:3::2 (metric 20) (via default) from 10.99.99.99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      Extended Community: RT:100:100 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
      Originator: 10.3.3.1, Cluster list: 10.99.99.99
      Local vxlan vtep:
        vrf:red, vni:30000
        local router mac:AABB.CC81.F500
        encap:3
     vtep-ip:2001:DB8:1::2
```

```
        sec-vtep-ip:UNKNOWN




     bdi:Vlan3
      Remote VxLAN:
        Topoid 0x1(vrf red)
        Remote Router MAC:AABB.CC81.F700
        Encap 8
        Egress VNI 30000


     RTEP 2001:DB8:3::2




   rx pathid: 0, tx pathid: 0x0
      Updated on Apr 4 2022 20:51:55 PST
```

(Dual-stack: Prefer IPv6) **verify** prefix is in VPNv4 table

<#root>

```
VTEP1#
show bgp vpnv4 unicast vrf red 10.10.10.0/24


BGP routing table entry for 100:101:10.10.10.0/24, version 21
Paths: (1 available, best #1, table red)
  Not advertised to any peer
  Refresh Epoch 1
  10, imported path from [5][100:103][0][24][10.10.10.0]/17 (global)
    2001:DB8:3::2 (metric 20) (via default) from 10.99.99.99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      Extended Community: RT:100:100 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
      Originator: 10.3.3.1, Cluster list: 10.99.99.99
      Tunnel Encapsulation Attribute:


        Encap type: 8


          Secondary nexthop address 2001:DB8:3::2(inaccessible)


      Local vxlan vtep:
        vrf:red, vni:30000
        local router mac:AABB.CC81.F500
        encap:4
        vtep-ip:10.1.1.2
```

```
        sec-vtep-ip:ABCC:1::2


        bdi:Vlan3
      Remote VxLAN:
        Topoid 0x1(vrf red)
        Remote Router MAC:AABB.CC81.F700
        Encap 8
        Egress VNI 30000

        RTEP 2001:DB8:3::2


      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 25 2022 04:30:45 PST
```

Verify prefix is in VPNv6 table

<#root>

VTEP1#

```
show bgp vpnv6 unicast vrf red 2001:10::/128


BGP routing table entry for [100:101]2001:10::/128, version 16
Paths: (1 available, best #1, table red)
  Flag: 0x100
  Not advertised to any peer
  Refresh Epoch 1
  10, imported path from [5][100:103][0][128][2001:10::]/29 (global)
    2001:DB8:3::2 (via default) from 10.99.99.99 (10.99.99.99)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      Extended Community: RT:100:200 OSPF ROUTER ID:10.10.10.0:0
        OSPF RT:0.0.0.0:2:0 ENCAP:8 Router MAC:AABB.CC81.F700
      Originator: 10.3.3.1, Cluster list: 10.99.99.99


 Tunnel Encapsulation Attribute:


        Encap type: 8


          Secondary nexthop address 2001:DB8:3::2(inaccessible)


      Local vxlan vtep:
        vrf:red, vni:30000
        local router mac:AABB.CC81.F500
        encap:4

        vtep-ip:10.1.1.2


        sec-vtep-ip:ABCC:1::2


        bdi:Vlan3
      Remote VxLAN:
```

```
        Topoid 0x1E000001(vrf red)
        Remote Router MAC:AABB.CC81.F700
        Encap 8
        Egress VNI 30000
```

```
 RTEP 2001:DB8:3::2
```

```
      rx pathid: 0, tx pathid: 0x0
      Updated on Apr 25 2022 04:17:53 PST
```

Verify Imported VPN Prefix in Remote VTEP IP VRF Table

Verify prefix is in VPNv4 routing table

<#root>

VTEP1#

show ip route vrf red 10.10.10.0

```
Routing Table: red
Routing entry for 10.10.10.0/24
  Known via "bgp 100", distance 200, metric 0
  Tag 10, type internal
  Last update from 2001:DB8:3::2 on Vlan3, 00:26:36 ago
  Routing Descriptor Blocks:
  * 2001:DB8:3::2 (red:ipv6), from 10.99.99.99, 00:26:36 ago, via Vlan3
      opaque_ptr 0x7F555D459A38
      Route metric is 0, traffic share count is 1
      AS Hops 1
      Route tag 10
      MPLS label: none
```

Verify prefix is in VPNv6 routing table

<#root>

VTEP1#

show ipv6 route vrf red 2001:10::/128

```
Routing entry for 2001:10::/128
  Known via "bgp 100", distance 200, metric 0
  Tag 10, type internal
  Route count is 1/1, share count 0
  Routing paths:
    2001:DB8:3::2%default, Vlan3%default
      Route metric is 0, traffic share count is 1
      MPLS label: nolabel
      From 10.99.99.99
      opaque_ptr 0x7F555D499A68
      Last updated 08:19:05 ago
```

Debug Commands

List of relevant debugs that can be enabled when troubleshooting EVPN VXLANv6 issues

BGP

Verify the route exchange between BGP EVPN and L2RIB/EVPNMgr

Route exchange

```
debug bgp l2vpn evpn evi event detail
```

EVI context interaction with EVPNMgr/L2RIB

```
debug bgp l2vpn evpn evi context detail
```

Verify the BGP EVPN route update, advertisement and receive

Receive

```
debug bgp l2vpn evpn update in
```

Transmit

```
debug bgp l2vpn evpn update out
```

Verify the BGP NVE/L3-EVPN interaction for vtep status notification

```
debug bgp l2vpn evpn nve detail
```

Verify the BGP bestpath computation details

EVPN

```
debug bgp l2vpn evpn addpath
```

VPNv4

```
debug bgp vpnv4 unicast addpath
```

VPNv6

```
debug bgp vpnv6 unicast addpath
```

Verify the BGP route import between EVPN and VPN tables

Events

```
debug bgp l2vpn evpn import events
```

Updates

```
debug bgp l2vpn evpn import updates
```

Verify dual-nexthop related events

```
debug bgp l2vpn evpn import events
debug ip bgp events
```

EVPN Manager

```
debug l2vpn evpn error
debug l2vpn evpn event
debug l2vpn evpn event detail
```

L2RIB

```
debug l2rib error
debug l2rib event
debug l2rib event detail
```

L2FIB

```
debug l2fib all
```

NVE Manager

```
debug nve all
```

Multicast

```
debug ipv6 mld
debug ipv6 mld group ff05::1
debug ipv6 pim
debug ipv6 mrib route
debug ipv6 mrib route ff05::1
debug ipv6 pim group ff05::1
debug ipv6 mrib table
debug ipv6 mfib platform errors
debug ipv6 mfib platform notify
debug ipv6 mfib events
debug ipv6 mfib errors
debug ipv6 mfib pak ff05::1
debug ipv6 mfib ps ff05::1
debug ipv6 mfib fs ff05::1
```

Platform Dependent Traces

Feature Specific Traces

Elevate these traces to debug level prior to collection of trace archive

```
set platform software trace fed switch active l2_fib_entry debug
set platform software trace fed switch active l2_fib_adj debug
set platform software trace fed switch active matm debug
set platform software trace fed switch active asic_l2u debug
set platform software trace fed switch active asic_l3u debug
set platform software trace fed switch active efp debug
set platform software trace fed switch active nve debug
set platform software trace fed switch active l3_tunnel debug
set platform software trace fed switch active l3_adj debug
set platform software trace fed switch active l3_fib debug
set platform software trace fed switch active l3_mcast_aal debug
set platform software trace fed switch active l3_mcast_db debug
set platform software trace fed switch active l3_mcast_mif debug
set platform software trace fed switch active l3_mcast_mroute debug
```

```
set platform software trace fed switch active asic_l3m debug
set platform software trace fed switch active asic_app debug
set platform software trace fed switch active asic_rrm noise
```

Fed Traces Since Last Reboot

```
show logging process fed internal start last boot switch active to-file flash:<file>
```

Fed Traces Since Last Clear Log

```
Show logging process fed internal start last clear switch active to-file flash:<file>
```

Related Information

- Migrate EVPN VxLAN to IPv6 Underlay on Catalyst 9000 Switches
- Technical Support & Documentation - Cisco Systems