Troubleshooting BGP EVPN VXLAN

Troubleshooting Scenarios for BGP EVPN VXLAN

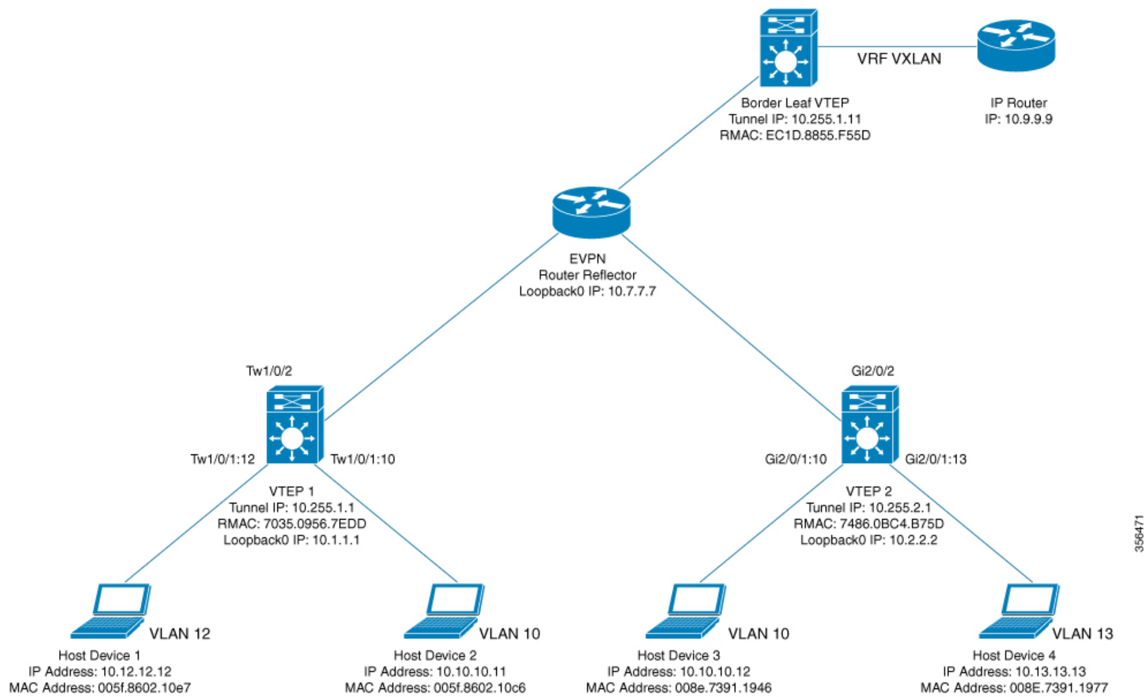
This document provides information about the various troubleshooting scenarios that are applicable to BGP EVPN VXLAN and how to troubleshoot each scenario.

In this troubleshooting document, comments have been added at the end of certain lines of the outputs of **show** commands. This has been done to highlight or explain a specific aspect of that line of output. If a comment begins in a new line, then it refers to the line of output that preceeds the comment. The following notation has been used throughout the document to highlight the comments inside the outputs of **show** commands:

```
<<-- Text highlighted in this format inside a command's output represents a comment.
     This is done for explanation purpose only and is not part of the command's output.
```

The following is a sample EVPN VXLAN topology with two access facing VTEPs (VTEP 1 and VTEP 2) and a border leaf VTEP connected in a VXLAN network through an EVPN route reflector. Each of the access facing VTEPs has two host devices connected to it and the border leaf VTEP is connected to an external IP network. All the troubleshooting scenarios in this document are explained using this topology.

Figure 1: EVPN VXLAN Topology



The following are the various troubleshooting scenarios that apply to BGP EVPN VXLAN for the topology illustrated in the Figure 1: EVPN VXLAN Topology above:

- **Scenario 1:** Troubleshooting Broadcast, Unkown Unicast, Multicast traffic Forwarding
- **Scenario 2:** Troubleshooting Unicast Forwarding Between VTEPs in the Same VLAN Through a Layer 2 VNI
- **Scenario 3:** Troubleshooting Unicast Forwarding Between VTEPS in Different VLANs Through a Layer 3 VNI
- **Scenario 4:** Troubleshooting Unicast Forwarding Between a VXLAN Network and an IP Network

Troubleshooting Broadcast, Unkown Unicast, Multicast Traffic Forwarding

This scenario might occur when host device 2 attempts to learn the ARP for host device 3 in Figure 1: EVPN VXLAN Topology, on page 2. Perform the checks listed in the following table before troubleshooting BUM traffic forwarding:

Table 1: Scenario 1: Broadcast, Unkown Unicast, Multicast traffic Forwarding

Check to be Performed	Steps to Follow
Is the packet of broadcast type?	Check if the packet is a broadcast packet, such as an ARP broadcast packet.
Are the hosts in the same subnet or in different subnets?	Perform any of the following steps: • Check the host device. • Check the SVI configuration on the VTEP.
Has the remote MAC address been learned for unknown unicast traffic?	Run the **show platform software fed switch active matm macTable vlan** *vlan-id* command in privileged EXEC mode on the local VTEP and check if the MAC address of the remote host device is displaed in the output. If not, you have not yet learned the remote host device and it needs to be resolved.

BUM traffic is forwarded by a VTEP into the VXLAN Core using multicast routing. In order to follow the path of an ARP broadcast packet, you need to identify the multicast group that needs to be used to send this traffic into the core and to the other VTEPs. BUM traffic first arrives at the local Layer 2 interface. The traffic is encapsulated here and sent out using the multicast group that is sourced from the VXLAN Loopback interface.

Note Underlay multicast needs to be fully configured before troubleshooting BUM traffic forwarding for EVPN VXLAN.

To troubleshoot EVPN VXLAN BUM traffic forwarding, follow these steps:

1. Determine the MAC Address of the Local Host Device and the Multicast Group Used for ARP Tunneling, on page 3
2. Set Up Embedded Capture Towards the Core-Facing Interface, on page 4
3. Ping the Remote Host Device, on page 4
4. Verify that an ARP Request Has Been Received and a Multicast Route Has Been Built, on page 4
5. Confirm the Presence of ARP Request Replies in Embedded Capture, on page 5
6. Verify that the Encapsulated ARP Request is Leaving in a Multicast Group to a VXLAN UDP Destination Port, on page 5
7. Verify that the ARP Reply from Core Interface is Encapsulated in Unicast to a VXLAN UDP Destination Port, on page 6

Determine the MAC Address of the Local Host Device and the Multicast Group Used for ARP Tunneling

The following examples show how to verify the MAC address of the local host device and the multicast group that is used for tunneling the ARP broadcast request:

```
VTEP-1# show mac address-table address 005f.8602.10c6
Mac Address Table
-------------------------------------------

Vlan Mac Address Type     Ports
---- ----------- -------- -----
10 005f.8602.10c6 DYNAMIC Tw1/0/1   <<— MAC address of 10.10.10.11 is learnt here

VTEP-1# show run int nve 1
interface nve1
 no ip address
 source-interface Loopback999
 host-reachability protocol bgp
 member vni 10001 mcast-group 239.10.10.10    <<— Group is mapped to the VNI under NVE

VTEP-1# show run | s vlan conf
vlan configuration 10
 member evpn-instance 10 vni 10001   <<— VNI mapped under VLAN 10

VTEP-1# show l2vpn evpn evi
EVI   VLAN  Ether Tag  L2 VNI    Multicast     Pseudoport
----- ----- ---------- --------- ------------- ------------------
10    10    0          10001     239.10.10.10  Tw1/0/1:10
   <<— EVPN instance 10 is mapped to VLAN 10 and VNI 10001
       (Using multicast group 239.10.10.10 for Broadcast ecap tunnel)
<...snip...>
```

Set Up Embedded Capture Towards the Core-Facing Interface

The following example shows how to set up embedded capture towards the core-facing interface:

Note On a production network, use this command with a filter.

```
VTEP-1# show monitor capture 1 parameter
monitor capture 1 interface TwoGigabitEthernet1/0/2 BOTH
monitor capture 1 match any
monitor capture 1 buffer size 100
monitor capture 1 limit pps 1000
```

Ping the Remote Host Device

The following example shows how to ping the remote host device:

```
VTEP-1-HOST# ping 10.10.10.12     <<— sourced from Host machine 10.10.10.11
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.10.12, timeout is 2 seconds:
..!!!
```

Verify that an ARP Request Has Been Received and a Multicast Route Has Been Built

This step is to verify that there is multicast reachability between VTEPs using standard multicast validation. Underly multicast state is not permanent. If it is not in use, these S,G states will expire.

The following output confirms that an ARP request has been received and a multicast route has been built:

```
VTEP-1# show ip mroute 239.10.10.10 10.255.1.1
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
L - Local, P - Pruned, R - RP-bit set, F - Register flag,
T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
U - URD, I - Received Source Specific Host Report,
Z - Multicast Tunnel, z - MDT-data group sender,
Y - Joined MDT-data group, y - Sending to MDT-data group,
G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
Q - Received BGP S-A Route, q - Sent BGP S-A Route,
V - RD & Vector, v - Vector, p - PIM Joins on route,
x - VxLAN group, c - PFP-SA cache created entry
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(10.255.1.1, 239.10.10.10), 00:00:25/00:02:34, flags: FTx   <<— x flag set for VxLAN group
Incoming interface: Loopback999, RPF nbr 0.0.0.0        <<— Broadcast being encapsulated
                                                            into VXLAN tunnel IP
Outgoing interface list:
TwoGigabitEthernet1/0/2, Forward/Sparse, 00:00:23/00:03:06
   <<— Sending towards core to VTEP-2
(10.255.1.4, 239.10.10.10), 3d18h/00:02:25, flags: JTx <<— BUM traffic from VTEP-2 (if the
                                                            ARP request was from VTEP-2)
  Incoming interface: TwoGigabitEthernet1/0/2, RPF nbr 10.1.1.6
  Outgoing interface list:
    Tunnel0, Forward/Sparse-Dense, 3d18h/00:00:14     <<— Tunnel 0 is the VXLAN tunnel
                                                          used for decapsulation
```

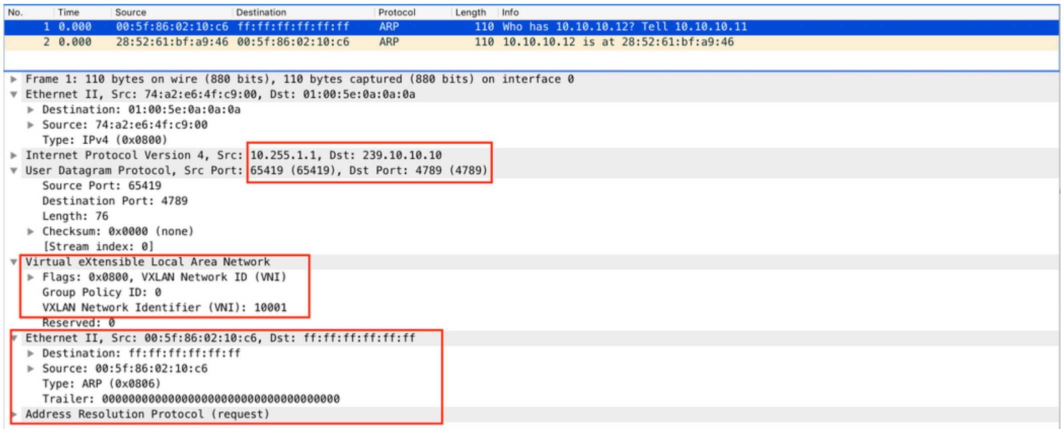
Confirm the Presence of ARP Request Replies in Embedded Capture

The following output confirms that the ARP request replies are present in embedded capture:

```
VTEP-1# show monitor capture 1 buffer display-filter "arp"
Starting the packet display ........ Press Ctrl + Shift + 6 to exit

7 0.000018 00:5f:86:02:10:c6 -> ff:ff:ff:ff:ff:ff ARP 110 Who has 10.10.10.12? Tell
10.10.10.11
9 0.000022 28:52:61:bf:a9:46 -> 00:5f:86:02:10:c6 ARP 110 10.10.10.12 is at 28:52:61:bf:a9:46
```

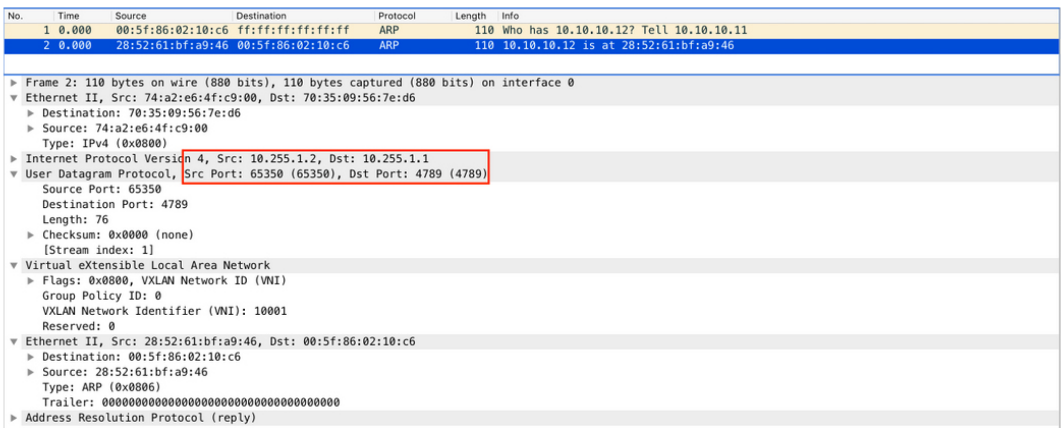
Verify that the Encapsulated ARP Request is Leaving in a Multicast Group to a VXLAN UDP Destination Port

The following image shows the ARP request leaving encapsulated in the multicast group 239.10.10.10, sourced from a VXLAN Loopback, to the VXLAN UDP destination port 4789 in the VNI 10001 and VLAN 10.



Verify that the ARP Reply from Core Interface is Encapsulated in Unicast to a VXLAN UDP Destination Port

The following image shows the ARP reply from core interface that is encapsulated in unicast, between VXLAN Loopbacks, to the VXLAN UDP destination port 4789 in the VNI 10001 and VLAN 10.



Once all of the above checks are verified, if there is still a problem with broadcast reachability, then repeat the checks on the remote VTEP.

Troubleshooting Unicast Forwarding Between VTEPs in the Same VLAN Through a Layer 2 VNI

This scenario might occur when host device 2 in VLAN 10 attempts to ping host device 3 that is also in VLAN 10. Perform the checks listed in the following table before troubleshooting unicast forwarding between VTEPs in the same VLAN through a Layer 2 VNI:

Table 2: Scenario 2: Troubleshooting Unicast Forwarding Between VTEPs in the Same VLAN Through a Layer 2 VNI

Check to be Performed	Steps to Follow
Has ARP been resolved on the local host for the Layer 2 adjacent remote host?	Run the **arp -a** command in privileged EXEC mode on the host device.
Do the hosts have the same subnet masks?	Perform any of the following steps: • Check the host device. • Check the SVI configuration on the VTEP.
Do you have the EVPN instance configured on your local VTEP?	Run the following commands in privileged EXEC mode on the VTEP: • **show run | section l2vpn** • **show run | section vlan config** • **show run interface nve** *interface-number*
Has the remote MAC address been learned in platform MATM in the same VLAN as the local host?	Run the **show platform software fed switch active matm macTable vlan** *vlan-id* command in privileged EXEC mode on the VTEP to check for the remote MAC addresses in the same VLAN.

To troubleshoot unicast forwarding between two VTEPs in the same VLAN using a Layer 2 VNI, follow these steps:

- Verify the provisioning of the EVPN VXLAN Layer 2 overlay network.
- Verify intra-subnet traffic movement in the EVPN VXLAN Layer 2 overlay network.

Verifying the Provisioning of an EVPN VXLAN Layer 2 Overlay Network

To verify the provisioning of an EVPN VXLAN Layer 2 overlay network, perform these checks:

1. Verify the Provisioning of the EVPN Instance in EVPN Manager, on page 7
2. Ensure that an NVE Peer is Present for the Layer 2 VNI, on page 9
3. Verify the Provisioning of the Layer 2 VNI in NVE Component, on page 9
4. Verify That the Layer 2 VNI VXLAN Tunnel Pseudoport is added to the Access VLAN in Layer 2 Forwarding Information Base (FIB), on page 10

Verify the Provisioning of the EVPN Instance in EVPN Manager

The following examples show how to verify that the EVPN instance is provisioned in the EVPN manager:

```
VTEP-1# show run | section l2vpn
l2vpn evpn instance 10 vlan-based
encapsulation vxlan
```

```
route-target export 10:1      <<— Import or export right route-targets

route-target import 10:2      <<— Import or export right route-targets

VTEP-1# show run | section vlan config
vlan configuration 10
member evpn-instance 10 vni 10001    <<— EVPN instance & VNI mapped to the VLAN

VTEP-1# show run interface nve1
interface nve1
source-interface Loopback999
host-reachability protocol bgp
member vni10001 mcast-group 239.10.10.10     <<— VNI added to NVE interface

VTEP-1# show run interface loopback 999
interface Loopback999
description VxLAN Loopback
ip address 10.255.1.1 255.255.255.255
```

Note Run the **show run** commands on VTEP 2 to verify its configuration, if required.

```
VTEP-1# show l2vpn evpn evi 10 detail <<— VLAN number and EVPN Instance number
                                          are not always the same, confirm which
                                          EVPN Instance maps to your VLAN
                                          with the show l2vpn evpn evi command
EVPN instance:    10 (VLAN Based)    <<— EVPN Instance number does map to the VLAN.
  RD:             10.1.1.1:10 (auto)
  Import-RTs:     10:2     <<— Importing VTEP-2 (if you are not seeing the prefix,
                               check configuration for the right import/export statement
                               under the l2vpn evpn instance)

  Export-RTs:     10:1
  Per-EVI Label:  none
  State:          Established
  Encapsulation:  vxlan
  Vlan:           10       <<— Layer 2 VLAN
    Ethernet-Tag: 0
    State:        Established <<— If State is not "Established", there
                                  could be a misconfiguration

    Core If:      Vlan99
    Access If:    Vlan10
    NVE If:       nve1
    RMAC:         7035.0956.7edd
    Core Vlan:    99
    L2 VNI:       10001           <<— Layer 2 VNI
    L3 VNI:       99999
    VTEP IP:      10.255.1.1
    MCAST IP:     239.10.10.10     <<— BUM Group for flooded traffic (Layer 2 learning, etc)

    VRF:          vxlan
    IPv4 IRB: Enabled
    IPv6 IRB: Enabled
    Pseudoports:
      TwoGigabitEthernet1/0/1 service instance 10
   <<— Layer 2 Access pseudoport (combination of Layer 2 port and service instance)
```

Note If only a Layer 2 overlay network has been configured for bridging, then the `Core If` , `Access If`, `RMAC`, `Core BD`, `L3 VNI`, and `VRF` fields do not show any values as they are not set.

```
VTEP-2# show l2vpn evpn evi 10 detail
EVPN instance:     10 (VLAN Based)
RD:                10.2.2.2:10 (auto)
Import-RTs:        10:1        <<— Importing VTEP-1 route-target
Export-RTs:        10:2
Per-EVI Label:     none
State:             Established
Encapsulation:     vxlan
Vlan:              10          <<— Layer 2 VLAN
  Ethernet-Tag:    0
  State:           Established
  Core If:         Vlan99
  Access If:       Vlan10
  NVE If:          nve1
  RMAC:            7486.0bc4.b75d
  Core Vlan:       99
  L2 VNI:          10001       <<— Layer 2 VNI
  L3 VNI:          99999
  VTEP IP:         10.255.2.1
  MCAST IP:        239.10.10.10
  VRF:             vxlan
  IPv4 IRB: Enabled
  IPv6 IRB: Enabled
  Pseudoports:
   GigabitEthernet2/0/1 service instance 10
   <<— Layer 2 Access pseudoport (combination of Layer 2 port and service instance)
```

Ensure that an NVE Peer is Present for the Layer 2 VNI

The following examples show how to check if an NVE peer is present for the Layer 2 VNI:

```
VTEP-1# show nve peers vni 10001     <<— This VNI is learned from "show l2vpn evpn evi"
Interface  VNI      Type Peer-IP          RMAC/Num_RTs   eVNI     state flags UP time
nve1       10001    L2CP 10.255.2.1       2              10001      UP   N/A 00:01:03
   <<— Layer 2 Control Plane (L2CP) peer for the VNI is an indicator that this is
       Layer 2 forwarding
   <<— Interface NVE1, L2CP, egress VNI are shown, state is UP for a time of 00:01:03

VTEP-2# show nve peers vni 10001
Interface  VNI      Type Peer-IP          RMAC/Num_RTs   eVNI     state flags UP time
nve1       10001    L2CP 10.255.1.1       3              10001      UP   N/A 00:47:2
   <<— Interface NVE1, L2CP, egress VNI are shown, state is UP for a time of 00:47:02
```

Verify the Provisioning of the Layer 2 VNI in NVE Component

The following example shows how to verify that the Layer 2 VNI is provisioned in the NVE component:

```
VTEP-1# show nve vni 10001 detail     <<— VNI 10001 is correlated to VLAN 10
                                         from show l2vpn evpn evi
Interface  VNI        Multicast-group VNI state  Mode  VLAN  cfg vrf
nve1       10001      239.10.10.10    Up         L2CP  10    CLI vxlan
```

```
   <<— state is UP, type is Layer 2 VNI (L2CP); VLAN 10 is mapped to VNI 10001

L2 VNI IPv6 IRB down reason:
BDI or associated L3 BDI's IPv6 addr un-configured
IPv6 topo_id disabled


L2CP VNI local VTEP info:      <<— Layer 2 VNI provisioning
VLAN: 10                       <<— Confirms that mapping is with VLAN 10
SVI if handler: 0x4D
Local VTEP IP: 10.255.1.1      <<— VxLAN Tunnel IP

Core IRB info:      <<— Layer 3 VPN provisioning (not required for troubleshooting
                        a scenario with pure Layer 2 VPN packet path
L3VNI: 99999
VRF name: vxlan
VLAN: 99
V4TopoID: 0x2
V6TopoID: 0xFFFF
Local VTEP IP: 10.255.1.1
SVI if handler: 0x50
SVI MAC: 7035.0956.7EDD

VNI Detailed statistics:
   Pkts In   Bytes In   Pkts Out  Bytes Out
         0          0 18158681548 27383291735556
```

Verify That the Layer 2 VNI VXLAN Tunnel Pseudoport is added to the Access VLAN in Layer 2 Forwarding Information Base (FIB)

The following examples show how to verify that the Layer 2 VXLAN tunnel pseudoport is added to the access VLAN in Layer 2 FIB:

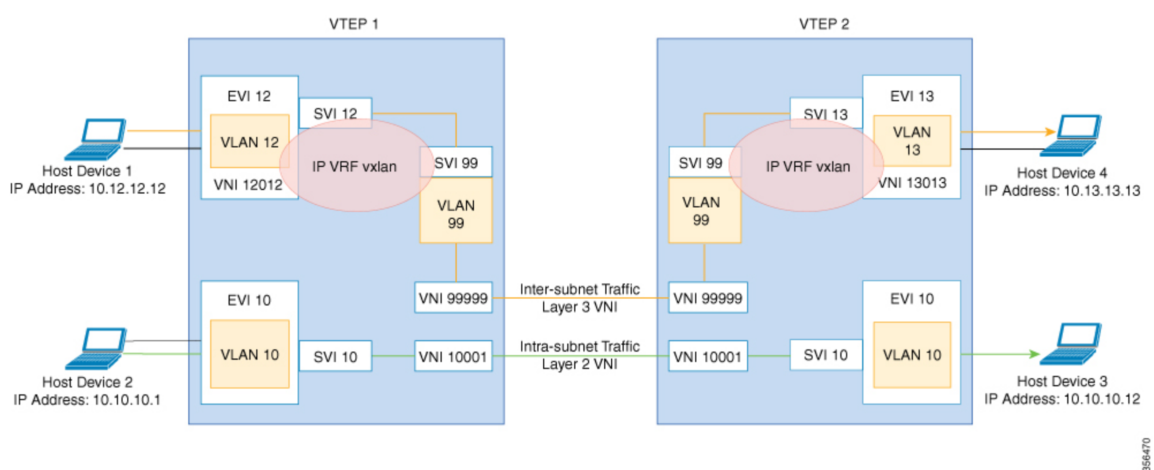
```
VTEP-1# show l2fib bridge-domain 10 detail    <<— Bridge-domain will be same as VLAN number
Bridge Domain : 10
  Reference Count : 14
  Replication ports count : 2
  Unicast Address table size : 3
  IP Multicast Prefix table size : 3

  Flood List Information :
    Olist: 5109, Ports: 2

  VxLAN Information :
    VXLAN_DEC nv1:10001:239.10.10.10

  Port Information :
    BD_PORT   Tw1/0/1:10       <<— Pseudoport has been added to bridge-domain:
                                   (physical port + the BD number for the VLAN)
    VXLAN_REP nv1:10001:239.10.10.10        <<— VXLAN Replication group

  Unicast Address table information :
    008e.7391.1946  VXLAN_CP  L:10001:10.255.1.1 R:10001:10.255.2.1

  IP Multicast Prefix table information :
    Source: *, Group: 224.0.0.0/24, IIF: Null, Adjacency: Olist: 5109, Ports: 2
    Source: *, Group: 224.0.1.39, IIF: Null, Adjacency: Olist: 5109, Ports: 2
    Source: *, Group: 224.0.1.40, IIF: Null, Adjacency: Olist: 5109, Ports: 2
```

```
VTEP-2# show l2fib bridge-domain 10 detail
Bridge Domain : 10
  Reference Count : 15
  Replication ports count : 2
  Unicast Address table size : 4
  IP Multicast Prefix table size : 3

  Flood List Information :
    Olist: 5109, Ports: 2

  VxLAN Information :
    VXLAN_DEC nv1:10001:239.10.10.10

  Port Information :
    BD_PORT   Gi2/0/1:10        <<— Pseudoport has been added to bridge-domain:
                                    (physical port + the BD number for the VLAN)
    VXLAN_REP nv1:10001:239.10.10.10        <<— VXLAN replication group

  Unicast Address table information :
    005f.8602.10c6  VXLAN_CP  L:10001:10.255.2.1 R:10001:10.255.1.1

  IP Multicast Prefix table information :
    Source: *, Group: 224.0.0.0/24, IIF: Null, Adjacency: Olist: 5109, Ports: 2
    Source: *, Group: 224.0.1.39, IIF: Null, Adjacency: Olist: 5109, Ports: 2
    Source: *, Group: 224.0.1.40, IIF: Null, Adjacency: Olist: 5109, Ports: 2
```

Verifying Intra-Subnet Traffic Movement in an EVPN VXLAN Layer 2 Overlay Network

The following figure illustrates the movement of traffic from host devices connected to VTEP 1 to host devices connected to VTEP 2:

Figure 2: Movement of traffic in an EVPN VXLAN network Through Layer 2 and Layer 3 VNIs



In the above figure, Layer 2 traffic moves from host device 2 to host device 3 through the Layer 2 VNI 10001. To verify the movement of intra-subnet traffic in the EVPN VXLAN Layer 2 overlay network, perform these checks:

1. Verify that the Local MAC Addresses Have Been Learned in IOS-MATM, on page 12
2. Verify that Both Local and Remote MAC Addresses are Learned in FED-MATM, on page 12

3. Confirm that the ICMP Echo Request Leaves VTEP 1 Encapsulated and Goes to a UDP Destination Port on VTEP 2, on page 13
4. Verify ARP for Local Host Devices, on page 13
5. Verify that the MAC Address Entries are Learned in SISF Device Tracking Table, on page 13
6. Verify that EVPN Manager Has Been Updated with the MAC Address Entries, on page 14
7. Verify that EVPN Manager Has Updated the MAC Routes into Layer 2 RIB, on page 15
8. Verify that Layer 2 RIB Has Updated BGP with the Local MAC Routes, and that BGP Has Updated Layer 2 RIB with the Remote MAC Routes, on page 15
9. Verify that the MAC Routes Learned from BGP and Updated to Layer 2 RIB are Also Updated to L2FIB, on page 17

Note Only MAC routes are considered while verifying the movement of intra-subnet traffic. MAC-IP routes are not applicable to bridged traffic.

Verify that the Local MAC Addresses Have Been Learned in IOS-MATM

The following examples show how to verify that the local MAC addresses have been learned in IOS-MATM:

```
VTEP-1# show mac address-table interface tw 1/0/1 vlan 10
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
  10    005f.8602.10c6    DYNAMIC     Tw1/0/1     <<— IOS-MATM shows only
                                                      local MAC addresses

VTEP-2# show mac address-table interface g 2/0/1 vlan 10
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
  10    008e.7391.1946    DYNAMIC     Gi2/0/1
```

Verify that Both Local and Remote MAC Addresses are Learned in FED-MATM

The following examples show how to verify that both local and remote MAC addresses are learned in FED-MATM:

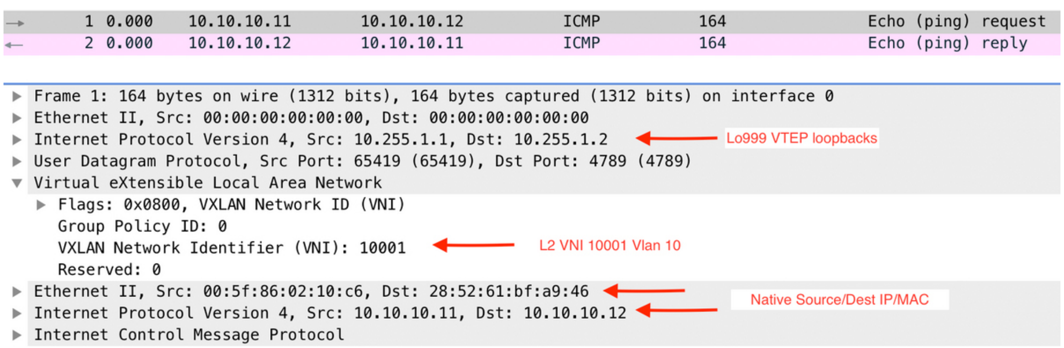
```
VTEP-1# show platform software fed switch active matm macTable vlan 10
VLAN   MAC                    Type   Seq#   EC_Bi  Flags  machandle
siHandle            riHandle            diHandle              *a_time   *e_time   ports
------------------------------------------------------------------------------------------
10     005f.8602.10c6          0x1      60      0      0  0x7efcc0d78fc8      0x7efcc0ca8b88
      0x0                0x7efcc06cf9c8           300      144   TwoGigabitEthernet1/0/1

   <<— Local MAC address is displayed here
10     008e.7391.1946    0x1000001      0      0     64  0x7efcc0cafb38      0x7efcc0d7f628
```

```
      0x7ffa48c850b8      0x7efcc038cc18              0      144  RLOC 10.255.2.1 adj_id
135
   <<— Remote MAC address is displayed here

VTEP-2#sh platform software fed switch active matm macTable vlan 10
VLAN   MAC                    Type  Seq#   EC_Bi  Flags  machandle           siHandle
      riHandle            diHandle              *a_time  *e_time  ports
------------------------------------------------------------------------------------------
10     005f.8602.10c6   0x1000001      0      0     64  0x7fcec4e977d8      0x7fcec4e93ae8
      0x7fcec4e93308      0x7fcec430a3d8              0         0  RLOC 10.255.1.1 adj_id
64
   <<— Remote MAC address is displayed here
10     008e.7391.1946         0x1     46      0      0  0x7fcec4c6a248      0x7fcec4c20698
      0x0                 0x7fcec4611438            300       126  GigabitEthernet2/0/1

   <<— Local MAC address is displayed here
```

Confirm that the ICMP Echo Request Leaves VTEP 1 Encapsulated and Goes to a UDP Destination Port on VTEP 2

The following image confirms that the ICMP echo request leaves VTEP 1 encapsulated and goes to a UDP destination port on VTEP 2 through the loopback interface Lo999 and the Layer 2 VNI 10001:

Figure 3:



Verify ARP for Local Host Devices

The following examples show how to verify ARP for local host devices:

```
VTEP-1# show ip arp vrf vxlan 10.10.10.11
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  10.10.10.11              2  005f.8602.10c6  ARPA   Vlan10

VTEP-2# show ip arp vrf vxlan 10.10.10.12
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  10.10.10.12              4  008e.7391.1946  ARPA   Vlan10
```

Verify that the MAC Address Entries are Learned in SISF Device Tracking Table

The following examples show how to verify that the MAC addresses are learned in SISF device tracking table:

```
VTEP-1# show device-tracking database mac   <<— Only Local MAC addresses are seen
                                                in SISF device tracking table
 MAC                Interface      vlan prlvl      state           time left policy
 005f.8602.10c6   Tw1/0/1           10 NO TRUST   MAC-REACHABLE  347 s      evpn-sisf-policy
   <<— MAC, REACH, and EVPN type SISF policy are displayed

VTEP-2# show device-tracking database mac   <<— Only Local MAC addresses are seen
                                                in SISF device tracking table
 MAC                Interface      vlan prlvl      state           time left policy
 008e.7391.1946   Gi2/0/1           10 NO TRUST   MAC-REACHABLE  164 s      evpn-sisf-policy
   <<— MAC, REACH, and EVPN type SISF policy are displayed
```

Verify that EVPN Manager Has Been Updated with the MAC Address Entries

EVPN manager learns local MAC addresses and adds them to Layer 2 RIB. EVPN Manager also learns the remote MAC addresses from Layer 2 RIB, but the entries are only used for processing MAC mobility.

The following examples show how to verify that EVPN manager has been updated with the MAC addresses:

```
VTEP-1# show l2vpn evpn mac evi 10
MAC Address     EVI   VLAN  ESI                       Ether Tag  Next Hop
-------------- ----- ----- ------------------------ ---------- ----------------
005f.8602.10c6 10    10    0000.0000.0000.0000.0000 0          Tw1/0/1:10
   <<— MAC Addresss learned by EVPN Manager. States look correct
008e.7391.1946 10    10    0000.0000.0000.0000.0000 0          10.255.2.1

VTEP-1#sh l2vpn evpn mac evi 10 detail
MAC Address:               005f.8602.10c6       <<— Local MAC address
EVPN Instance:             10       <<— EVPN Instance
Vlan:                      10       <<— VLAN
Ethernet Segment:          0000.0000.0000.0000.0000
Ethernet Tag ID:           0
Next Hop(s):               TwoGigabitEthernet1/0/1 service instance 10<<— Local interface
                                                                        or local instance
VNI:                       10001       <<— VNI Label
Sequence Number:           0
MAC only present:          Yes
MAC Duplication Detection: Timer not running

MAC Address:               008e.7391.1946       <<— Remote MAC Address
EVPN Instance:             10        <<— EVPN Instance
Vlan:                      10        <<— VLAN
Ethernet Segment:          0000.0000.0000.0000.0000
Ethernet Tag ID:           0
Next Hop(s):               10.255.2.1       <<— Remote VTEP-2 Tunnel Loopback
Local Address:             10.255.1.1       <<— Local VTEP-1 Tunnel Loopback
VNI:                       10001       <<— VNI Label
Sequence Number:           0
MAC only present:          Yes
MAC Duplication Detection: Timer not running

VTEP-2# show l2vpn evpn mac evi 10
MAC Address     EVI   VLAN  ESI                       Ether Tag  Next Hop
-------------- ----- ----- ------------------------ ---------- ----------------
005f.8602.10c6 10    10    0000.0000.0000.0000.0000 0          10.255.1.1
008e.7391.1946 10    10    0000.0000.0000.0000.0000 0          Gi2/0/1:10
```

```
VTEP-2#sh l2vpn evpn mac evi 10 detail
MAC Address:               005f.8602.10c6     <<— Remote MAC address
EVPN Instance:             10         <<— EVPN Instance
Vlan:                      10         <<— VLAN
Ethernet Segment:          0000.0000.0000.0000.0000
Ethernet Tag ID:           0
Next Hop(s):               10.255.1.1     <<— Remote VTEP-1 Tunnel Loopback
Local Address:             10.255.2.1     <<— Local VTEP-2 Tunnel Loopback
VNI:                       10001          <<— VNI Label
Sequence Number:           0
MAC only present:          Yes
MAC Duplication Detection: Timer not running

MAC Address:               008e.7391.1946       <<— Remote MAC adress
EVPN Instance:             10         <<— EVPN Instance
Vlan:                      10         <<— VLAN
Ethernet Segment:          0000.0000.0000.0000.0000
Ethernet Tag ID:           0
Next Hop(s):               GigabitEthernet2/0/1 service instance 10  <<— Local interface
                                                                         or local instance
VNI:                       10001      <<— VNI Label
Sequence Number:           0
MAC only present:          Yes
MAC Duplication Detection: Timer not running
```

Verify that EVPN Manager Has Updated the MAC Routes into Layer 2 RIB

Layer 2 RIB learns local MAC addresses from EVPN manager and updates BGP and Layer 2 FIB with them. Layer 2 RIB also learns remote MAC addresses from BGP and updates EVPN manager and Layer 2 FIB with them. Layer 2 RIB needs both local and remote MAC addresses in order to update BGP and Layer 2 FIB.

The following examples show how to verify that EVPN manager has updated the MAC routes into Layer 2 RIB:

```
VTEP-1# show l2route evpn mac
  EVI       ETag  Prod     Mac Address                 Next Hop(s) Seq Number
----- ---------- ----- -------------- ---------------------------- ----------
   10          0 L2VPN 005f.8602.10c6                   Tw1/0/1:10          0
   <<— Local prefix was added by EVPN Manager (Layer 2 VPN) into Layer 2 RIB
   10          0   BGP 008e.7391.1946          V:10001 10.255.2.1           0
   <<— Remote prefix was added by BGP into Layer 2 RIB

VTEP-2# show l2route evpn mac
  EVI       ETag  Prod     Mac Address                 Next Hop(s) Seq Number
----- ---------- ----- -------------- ---------------------------- ----------
   10          0   BGP 005f.8602.10c6          V:10001 10.255.1.1           0
   <<— Remote prefix was added by BGP into Layer 2 RIB
   10          0 L2VPN 008e.7391.1946                   Gi2/0/1:10          0
   <<— Local prefix was added by EVPN Manager (Layer 2 VPN) into Layer 2 RIB
```

Verify that Layer 2 RIB Has Updated BGP with the Local MAC Routes, and that BGP Has Updated Layer 2 RIB with the Remote MAC Routes

The following examples show how top verify that Layer 2 RIB has updated BGP with the local MAC routes and that BGP has updated Layer 2 RIB with the remote MAC routes:

```
VTEP-1# show bgp l2vpn evpn route-type 2 0 005f860210c6 *
```

```
   <<— Route-type is 2, Ethernet tag = 0, Local MAC address is in
       undelimited format, and * specifies to omit IP address
BGP routing table entry for [2][10.1.1.1:10][0][48][005F860210C6][0][*]/20, version 249
Paths: (1 available, best #1, table evi_10) <<— Added to BGP from EVPN Manager
                                                provisioning in l2vpn evi context
  Advertised to update-groups:
     2
  Refresh Epoch 1
  Local
    :: (via default) from 0.0.0.0 (10.1.1.1)    <<— Locally Advertised by VTEP-1,
                                                    (:: indicates local)
      Origin incomplete, localpref 100, weight 32768, valid, sourced, local, best
      EVPN ESI: 00000000000000000000, Label1 10001    <<— VNI ID is 10001 for VLAN 10
      Extended Community: RT:10:1 ENCAP:8    <<— RT 10:1 (local RT), Encap type 8 is VXLAN
      Local irb vxlan vtep:
        vrf:vxlan, l3-vni:99999
        local router mac:7035.0956.7EDD
        core-irb interface:Vlan99
        vtep-ip:10.255.1.1
      rx pathid: 0, tx pathid: 0x0


VTEP-1# show bgp l2vpn evpn route-type 2 0 008e73911946 *
   <<— Route-type is 2, Ethernet tag = 0, Remote MAC address is in
       undelimited format, and * specifies to omit IP address
BGP routing table entry for [2][10.1.1.1:10][0][48][008e73911946][0][*]/20, version 253
Paths: (1 available, best #1, table evi_10)    <<— EVPN instance BGP table for VLAN 10
  Not advertised to any peer
  Refresh Epoch 1
  Local, imported path from [2][10.2.2.2:10][0][48][008e73911946][0][*]/20 (global)
   <<— From VTEP-2, RD is 10.2.2.2:10, MAC length is 48, [*] indicates MAC only
    10.255.2.1 (metric 2) (via default) from 10.2.2.2 (10.2.2.2)
   <<— Next hop of VTEP-2 Lo999, learned from RR 10.2.2.2
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Label1 10001    <<— VNI ID 10001 for VLAN 10
      Extended Community: RT:10:2 ENCAP:8     <<— Layer 2 VPN Route-Target 10:2
                                                  Encap type 8 is VXLAN
      Originator: 10.2.2.2, Cluster list: 10.2.2.2
      rx pathid: 0, tx pathid: 0x0

BGP routing table entry for [2][10.2.2.2:10][0][48][008e73911946][0][*]/20, version 251
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Not advertised to any peer
  Refresh Epoch 1
  Local
    10.255.2.1 (metric 2) (via default) from 10.2.2.2 (10.2.2.2)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Label1 10001
      Extended Community: RT:10:2 ENCAP:8
      Originator: 10.2.2.2, Cluster list: 10.2.2.2
      rx pathid: 0, tx pathid: 0x0


VTEP-2# show bgp l2vpn evpn route-type 2 0 008e73911946 *
   <<— Route-type is 2, Ethernet tag = 0, Local MAC address is in
       undelimited format, and * specifies to omit IP address
BGP routing table entry for [2][10.2.2.2:10][0][48][008e73911946][0][*]/20, version 292
Paths: (1 available, best #1, table evi_10)
  Advertised to update-groups:
     2
  Refresh Epoch 1
  Local
    :: (via default) from 0.0.0.0 (10.2.2.2)    <<— Locally Advertised by VTEP-2,
                                                    (:: indicates local)
```

```
      Origin incomplete, localpref 100, weight 32768, valid, sourced, local, best
      EVPN ESI: 00000000000000000000, Label1 10001    <<— VNI ID 10001 for VLAN 10
      Extended Community: RT:10:2 ENCAP:8    <<— RT 10:2 (local RT), Encap type 8 is VXLAN
      Local irb vxlan vtep:
        vrf:vxlan, l3-vni:99999
        local router mac:7486.0BC4.B75D
        core-irb interface:Vlan99
        vtep-ip:10.255.2.1
      rx pathid: 0, tx pathid: 0x0

VTEP-2# show bgp l2vpn evpn route-type 2 0 005f860210c6 *
   <<— Route-type is 2, Ethernet tag = 0, Remote MAC address is in
       undelimited format, and * specifies to omit IP address
BGP routing table entry for [2][10.1.1.1:10][0][48][005F860210C6][0][*]/20, version 312
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Not advertised to any peer
  Refresh Epoch 7
  Local
    10.255.1.1 (metric 2) (via default) from 10.2.2.2 (10.2.2.2)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Label1 10001
      Extended Community: RT:10:1 ENCAP:8
      Originator: 10.1.1.1, Cluster list: 10.2.2.2
      rx pathid: 0, tx pathid: 0x0

BGP routing table entry for [2][10.2.2.2:10][0][48][005F860210C6][0][*]/20, version 314
Paths: (1 available, best #1, table evi_10)    <<— EVPN instance BGP table for VLAN 10
  Not advertised to any peer
  Refresh Epoch 7
  Local, imported path from [2][10.1.1.1:10][0][48][005F860210C6][0][*]/20 (global)
   <<— From VTEP-2, RD is 10.2.2.2:10, MAC length is 48, [*] indicates MAC only
   <<— From VTEP-1, RD is 10.1.1.1:10, MAC length is 48, [*] indicates MAC only
    10.255.1.1 (metric 2) (via default) from 10.2.2.2 (10.2.2.2)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Label1 10001    <<— VNI ID 10001 for VLAN 10
      Extended Community: RT:10:1 ENCAP:8    <<— Layer 2 VPN Route-Target 10:1
                                                 Encap type 8 is VXLAN
      Originator: 10.1.1.1, Cluster list: 10.2.2.2
      rx pathid: 0, tx pathid: 0x0
```

Verify that the MAC Routes Learned from BGP and Updated to Layer 2 RIB are Also Updated to L2FIB

The following examples show how to verify that the MAC routes that are learned from BGP and updated to Layer 2 RIB are also updated to Layer 2 FIB:

```
VTEP-2# show l2fib bridge-domain 10 detail
Bridge Domain : 10
  Reference Count : 15
  Replication ports count : 2
  Unicast Address table size : 4
  IP Multicast Prefix table size : 3

  Flood List Information :
    Olist: 5109, Ports: 2

  VxLAN Information :
    VXLAN_DEC nv1:10001:239.10.10.10

  Port Information :
    BD_PORT   Gi2/0/1:10
```

```
    VXLAN_REP nv1:10001:239.10.10.10

  Unicast Address table information :
    005f.8602.10c6  VXLAN_CP  L:10001:10.255.2.1 R:10001:10.255.1.1
   <<— Remote MAC address is learned (local MAC address is not expected to be present)

  IP Multicast Prefix table information :
    Source: *, Group: 224.0.0.0/24, IIF: Null, Adjacency: Olist: 5109, Ports: 2
    Source: *, Group: 224.0.1.39, IIF: Null, Adjacency: Olist: 5109, Ports: 2
    Source: *, Group: 224.0.1.40, IIF: Null, Adjacency: Olist: 5109, Ports: 2


VTEP-1# show l2fib bridge-domain 10 detail
Bridge Domain : 10
  Reference Count : 14
  Replication ports count : 2
  Unicast Address table size : 3
  IP Multicast Prefix table size : 3

  Flood List Information :
    Olist: 5109, Ports: 2

  VxLAN Information :
    VXLAN_DEC nv1:10001:239.10.10.10

  Port Information :
    BD_PORT   Tw1/0/1:10
    VXLAN_REP nv1:10001:239.10.10.10

  Unicast Address table information :
    008e.7391.1946  VXLAN_CP  L:10001:10.255.1.1 R:10001:10.255.2.1
   <<— Remote MAC address is learned (local MAC address is not expected to be present)

  IP Multicast Prefix table information :
    Source: *, Group: 224.0.0.0/24, IIF: Null, Adjacency: Olist: 5109, Ports: 2
    Source: *, Group: 224.0.1.39, IIF: Null, Adjacency: Olist: 5109, Ports: 2
    Source: *, Group: 224.0.1.40, IIF: Null, Adjacency: Olist: 5109, Ports: 2
```

Note Only remote MAC routes are displayed in the output.

Troubleshooting Unicast Forwarding Between VTEPS in Different VLANs Through a Layer 3 VNI

This scenario might occur when host device 1 in VLAN 12 attempts to ping host device 4 in VLAN 13. Perform the checks listed in the following table before troubleshooting unicast forwarding between VTEPs in different VLANs through a Layer 3 VNI:

Table 3: Scenario 3: Troubleshooting Unicast Forwarding Between VTEPS in Different VLANs Through a Layer 3 VNI

Check to be Performed	Steps to Follow
Are the source and destination host devices in different subnets?	Check the subnet of the local host device and compare it against the subnet of the remote host device.

Check to be Performed	Steps to Follow
Do you have an SVI interface configured for the remote subnet?	Run the **show ip interface brief | excluse unassigned** command in privileged EXEC mode on the VTEP.
Do you have the EVPN instance configured on your local VTEP?	Run the following commands in privileged EXEC mode on the VTEP: • **show run | section l2vpn** • **show run | section vlan config** • **show run interface nve** *interface-number*

To troubleshoot unicast forwarding between two VTEPs in different VLANs using a Layer 3 VNI, follow these steps:

- Verify the provisioning of the EVPN VXLAN Layer 3 overlay network.
- Verify inter-subnet traffic movement and symmetric IRB in the EVPN VXLAN Layer 3 overlay network.

Verifying the Provisioning of an EVPN VXLAN Layer 3 Overlay Network

To verify the provisioning of an EVPN VXLAN Layer 3 overlay network, perform these checks:

1. Verify that the Access SVIs, Core SVIs, and NVE Interfaces are Up, on page 19
2. Verify that the IP VRF is Provisioned with the Correct SVIs, Stitching Route-Targets, and Route Distinguisher, on page 20
3. Verify that Both Layer 2 and Layer 3 VNIs are provisioned in the VRF and are UP, on page 21
4. Verify that EVPN Manager is Updated from the NVE with all the Layer 2 and IRB Attributes, on page 22
5. Verify that the Remote Layer 3 VNI Details are Learned on Each VTEP, on page 23
6. Verify that the Layer 3 VNI Tunnel Pseudoport is Installed into Layer 2 FIB in the Core VLAN, on page 23

Verify that the Access SVIs, Core SVIs, and NVE Interfaces are Up

The following examples show how to verify that the access SVIs, core SVIs, and NVE interfaces are up:

```
VTEP-1# show ip interface brief
Interface              IP-Address      OK? Method Status          Protocol
Vlan10                 10.10.10.1      YES NVRAM  up              up
Vlan12                 10.12.12.1      YES NVRAM  up              up  <<— Access Interface
Vlan99                 10.255.1.1      YES unset  up              up  <<— Core Interface
   <<— If protocol status for the core interface is down, run the no autostate command
Loopback0              10.1.1.1        YES NVRAM  up              up
Loopback999            10.255.1.1      YES NVRAM  up              up
Tunnel0                10.255.1.1      YES unset  up              up
```

```
Tunnel1                 10.1.1.5        YES unset  up              up
nve1                    unassigned      YES unset  up              up

VTEP-2# show ip interface brief
Interface               IP-Address      OK? Method Status          Protocol
Vlan10                  10.10.10.1      YES NVRAM  up              up
Vlan13                  10.13.13.1      YES NVRAM  up              up  <<— Access Interface
Vlan99                  10.255.2.1      YES unset  up              up  <<— Core Interface
   <<— If protocol status for the core interface is down, run the no autostate command
Loopback0               10.2.2.2        YES NVRAM  up              up
Loopback999             10.255.2.1      YES NVRAM  up              up
Tunnel0                 10.255.2.1      YES unset  up              up
Tunnel1                 10.1.1.10       YES unset  up              up
```

Verify that the IP VRF is Provisioned with the Correct SVIs, Stitching Route-Targets, and Route Distinguisher

The following examples show how to verify that the IP VRF is provisioned with the correct SVIs, stitching route-targets, and route distinguisher:

```
VTEP-1# show run vrf vxlan    <<— vxlan is the name of the VRF
vrf definition vxlan
rd 10.255.1.1:1
!
address-family ipv4
 route-target export 10.255.1.1:1 stitching     <<— Exporting local route-target
 route-target import 10.255.2.1:1 stitching     <<— Importing VTEP-2 route-target

VTEP-1# show ip vrf vxlan    <<— vxlan is the name of the VRF
  Name                            Default RD            Interfaces
  vxlan                           10.255.1.1:1          Vl10
                                                        Vl12
                                                        Vl99

VTEP-1# show ip vrf detail vxlan    <<— vxlan is the name of the VRF
VRF vxlan (VRF Id = 2); default RD 10.255.1.1:1; default VPNID <not set>
New CLI format, supports multiple address-families
Flags: 0x180C
Interfaces:
Vl10 Vl12 Vl99
Address family ipv4 unicast (Table ID = 0x2):   <<— Table 2 maps to VRF vxlan,
                                                    also found in BPG VPNv4 table
Flags: 0x0
No Export VPN route-target communities
No Import VPN route-target communities
Export VPN route-target stitching communities
   <<— VRF is using stitching route-targets. VTEPs must
       import each other's targets (same as Layer 3 VPN)
RT:10.255.1.1:1
Import VPN route-target stitching communities
RT:10.255.2.1:1
No import route-map
No global export route-map
No export route-map
VRF label distribution protocol: not configured
VRF label allocation mode: per-prefix

VTEP-2# show ip vrf vxlan    <<— vxlan is the name of the VRF
  Name                            Default RD            Interfaces
```

```
  vxlan                             10.255.2.1:1          Vl10
                                                          Vl13
                                                          Vl99

VTEP-2# show ip vrf detail vxlan    <<— vxlan is the name of the VRF
VRF vxlan (VRF Id = 2); default RD 10.255.2.1:1; default VPNID <not set>
New CLI format, supports multiple address-families
Flags: 0x180C
Interfaces:
Vl10 Vl13 Vl99
Address family ipv4 unicast (Table ID = 0x2):  <<— Table 2 maps to VRF vxlan,
                                                    also found in BPG VPNv4 table
Flags: 0x0
No Export VPN route-target communities
No Import VPN route-target communities
Export VPN route-target stitching communities
   <<— VRF is using stitching route-targets. VTEPs must
       import each other's targets (same as Layer 3 VPN)
RT:10.255.2.1:1
Import VPN route-target stitching communities
RT:10.255.1.1:1
No import route-map
No global export route-map
No export route-map
VRF label distribution protocol: not configured
VRF label allocation mode: per-prefix
```

Verify that Both Layer 2 and Layer 3 VNIs are provisioned in the VRF and are UP

The following examples show how to verify that both Layer 2 and Layer 3 VNIs are provisioned in the VRF and are up:

```
VTEP-1# show run | section vlan config
vlan configuration 99    <<— VNI is a member of VRF vxlan, not of EVPN instance
 member vni99999

VTEP-1# show run interface vlan 99
interface Vlan99
 description connected to L3_VNI_99999
 vrf forwarding vxlan
 ip unnumbered Loopback999

VTEP-1# show run interface nve 1
no ip address
 source-interface Loopback999
 host-reachability protocol bgp
 member vni 99999 vrf vxlan      <<— VNI tied to the VRF under NVE interface
 member vni 12012 mcast-group 239.12.12.12 <<— VNI tied to the NVE

VTEP-1# show run | section l2vpn
l2vpn evpn instance 12 vlan-based
 encapsulation vxlan
 route-target export 12:1     <<— Remote VTEP is NOT importing this route target,
                                  as it does not have the VLAN or VNI on its end
 route-target import 12:1
 no auto-route-target

VTEP-1# show run | section vlan config
```

```
vlan configuration 12
 member evpn-instance 12 vni 12012  <<— EVPN instance or VNI associated to the VLAN

VTEP-1# show nve vni
Interface  VNI        Multicast-group VNI state  Mode  VLAN  cfg vrf
nve1       10001      239.10.10.10    Up         L2CP  10    CLI vxlan
nve1       12012      239.12.12.12    Up         L2CP  12    CLI vxlan <<— Layer 2 VNI
nve1       99999      N/A             Up         L3CP  99    CLI vxlan <<— Layer 3 VNI

VTEP-2# show nve vni
Interface  VNI        Multicast-group VNI state  Mode  VLAN  cfg vrf
nve1       13013      239.13.13.13    Up         L2CP  13    CLI vxlan <<— Layer 2 VNI
nve1       10001      239.10.10.10    Up         L2CP  10    CLI vxlan
nve1       99999      N/A             Up         L3CP  99    CLI vxlan <<— Layer 3 VNI
```

Verify that EVPN Manager is Updated from the NVE with all the Layer 2 and IRB Attributes

The following examples show how to verify that EVPN manager is updated from the NVE with all the Layer 2 and IRB attributes:

```
VTEP-1# show l2vpn evpn evi
EVI   VLAN  Ether Tag  L2 VNI    Multicast     Pseudoport
----- ----- ---------- --------- ------------- ------------------
12    12    0          12012     239.12.12.12  Tw1/0/1:12
   <<— See which EVPN instance maps to the VLAN. The VLAN
       or EVPN instance values are not always the same
<...snip...>

VTEP-1# show l2vpn evpn evi 12 detail
EVPN instance:    12 (VLAN Based)
  RD:             10.1.1.1:12 (auto)
  Import-RTs:     12:1
  Export-RTs:     12:1
  Per-EVI Label:  none
  State:          Established
  Encapsulation:  vxlan
  Vlan:           12     <<— VLAN Layer 2 VNI
    Ethernet-Tag: 0
    State:        Established
    Core If:      Vlan99     <<— Interface handling IP VRF forwarding
    Access If:    Vlan12
    NVE If:       nve1
    RMAC:         7035.0956.7edd  <<— RMAC is the BIA of SVI 99 Core interface
    Core Vlan:    99
    L2 VNI:       12012
    L3 VNI:       99999
    VTEP IP:      10.255.1.1   <<— Local Tunnel endpoint IP address
    MCAST IP:     239.12.12.12
    VRF:          vxlan     <<— IP VRF for Layer 3 VPN
    Pseudoports:
      TwoGigabitEthernet1/0/1 service instance 12

VTEP-2# show l2vpn evpn evi
EVI   VLAN  Ether Tag  L2 VNI    Multicast     Pseudoport
----- ----- ---------- --------- ------------- ------------------
13    13    0          13013     239.13.13.13  Gi2/0/1:13
   <<— See which EVPN instance maps to the VLAN. The VLAN
       or EVPN instance values are not always the same
```

```
VTEP-2# show l2vpn evpn evi 13 detail
EVPN instance:     13 (VLAN Based)
  RD:              10.2.2.2:13 (auto)
  Import-RTs:      13:2
  Export-RTs:      13:2
  Per-EVI Label:   none
  State:           Established
  Encapsulation:   vxlan
  Vlan:            13     <<— VLAN Layer 2 VNI
    Ethernet-Tag:  0
    State:         Established
    Core If:       Vlan99     <<— Interface handling IP VRF forwarding
    Access If:     Vlan13
    NVE If:        nve1
    RMAC:          7486.0bc4.b75d   <<— RMAC is the BIA of SVI 99 Core interface
    Core Vlan:     99
    L2 VNI:        13013
    L3 VNI:        99999
    VTEP IP:       10.255.2.1    <<— Local Tunnel endpoint IP address
    MCAST IP:      239.13.13.13
    VRF:           vxlan     <<— IP VRF for Layer 3 VPN
    Pseudoports:
      GigabitEthernet2/0/1 service instance 13
```

Verify that the Remote Layer 3 VNI Details are Learned on Each VTEP

The following examples show how to verify that the remote Layer 3 VNI details are learned on each VTEP:

```
VTEP-1# show nve peers
Interface  VNI      Type Peer-IP          RMAC/Num_RTs   eVNI     state flags UP time
nve1       99999    L3CP 10.255.2.1       7486.0bc4.b75d 99999      UP   A/M 1w1d
   <<— Layer 3 Control Plane (L3CP), RMAC of Remote VTEP and Uptime of peer are displayed

VTEP-2# show nve peers
Interface  VNI      Type Peer-IP          RMAC/Num_RTs   eVNI     state flags UP time
nve1       99999    L3CP 10.255.1.1       7035.0956.7edd 99999      UP   A/M 21:27:36
   <<— Layer 3 Control Plane (L3CP), RMAC of Remote VTEP and Uptime of peer are displayed
```

Verify that the Layer 3 VNI Tunnel Pseudoport is Installed into Layer 2 FIB in the Core VLAN

The following examples show how to verify that the Layer 3 VNI tunnel pseudoport is installed into Layer 2 FIB in the core VLAN:

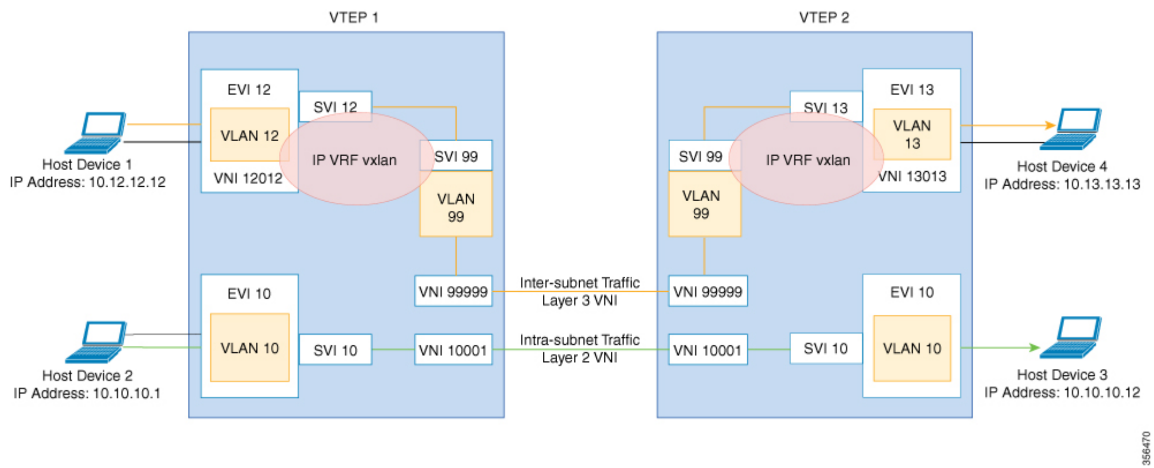
```
VTEP-1# show l2fib bridge-domain 99 detail
   <<— The Core VLAN can be obtained in the output of the
       show l2vpn evpn evi <evpn-instance> detail command
Bridge Domain : 99
  Reference Count : 8
  Replication ports count : 0
  Unicast Address table size : 1
  IP Multicast Prefix table size : 3

  Flood List Information :
    Olist: 5112, Ports: 0
```

```
  VxLAN Information :

  Unicast Address table information :
    7486.0bc4.b75d  VXLAN_CP  L:99999:10.255.1.1 R:99999:10.255.2.1
   <<— Encapsulation Information to reach remote VTEP-2

  IP Multicast Prefix table information :
    Source: *, Group: 224.0.0.0/24, IIF: Null, Adjacency: Olist: 5112, Ports: 0
    Source: *, Group: 224.0.1.39, IIF: Null, Adjacency: Olist: 5112, Ports: 0
    Source: *, Group: 224.0.1.40, IIF: Null, Adjacency: Olist: 5112, Ports: 0


VTEP-2# show l2fib bridge-domain 99 detail
   <<— The Core VLAN can be obtained in the output of the
       show l2vpn evpn evi <evpn-instance> detail command

Bridge Domain : 99
  Reference Count : 8
  Replication ports count : 0
  Unicast Address table size : 1
  IP Multicast Prefix table size : 3

  Flood List Information :
    Olist: 5111, Ports: 0

  VxLAN Information :

  Unicast Address table information :
    7035.0956.7edd  VXLAN_CP  L:99999:10.255.2.1 R:99999:10.255.1.1
   <<— Encapsulation Information to reach remote VTEP-2

  IP Multicast Prefix table information :
    Source: *, Group: 224.0.0.0/24, IIF: Null, Adjacency: Olist: 5111, Ports: 0
    Source: *, Group: 224.0.1.39, IIF: Null, Adjacency: Olist: 5111, Ports: 0
    Source: *, Group: 224.0.1.40, IIF: Null, Adjacency: Olist: 5111, Ports: 0
```

Verifying Inter-Subnet Traffic Movement and Symmetric IRB in an EVPN VXLAN Layer 3 Overlay Network

The following figure illustrates the movement of traffic from host devices connected to VTEP 1 to host devices connected to VTEP 2:

Figure 4: Movement of traffic in an EVPN VXLAN network through Layer2 and Layer 3 VNIs



In the above figure, Layer 3 traffic moves from host device 1 to host device 4 through the Layer 3 VNI 99999. To verify the movement of inter-subnet traffic in the EVPN VXLAN Layer 3 overlay network, perform these checks:

1. Verify that Local MAC Address and IP Address Entries are Learned in SISF Device Tracking Table, on page 25
2. Verify that MAC Address and IP Address Entries are Learned in EVPN Manager, on page 26
3. Verify that MAC Address and IP Address Entries are Learned in Layer 2 RIB, on page 27
4. Verify that Local MAC Address and IP Address Entries are Learned in MAC VRF, on page 27
5. Verify that Remote MAC-IP Address Pair is Learend in the VRF, on page 28
6. Verify that IP Routes are Inserted in RIB, on page 29
7. Verify that the Adjacency Table Contains Entries for the VRF-Enabled Core VLAN Interface, on page 29
8. Confirm that Adjacency Exists to the VTEP Tunnel IP Address for a Host Device in IP VRF, on page 30
9. Confirm that Adjacency Exists to Reach Tunnel Destination, on page 30
10. Confirm that the ICMP Echo Request that Leaves Encapsulated from the Source VTEP Reaches the Loopback Tunnel Endpoint and UDP Destination Port on the Destination VTEP Through the Layer 3 VNI and IP VRF, on page 30

Verify that Local MAC Address and IP Address Entries are Learned in SISF Device Tracking Table

The following examples show how to verify that local MAC address and IP address entries are learned in SISF device tracking table:

```
VTEP-1# show device-tracking database vlanid 12
Binding Table has 4 entries, 2 dynamic (limit 100000)
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 10.12.12.12                            005f.8602.10e7  Tw1/0/1          12  0005  115s
  REACHABLE  N/A

VTEP-2# show device-tracking database vlanid 13
vlanDB has 2 entries for vlan 13, 1 dynamic
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 10.13.13.13                            008e.7391.1977  Gi2/0/1          13  0005  155s
  REACHABLE  N/A
```

Verify that MAC Address and IP Address Entries are Learned in EVPN Manager

The following examples show how to verify that MAC address and IP address entries are learned in EVPN manager:

```
VTEP-1# show l2vpn evpn mac ip evi 12
IP Address                EVI   VLAN  MAC Address    Next Hop
------------------------- ----- ----- -------------- -------------------------
10.12.12.12               12    12    005f.8602.10e7 Tw1/0/1:12

VTEP-1#sh l2vpn evpn mac ip evi 12 detail
IP Address:                10.12.12.12
EVPN Instance:             12
Vlan:                      12
MAC Address:               005f.8602.10e7
Ethernet Segment:          0000.0000.0000.0000.0000
Ethernet Tag ID:           0
Next Hop:                  TwoGigabitEthernet1/0/1 service instance 12
VNI:                       12012
Sequence Number:           0
IP Duplication Detection:  Timer not running


VTEP-2# show l2vpn evpn mac ip evi 13
IP Address                EVI   VLAN  MAC Address    Next Hop
------------------------- ----- ----- -------------- -------------------------
10.13.13.13               13    13    008e.7391.1977 Gi2/0/1:13

VTEP-2#sh l2vpn evpn mac ip evi 13 detail
IP Address:                10.13.13.13
EVPN Instance:             13
Vlan:                      13
MAC Address:               008e.7391.1977
Ethernet Segment:          0000.0000.0000.0000.0000
```

```
Ethernet Tag ID:           0
Next Hop:                  GigabitEthernet2/0/1 service instance 13
VNI:                       13013
Sequence Number:           0
IP Duplication Detection:  Timer not running
```

Verify that MAC Address and IP Address Entries are Learned in Layer 2 RIB

The following examples show how to verify that MAC address and IP address entries are learned in Layer 2 RIB:

```
VTEP-1# show l2route evpn mac ip
  EVI       ETag  Prod    Mac Address         Host IP                Next Hop(s)
----- ---------- ----- -------------- --------------- --------------------------
   12          0 L2VPN 005f.8602.10e7     10.12.12.12                 Tw1/0/1:12

VTEP-2# show l2route evpn mac ip
  EVI       ETag  Prod    Mac Address         Host IP                Next Hop(s)
----- ---------- ----- -------------- --------------- --------------------------
   13          0 L2VPN 008e.7391.1977     10.13.13.13                 Gi2/0/1:13
```

Verify that Local MAC Address and IP Address Entries are Learned in MAC VRF

```
VTEP-1# show bgp l2vpn evpn evi 12 route-type 2 0 005F860210E7 10.12.12.12
BGP routing table entry for [2][10.1.1.1:12][0][48][005F860210E7][32][10.12.12.12]/24,
version 72
Paths: (1 available, best #1, table evi_12)     <<-- The Layer 2 VPN table number
                                                      for EVPN instance 12
  Advertised to update-groups:
     1
  Refresh Epoch 1
  Local     <<-- Indicates locally learned route
    :: (via default) from 0.0.0.0 (10.1.1.1)
      Origin incomplete, localpref 100, weight 32768, valid, sourced, local, best
      EVPN ESI: 00000000000000000000, Label1 12012, Label2 99999 <<-- Displays both Layer 2
                                                                      and VRF labels
      Extended Community: RT:12:1 RT:10.255.1.1:1 ENCAP:8    <<-- Note the VRF stitching RT
                                                                  as well as the Layer 2 RT
        Router MAC:7035.0956.7EDD
      Local irb vxlan vtep:
        vrf:vxlan, l3-vni:99999
        local router mac:7035.0956.7EDD   <<-- Local RMAC
        core-irb interface:Vlan99     <<-- VRF Layer 3 VPN interface
        vtep-ip:10.255.1.1    <<-- Loopback 999 tunnel endpoint
      rx pathid: 0, tx pathid: 0x0
```

The following examples show how to verify that local MAC address and IP address entries are learned in MAC VRF:

```
VTEP-2# show bgp l2vpn evpn evi 13 route-type 2 0 008E73911977 10.13.13.13
BGP routing table entry for [2][10.2.2.2:13][0][48][008E73911977][32][10.13.13.13]/24,
version 70
Paths: (1 available, best #1, table evi_13)
  Advertised to update-groups:
     1
  Refresh Epoch 1
  Local     <<-- Indicates locally learned route
```

```
    :: (via default) from 0.0.0.0 (10.2.2.2)
      Origin incomplete, localpref 100, weight 32768, valid, sourced, local, best
      EVPN ESI: 00000000000000000000, Label1 13013, Label2 99999
      Extended Community: RT:13:1 RT:10.255.2.1:1 ENCAP:8
        Router MAC:7486.0BC4.B75D
      Local irb vxlan vtep:
        vrf:vxlan, l3-vni:99999
        local router mac:7486.0BC4.B75D
        core-irb interface:Vlan99
        vtep-ip:10.255.2.1
      rx pathid: 0, tx pathid: 0x0
```

Verify that Remote MAC-IP Address Pair is Learend in the VRF

The following examples verify that remote MAC-IP address pair is learned in the VRF:

```
VTEP-1# show bgp vpnv4 unicast vrf vxlan 10.13.13.13
BGP routing table entry for 10.255.1.1:1:10.13.13.13/32, version 15
Paths: (1 available, best #1, table vxlan)         <<— VPNv4 VRF BGP table
  Not advertised to any peer
  Refresh Epoch 2
  Local, imported path from [2][10.2.2.2:13][0][48][008E73911977][32][10.13.13.13]/24
(global)
   <<— EVPN type-2, l2vpn RD 10.2.2.2:13, MAC and IP addresses
    10.255.2.1 (metric 3) (via default) from 10.2.2.2 (10.2.2.2)
   <<— Next hop 10.255.2.1, learned from RR 10.2.2.2
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      Extended Community: ENCAP:8 Router MAC:7486.0BC4.B75D
      Originator: 10.2.2.2, Cluster list: 10.2.2.2
      Local vxlan vtep:
        vrf:vxlan, vni:99999
        local router mac:7035.0956.7EDD
        encap:8
        vtep-ip:10.255.1.1
        bdi:Vlan99
      Remote VxLAN:
        Topoid 0x2(vrf vxlan)    <<— VRF vxlan (mapped to ID 2)
        Remote Router MAC:7486.0BC4.B75D  <<— VTEP-2 RMAC
        Encap 8     <<— VXLAN encap (type 8)
        Egress VNI 99999     <<— VRF VNI
        RTEP 10.255.2.1     <<— VTEP-2 Remote Tunnel Endpoint
      rx pathid: 0, tx pathid: 0x0

VTEP-2# show bgp vpnv4 unicast vrf vxlan 10.12.12.12
BGP routing table entry for 10.255.2.1:1:10.12.12.12/32, version 15
Paths: (1 available, best #1, table vxlan)
  Not advertised to any peer
  Refresh Epoch 2
  Local, imported path from [2][10.1.1.1:12][0][48][005F860210E7][32][10.12.12.12]/24
(global)
   <<— EVPN type-2, l2vpn RD 10.1.1.1:12, MAC and IP addresses
    10.255.1.1 (metric 3) (via default) from 10.2.2.2 (10.2.2.2)
   <<— Next hop 10.255.1.1, learned from RR 10.2.2.2
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      Extended Community: ENCAP:8 Router MAC:7035.0956.7EDD
      Originator: 10.1.1.1, Cluster list: 10.2.2.2
      Local vxlan vtep:
        vrf:vxlan, vni:99999
        local router mac:7486.0BC4.B75D
        encap:8
        vtep-ip:10.255.2.1
```

```
    bdi:Vlan99
  Remote VxLAN:
    Topoid 0x2(vrf vxlan)     <<— VRF vxlan (mapped to ID 2)
    Remote Router MAC:7035.0956.7EDD  <<— VTEP-1 RMAC
    Encap 8     <<— VXLAN encap (type 8)
    Egress VNI 99999     <<— VRF VNI
    RTEP 10.255.1.1     <<— VTEP-2 Remote Tunnel Endpoint
  rx pathid: 0, tx pathid: 0x0
```

Verify that IP Routes are Inserted in RIB

The following examples show how to verify that IP routes are inserted in RIB:

```
VTEP-1# show ip route vrf vxlan 10.13.13.13

Routing Table: vxlan
Routing entry for 10.13.13.13/32
  Known via "bgp 69420", distance 200, metric 0, type internal
  Last update from 10.255.2.1 on Vlan99, 00:11:33 ago
  Routing Descriptor Blocks:
  * 10.255.2.1 (default), from 10.2.2.2, 00:11:33 ago, via Vlan99 <<— Next hop here is the
                                                                       Core VLAN interface
      Route metric is 0, traffic share count is 1
      AS Hops 0
      MPLS label: none


VTEP-2# show ip route vrf vxlan 10.12.12.12

Routing Table: vxlan
Routing entry for 10.12.12.12/32
  Known via "bgp 69420", distance 200, metric 0, type internal
  Last update from 10.255.1.1 on Vlan99, 00:04:06 ago
  Routing Descriptor Blocks:
  * 10.255.1.1 (default), from 10.2.2.2, 00:04:06 ago, via Vlan99 <<— Next hop here is the
                                                                       Core VLAN interface
      Route metric is 0, traffic share count is 1
      AS Hops 0
      MPLS label: none
```

Verify that the Adjacency Table Contains Entries for the VRF-Enabled Core VLAN Interface

The following examples show how to verify that the adjacency table contains entries for the VRF-enabled core VLAN interface:

```
VTEP-1# show adjacency vlan 99 detail
Protocol Interface                 Address
IP       Vlan99                    10.255.2.1(9)    <<— IP unnumbered from Loopback 999
                                   0 packets, 0 bytes
                                   epoch 0
                                   sourced in sev-epoch 6
                                   Encap length 14
                                   74860BC4B75D703509567EDD0800
   <<— Local RMAC is 74860BC4B75D, Remote RMAC is 703509567EDD, etype is 800
                                   VXLAN Transport tunnel
   <<— Tunnel Interface (RMAC, using VTEP Loopback IP address)

VTEP-2# show adjacency vlan 99 detail
```

```
Protocol Interface                    Address
IP       Vlan99                       10.255.1.1(9)    <<— IP unnumbered from Loopback 999
                                      0 packets, 0 bytes
                                      epoch 0
                                      sourced in sev-epoch 5
                                      Encap length 14
                                      703509567EDD74860BC4B75D0800
   <<— Local RMAC is 703509567EDD, Remote RMAC is 74860BC4B75D, etype is 800
                                      VXLAN Transport tunnel
   <<— Tunnel Interface (RMAC, using VTEP Loopback IP address)
```

Confirm that Adjacency Exists to the VTEP Tunnel IP Address for a Host Device in IP VRF

The following example shows how to confirm that adjacency exists to the VTEP Tunnel IP address for a host device in IP VRF:

```
VTEP-1# show ip cef vrf vxlan 10.13.13.13/32  <<— Remote host in VLAN 13 of VTEP-2
10.13.13.13/32
  nexthop 10.255.2.1 Vlan99
```

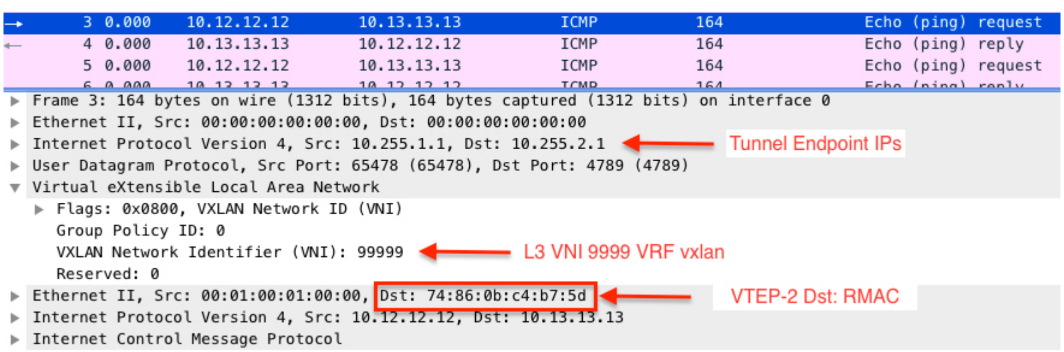
Confirm that Adjacency Exists to Reach Tunnel Destination

The following example shows how to confirm that adjacency exists to reach tunnel destination:

```
VTEP-1# show ip cef 10.255.1.11
10.255.2.1/32
  nexthop 10.1.1.6 TwoGigabitEthernet1/0/2
```

Confirm that the ICMP Echo Request that Leaves Encapsulated from the Source VTEP Reaches the Loopback Tunnel Endpoint and UDP Destination Port on the Destination VTEP Through the Layer 3 VNI and IP VRF

The following image confirms that the ICMP echo request that leaves encapsulated from source VTEP reaches the Loopback interface and UDP destination port on the destination VTEP through the Layer 3 VNI and IP VRF:



Troubleshooting Unicast Forwarding Between a VXLAN Network and an IP Network

This scenario might occur when host device 1 attempts to ping an external IP address through a border leaf VTEP. Perform the checks listed in the following table before troubleshooting unicast forwarding between a VXLAN network and an external IP network.

Table 4: Scenario 4: Troubleshooting Unicast Forwarding Between a VXLAN Network and an IP Network

Check to be performed	Steps to follow
Is one IP address present in the VXLAN network and the other IP address coming from external IP network?	Check the local subnets (or the SVI interfaces) if the remote subnet is present. **Note** Local subnet has the remote subnet listed even in the case of scenario 3.
Is the EVPN route type 5 being used to send traffic to remote destination?	Run the **show bgp l2vpn evpn all** command in privileged EXEC mode on the VTEP. Look for remote prefix to be displayed as `[5]` for route type 5.

To troubleshoot unicast forwarding between a VXLAN network and an external IP network, follow these steps:

- Verify the provisioning of the EVPN VXLAN Layer 3 overlay network.
- Verify traffic movement from the VXLAN network to the IP network through the border leaf switch using route type 5.

Verifying the Provisioning of an EVPN VXLAN Layer 3 Overlay Network

See Verifying the Provisioning of an EVPN VXLAN Layer 3 Overlay Network, on page 19 for detailed steps.

Verifying Traffic from a VXLAN Fabric to an IP Network Through a Border Leaf Switch Using Route Type 5

To verify the movement of traffic from a VXLAN fabric to an external IP network through a border leaf switch, perform these checks:

1. Check the Table Entries for BGP, EVPN, and VPNv4 Tables, on page 31
2. Check the Table Entries for BGP, EVPN, and VPNv4 Tables, on page 31
3. Confirm that Adjacency exists to Reach Tunnel Destination, on page 34

Check the Table Entries for BGP, EVPN, and VPNv4 Tables

The following examples show how to check the table entries for BGP, EVPN and VPNv4 tables:

```
VTEP-1# show bgp vpnv4 unicast vrf vxlan 10.9.9.9/32
   <<- To a remote IP address outside the VXLAN fabric
BGP routing table entry for 10.255.1.1:1:10.9.9.9/32, version 150
Paths: (1 available, best #1, table vxlan)     <<- VPNv4 VRF BGP table
  Not advertised to any peer
  Refresh Epoch 2
  Local, imported path from [5][10.255.1.11:1][0][32][10.9.9.9]/17 (global)
   <<- Learned from EVPN into VPNv4
    10.255.1.11 (metric 3) (via default) from 10.2.2.2 (10.2.2.2)
      Origin IGP, metric 0, localpref 100, valid, internal, best
      Extended Community: ENCAP:8 Router MAC:EC1D.8B55.F55D
      Originator: 10.255.1.11, Cluster list: 10.2.2.2
      Local vxlan vtep:
        vrf:vxlan, vni:99999
        local router mac:7035.0956.7EDD
        encap:8
        vtep-ip:10.255.1.1
        bdi:Vlan99
      Remote VxLAN:
        Topoid 0x2(vrf vxlan)
        Remote Router MAC:EC1D.8B55.F55D  <<- Border_Leaf_VTEP RMAC
        Encap 8
        Egress VNI 99999      <<- VNI associated with VRF
        RTEP 10.255.1.11      <<- Tunnel IP address
      rx pathid: 0, tx pathid: 0x0


VTEP-1# show bgp l2vpn evpn all route-type 5 0 10.9.9.9 32
   <<- This is sent as type 5 as there is no VNI at all for it to be mapped to
BGP routing table entry for [5][10.255.1.11:1][0][32][10.9.9.9]/17, version 650
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Not advertised to any peer
  Refresh Epoch 2
  Local
    10.255.1.11 (metric 3) (via default) from 10.2.2.2 (10.2.2.2)
   <<- Border_Leaf_VTEP Tunnel IP address
      Origin IGP, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 99999, MPLS VPN
Label 0
   <<- Using Layer 3 VNI 99999
      Extended Community: RT:10.255.1.11:1 ENCAP:8 Router MAC:EC1D.8B55.F55D
   <<- Route Target and RMAC of Border_Leaf_VTEP
      Originator: 10.255.1.11, Cluster list: 10.2.2.2
      rx pathid: 0, tx pathid: 0x0


Border_Leaf_VTEP# show bgp vpnv4 unicast vrf vxlan 10.12.12.12/32
   <<- To VXLAN Fabric IP address on VTEP-1
BGP routing table entry for 10.255.1.11:1:10.12.12.12/32, version 3092
Paths: (1 available, best #1, table vxlan)
Not advertised to any peer
Refresh Epoch 4
Local, imported path from [2][10.1.1.1:12][0][48][005F860210E7][32][10.12.12.12]/24 (global)

   <<- EVPN type-2 has been imported to VPNv4, from VTEP-1
  10.255.1.1 (metric 3) (via default) from 10.2.2.2 (10.2.2.2)
    Origin incomplete, metric 0, localpref 100, valid, internal, best
    Extended Community: RT:10.255.1.11:1 ENCAP:8 Router MAC:7035.0956.7EDD
    Originator: 10.1.1.1, Cluster list: 10.2.2.2
    Local vxlan vtep:
      vrf:vxlan, vni:99999
      local router mac:EC1D.8B55.F55D
      encap:8
```

```
      vtep-ip:10.255.1.11
      bdi:Vlan99
    Remote VxLAN:
      Topoid 0x2(vrf vxlan)
      Remote Router MAC:7035.0956.7EDD  <<— VTEP-1 RMAC
       Encap 8
       Egress VNI 99999
       RTEP 10.255.1.1                  <<— VTEP-1 Tunnel IP address
       rx pathid: 0, tx pathid: 0x0

Border_Leaf_VTEP# show bgp l2vpn evpn all route-type 2 0 005F860210E7 10.12.12.12
   <<— Border_Leaf_VTEP still knows the type-2. This is still exchanged between the VTEPs
       even though the prefix has been imported to VPNv4
BGP routing table entry for [2][10.1.1.1:12][0][48][005F860210E7][32][10.12.12.12]/24,
version 3085
Paths: (1 available, best #1, table EVPN-BGP-Table)
Not advertised to any peer
Refresh Epoch 4
Local
10.255.1.1 (metric 3) (via default) from 10.2.2.2 (10.2.2.2)
  Origin incomplete, metric 0, localpref 100, valid, internal, best
  EVPN ESI: 00000000000000000000, Label1 12012, Label2 99999
   <<— Both Layer 2 VNI and Layer 3 VNI labels are seen in type-2,
       but only Layer 3 VNI 99999 is used, once imported to VPNv4
  Extended Community: RT:12:1 RT:10.255.1.1:1 ENCAP:8
    Router MAC:7035.0956.7EDD
  Originator: 10.1.1.1, Cluster list: 10.2.2.2
  rx pathid: 0, tx pathid: 0x0
```

Note To check if IP routes have been inserted into CEF table, run the **show ip route vrf** *vrf-name* command in privileged EXEC mode.

Confirm that Adjacency Exists to the VTEP Tunnel IP Address for the Host Device in IP VRF

The following examples show how to confirm that adjacency exists to the VTEP Tunnel IP address for the host device in IP VRF:

```
VTEP-1# show ip cef vrf vxlan 10.9.9.9/32 platform
10.9.9.9/32
  Platform adj-id: 0x1A, 0x0, tun_qos_dpidx:0    <<— Adjacency ID to remote IP address

VTEP-1# show platform software fed sw ac matm macTable vlan 99
VLAN   MAC                   Type  Seq#   EC_Bi  Flags  machandle           siHandle
      riHandle            diHandle              *a_time  *e_time  ports
------------------------------------------------------------------------------------------
99     7035.0956.7edd      0x8002      0       0      64   0x7ffa48d61be8      0x7ffa48d630b8
      0x0                 0x5154                  0         0  Vlan99
99     7486.0bc4.b75d    0x1000001      0       0      64   0x7ffa48fb1bb8      0x7ffa48fac698
      0x7ffa48fab038      0x7ffa4838cc18          0         0  RLOC 10.255.2.1 adj_id
103
99     ec1d.8b55.f55d    0x1000001      0       0      64   0x7ffa48d065e8      0x7ffa48d01d08
      0x7ffa48c9a618      0x7ffa4838cc18          0         0  RLOC 10.255.1.11 adj_id
47
```

Confirm that Adjacency exists to Reach Tunnel Destination

The following example shows how to confirm that adjacency exists to reach Tunnel destination:

```
VTEP-1# show ip cef 10.255.1.11
10.255.1.11/32
  nexthop 10.1.1.6 TwoGigabitEthernet1/0/2
```

Troubleshooting Tenant Routed Multicast

See Troubleshoot EVPN VxLAN TRM on Catalyst 9000 Switches document to learn how to troubleshoot issues with TRM in a BGP EVPN VXLAN fabric.