Configuring EVPN VXLAN Layer 3 Overlay Network

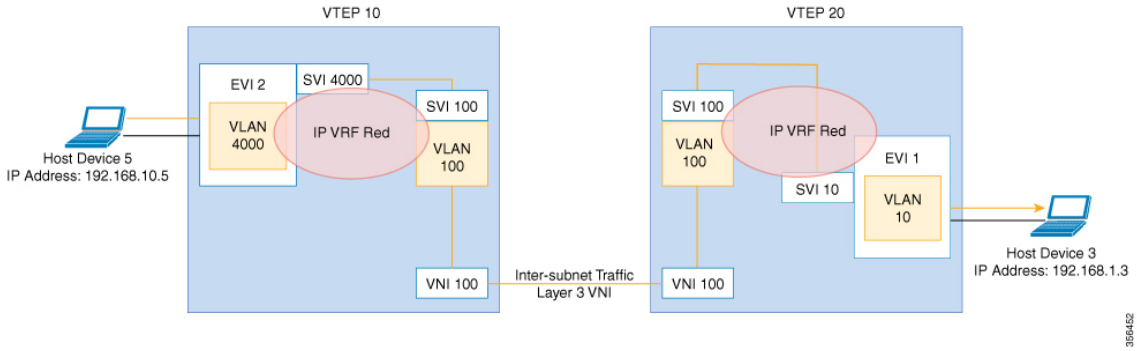
- Information About EVPN VXLAN Layer 3 Overlay Network, on page 1
- How to Configure EVPN VXLAN Layer 3 Overlay Network, on page 2
- Configuration Examples for EVPN VXLAN Layer 3 Overlay Network, on page 12
- Verifying EVPN VXLAN Layer 3 Overlay Network, on page 19

Information About EVPN VXLAN Layer 3 Overlay Network

An EVPN VXLAN Layer 3 overlay network allows host devices in different Layer 2 networks to send Layer 3 or routed traffic to each other. The network forwards the routed traffic using a Layer 3 virtual network instance (VNI) and an IP VRF.

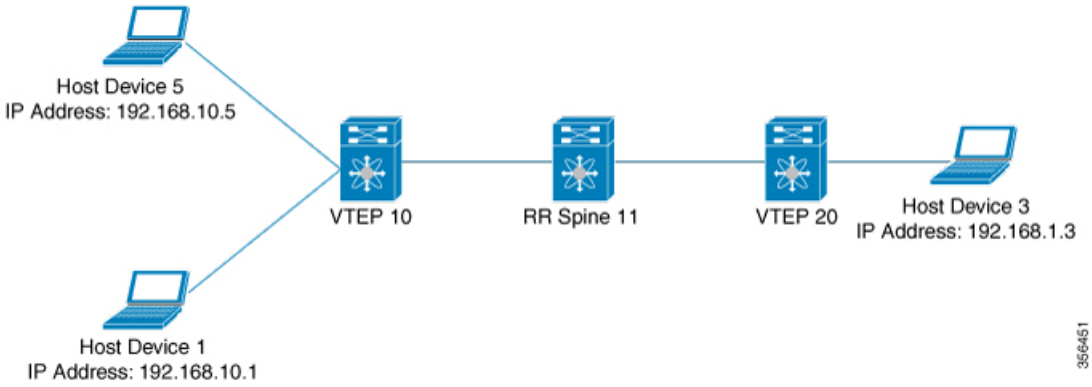
This module provides information only about how to configure a Layer 3 overlay network. You can also configure both Layer 2 and Layer 3 overlay networks together to enable integrated routing and bridging (IRB). For more information about IRB, see *Configuring EVPN VXLAN Integrated Routing and Bridging* module.

The following figure shows the movement of traffic in an EVPN VXLAN Layer 3 overlay network using a Layer 3 VNI:



How to Configure EVPN VXLAN Layer 3 Overlay Network

The following figure shows a sample topology of an EVPN VXLAN Network. Host device 3 and host device 5 are part of different subnets. The network forwards traffic from host device 1 to host device 3 using a Layer 3 VNI and an IP VRF.



Note In a two-VTEP topology, a spine switch is not mandatory. For information about configuration of spine switches in an EVPN VXLAN network, see *Configuring Spine Switches in a BGP EVPN VXLAN Fabric* module.

Perform the following set of procedures to configure an EVPN VXLAN Layer 3 overlay network:

- Configure the IP VRF on the VTEPs.
- Configure the core-facing VLAN on the VTEPs.
- Configure the access-facing VLAN on the VTEPs.
- Configure the switch virtual interface (SVI) for the core-facing VLAN.
- Configure the SVI for the access-facing VLAN.
- Configure the loopback interface on the VTEPs.
- Configure the network virtualization endpoint (NVE) interface on the VTEPs.
- Configure BGP with either IPv4 or IPv6 or both address families on the VTEPs.

Configuring an IP VRF on a VTEP

To configure an IP VRF on a VTEP, perform the following steps:

Procedure

	Command or Action	Purpose
Step 1	**enable**	Enables privileged EXEC mode.

	Command or Action	Purpose
	Example: `Device> enable`	Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**vrf definition** *vrf-name* **Example:** `Device(config)# vrf definition Green`	Enters the VRF configuration mode for the specified VRF instance.
Step 4	**rd** *vpn-route-distinguisher* **Example:** `Device(config-vrf)# rd 100:1`	Specifies the route distinguisher for the VRF instance.
Step 5	**address-family ipv4** [**multicast** | **unicast**] **Example:** `Device(config-vrf)# address-family ipv4`	Enters the IPv4 address family configuration mode.

Step 6	**route-target** {**export** | **import** | **both**} *route-target-ext-community*
	Example:
	`Device(config-vrf-af)# route-target export 100:1`
	Example:
	`Device(config-vrf-af)# route-target import 100:1`
		Creates a list of import, export, or both import and export route target communities for the specified VRF.
		Enter either an autonomous system number and an arbitrary number (xxx:y), or an IP address and an arbitrary number (A.B.C.D:y).

Step 7	**route-target** {**export** | **import** | **both**} *route-target-ext-community* **stitching**
	Example:
	`Device(config-vrf-af)# route-target export 100:1 stitching`
	Example:
	`Device(config-vrf-af)# route-target import 100:1 stitching`
		Configures importing, exporting, or both importing and exporting of EVPN route target communities for the VRF.

Step 8	**exit-address-family** **Example:** `Device(config-vrf-af)# exit-address-family`	Exits VRF address family configuration mode and enters VRF configuration mode.
Step 9	**address-family ipv6** [**multicast** | **unicast**] **Example:** `Device(config-vrf)# address-family ipv6`	Enters the IPv6 address family configuration mode.

	Command or Action	Purpose

Step 10	**route-target** {**export** | **import** | **both**} *route-target-ext-community*
	Example:
	`Device(config-vrf-af)# route-target export 100:1`
	Example:
	`Device(config-vrf-af)# route-target import 100:1`
		Creates a list of import, export, or both import and export route target communities for the specified VRF.
		Enter either an autonomous system number and an arbitrary number (xxx:y), or an IP address and an arbitrary number (A.B.C.D:y).

Step 11	**route-target** {**export** | **import** | **both**} *route-target-ext-community* **stitching**
	Example:
	`Device(config-vrf-af)# route-target export 100:1 stitching`
	Example:
	`Device(config-vrf-af)# route-target import 100:1 stitching`
		Configures importing, exporting, or both importing and exporting of VXLAN route target communities for the VRF.

Step 12	**exit-address-family** **Example:** `Device(config-vrf-af)# exit-address-family`	Exits VRF address family configuration mode and enters VRF configuration mode.
Step 13	**end** **Example:** `Device(config-vrf)# end`	Returns to privileged EXEC mode.

Configuring the Core-facing VLAN on a VTEP

To configure the core-facing VLAN on a VTEP, perform the following steps:

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**vlan configuration** *vlan-id* **Example:**	Enters VLAN feature configuration mode for the specified VLAN interface.

	Command or Action	Purpose
	`Device(config)# vlan configuration 11`	
Step 4	**member vni** *l3-vni-number* **Example:** `Device(config-vlan)# member vni 5000`	Adds EVPN instance as a member of the VLAN configuration. The VNI here is used as a Layer 3 VNI.
Step 5	**end** **Example:** `Device(config-vlan)# end`	Returns to privileged EXEC mode.

Configuring Access-facing VLAN on a VTEP

To configure the access-facing VLAN on a VTEP, perform the following steps:

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface** *interface-name* **Example:** `Device(config)# interface GigabitEthernet1/0/1`	Enters interface configuration mode for the specified interface.
Step 4	**switchport access vlan** *vlan-id* **Example:** `Device(config-if)# switchport access vlan 40`	Configures the interface as a static-access port of the specified VLAN. Interface can also be configured as a trunk interface, if required.
Step 5	**end** **Example:** `Device(config-if)# end`	Returns to privileged EXEC mode.

Configuring Switch Virtual Interface for the Core-facing VLAN

To configure an SVI for the core-facing VLAN on the VTEP:

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface vlan** *vlan-id* **Example:** `Device(config)# interface vlan 11`	Enters interface configuration mode for the specified VLAN.
Step 4	**vrf forwarding** *vrf-name* **Example:** `Device(config-if)# vrf forwarding Green`	Configures the SVI for the VLAN.
Step 5	**ip unnumbered***Loopback-interface* **Example:** `Device(config-if)# ip unnumbered Loopback0`	Enables IP processing on the Loopback interface without assigning an explicit IP address to the interface.
Step 6	**no autostate** **Example:** `Device(config-if)# no autostate`	Disables autostate on the interface. In EVPN deployments, once a VLAN is used for a core-facing SVI, it should not be allowed in any trunk. For a core-facing SVI to function properly, the **no autostate** command must be configured under the SVI.
Step 7	**end** **Example:** `Device(config-if)# end`	Returns to privileged EXEC mode.

Configuring the Switch Virtual Interface for the Access-facing VLANs

To configure the SVI for the access-facing VLAN on a VTEP, perform the following steps:

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface vlan** *vlan-id* **Example:** `Device(config)# interface vlan 40`	Enters interface configuration mode for the specified VLAN.
Step 4	**vrf forwarding** *vrf-name* **Example:** `Device(config-if)# vrf forwarding Green`	Configures the SVI for the VLAN.
Step 5	**ip address***ip-address* **Example:** `Device(config-if)# ip address 192.168.10.100 255.255.255.0`	Configures the IP address of the SVI.
Step 6	**mac-address***mac-address-value* **Example:** `Device(config-if)# mac-address aabb.cc01.f100`	(Optional) Manually sets the MAC address for the VLAN interface.
Step 7	**exit** **Example:** `Device(config-if)# exit`	Returns to global configuration mode.
Step 8	**end** **Example:** `Device(config-if)# end`	Returns to privileged EXEC mode.

Configuring the Loopback Interface on a VTEP

To configure the loopback interface on a VTEP, perform the following steps:

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**interface** *loopback-interface-id* **Example:** `Device(config)# interface Loopback0`	Enters interface configuration mode for the specified Loopback interface.
Step 4	**ip address** *ipv4-address* **Example:** `Device(config-if)# ip address 10.12.11.11 255.255.255.255`	Configures the IP address for the Loopback interface.
Step 5	**ip pim sparse mode** **Example:** `Device(config-if)# ip pim sparse mode`	(Optional) Enables Protocol Independent Multicast (PIM) sparse mode on the Loopback interface. **Note** Enable PIM sparse mode only if EVPN VXLAN Layer 2 overlay network is also configured on the VTEP with underlay multicast as the mechanism for forwarding BUM traffic.
Step 6	**end** **Example:** `Device(config-vlan)# end`	Returns to privileged EXEC mode.

Configuring the NVE Interface on a VTEP

To add a Layer 3 VNI member to the NVE interface on a VTEP, perform the following steps:

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface** *nve-interface-id* **Example:** `Device(config)# interface nve1`	Defines the interface to be configured as a trunk, and enters interface configuration mode.
Step 4	**no ip address** **Example:**	Disables IP processing on the interface by removing its IP address.

	Command or Action	Purpose
	`Device(config-if)# no ip address`	
Step 5	**source-interface** *loopback-interface-id* **Example:** `Device(config-if)# source-interface loopback0`	Sets the IP address of the specified loopback interface as the source IP address.
Step 6	**host-reachability protocol bgp** **Example:** `Device(config-if)# host-reachability protocol bgp`	Configures BGP as the host-reachability protocol on the interface. **Note** You must configure the host reachability protocol on the interface. If you do not execute this step, the VXLAN tunnel defaults to static VXLAN tunnel, which is currently not supported on the Cisco Catalyst 9000 Series switches.
Step 7	**member vni** *vni-id* **vrf** *vrf-name* **Example:** `Device(config-if)# member vni 5000 vrf Green`	Associates the Layer 3 VNI id with the NVE interface. **Note** The Layer 3 VNI id must match with the VNI id configured in the core VLAN on the VTEP.
Step 8	**end** **Example:** `Device(config-if)# end`	Returns to privileged EXEC mode.

Configuring BGP with IPv4 or IPv6 or Both Address Families on VTEP

To configure BGP on a VTEP with IPv4 or IPv6 or both address families and a spine switch as the neighbor, perform the following steps:

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

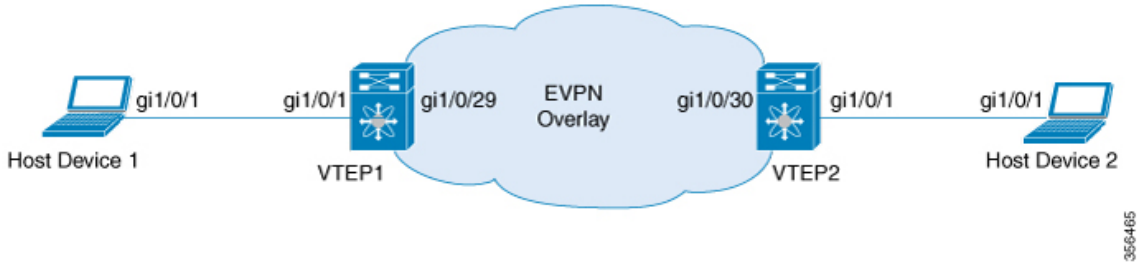
	Command or Action	Purpose
Step 3	**router bgp** *autonomous-system-number* **Example:** `Device(config)# router bgp 1`	Enables a BGP routing process, assigns it an autonomous system number, and enters router configuration mode.
Step 4	**bgp log-neighbor-changes** **Example:** `Device(config-router)# bgp log-neighbor-changes`	(Optional) Enables the generation of logging messages when the status of a BGP neighbor changes. For more information, see *Configuring BGP* module of the *IP Routing Configuration Guide*.
Step 5	**bgp update-delay** *time-period* **Example:** `Device(config-router)# bgp update-delay 1`	(Optional) Sets the maximum initial delay period before sending the first update. For more information, see *Configuring BGP* module of the *IP Routing Configuration Guide*.
Step 6	**bgp graceful-restart** **Example:** `Device(config-router)# bgp graceful-restart`	(Optional) Enables the BGP graceful restart capability for all BGP neighbors. For more information, see *Configuring BGP* module of the *IP Routing Configuration Guide*.
Step 7	**no bgp default ipv4-unicast** **Example:** `Device(config-router)# no bgp default ipv4-unicast`	(Optional) Disables default IPv4 unicast address family for BGP peering session establishment. For more information, see *Configuring BGP* module of the *IP Routing Configuration Guide*.
Step 8	**neighbor** *ip-address* **remote-as** *number* **Example:** `Device(config-router)# neighbor 10.11.11.11 remote-as 1`	Defines multiprotocol-BGP neighbors. Under each neighbor, define the configuration. Use the IP address of the spine switch as the neighbor IP address.
Step 9	**neighbor** {*ip-address* | *group-name*} **update-source** *interface* **Example:** `Device(config-router)# neighbor 10.11.11.11 update-source Loopback0`	Configures update source. Update source can be configured per neighbor or per peer-group. Use the IP address of the spine switch as the neighbor IP address.
Step 10	**address-family l2vpn evpn** **Example:** `Device(config-router)# address-family l2vpn evpn`	Specifies the L2VPN address family and enters address family configuration mode.
Step 11	**neighbor** *ip-address* **activate** **Example:** `Device(config-router-af)# neighbor 10.11.11.11 activate`	Enables the exchange information from a BGP neighbor. Use the IP address of the spine switch as the neighbor IP address.

	Command or Action	Purpose
Step 12	**neighbor** *ip-address* **send-community** [**both** | **extended** | **standard**] **Example:** `Device(config-router-af)# neighbor 10.11.11.11 send-community both`	Specifies the communities attribute sent to a BGP neighbor. Use the IP address of the spine switch as the neighbor IP address.
Step 13	**exit-address-family** **Example:** `Device(config-router-af)# exit-address-family`	Exits address family configuration mode and returns to router configuration mode.
Step 14	**address-family ipv4 vrf** *vrf-name* **Example:** `Device(config-router)# address-family ipv4 vrf Green`	Specifies the IPv4 address family and enters address family configuration mode.
Step 15	**advertise l2vpn evpn** **Example:** `Device(config-router-af)# advertise l2vpn evpn`	Advertises Layer 2 VPN EVPN routes within a tenant VRF in an EVPN VXLAN fabric.
Step 16	**redistribute connected** **Example:** `Device(config-router-af)# redistribute connected`	(Optional) Redistributes connected routes to BGP.
Step 17	**redistribute static** **Example:** `Device(config-router-af)# redistribute static`	(Optional) Redistributes static routes to BGP.
Step 18	**exit-address-family** **Example:** `Device(config-router-af)# exit-address-family`	Exits address family configuration mode and returns to router configuration mode.
Step 19	**address-family ipv6 vrf** *vrf-name* **Example:** `Device(config-router)# address-family ipv6 vrf green`	Specifies the IPv6 address family and enters address family configuration mode.
Step 20	**advertise l2vpn evpn** **Example:** `Device(config-router-af)# advertise l2vpn evpn`	Advertises Layer 2 VPN EVPN routes within a tenant VRF in an EVPN VXLAN fabric.

	Command or Action	Purpose
Step 21	**redistribute connected** **Example:** `Device(config-router-af)# redistribute connected`	(Optional) Redistributes connected routes to BGP.
Step 22	**redistribute static** **Example:** `Device(config-router-af)# redistribute static`	(Optional) Redistributes static routes to BGP.
Step 23	**exit-address-family** **Example:** `Device(config-router-af)# exit-address-family`	Exits address family configuration mode and returns to router configuration mode.
Step 24	**end** **Example:** `Device(config-router)# end`	Returns to privileged EXEC mode.

Configuration Examples for EVPN VXLAN Layer 3 Overlay Network

This section provides an example for configuring an EVPN VXLAN Layer 3 overlay network. This example shows a sample configuration for a VXLAN network with 2 VTEPs, VTEP 1 and VTEP 2, connected to perform routing.



Note In a two-VTEP topology, a spine switch is not mandatory. For information about configuration of spine switches in an EVPN VXLAN network, see *Configuring Spine Switches in a BGP EVPN VXLAN Fabric* module.

Table 1: Configuration Example for a VXLAN Network with Two VTEPs Connected to Perform Routing

VTEP 1	VTEP 2

VTEP 1	VTEP 2
VTEP1# **show running-config** ! hostname VTEP1 ! ! vrf definition green rd 103:2 ! address-family ipv4 route-target export 103:2 route-target import 104:2 route-target export 103:2 stitching route-target import 104:2 stitching exit-address-family ! address-family ipv6 route-target export 103:2 route-target import 104:2 route-target export 103:2 stitching route-target import 104:2 stitching exit-address-family ! ip multicast-routing ipv6 unicast-routing ! ! system mtu 9150 ! vlan configuration 200 member vni 5000 ! ! interface Loopback0 ip address 10.1.1.10 255.255.255.255 ip pim sparse-mode ! interface Loopback13 description demo only (for rt5 distribution) vrf forwarding green ip address 10.1.13.13 255.255.255.0 ! interface GigabitEthernet1/0/1 description access interface switchport access vlan 201 switchport mode access ! ! interface GigabitEthernet1/0/29 description core-underlay-interface no switchport ip address 172.16.1.29 255.255.255.0 ip pim sparse-mode ! ! interface Vlan200 description core svi for l3vni vrf forwarding green ip unnumbered Loopback0 ipv6 enable no autostate ! interface Vlan201	VTEP2# **show running-config** ! hostname VTEP2 ! ! vrf definition green rd 104:2 ! address-family ipv4 route-target export 104:2 route-target import 103:2 route-target export 104:2 stitching route-target import 103:2 stitching exit-address-family ! address-family ipv6 route-target export 104:2 route-target import 103:2 route-target export 104:2 stitching route-target import 103:2 stitching exit-address-family ! ip multicast-routing ipv6 unicast-routing ! ! system mtu 9150 ! vlan configuration 200 member vni 5000 ! ! interface Loopback0 ip address 10.2.2.20 255.255.255.255 ip pim sparse-mode ! interface Loopback14 description demo only (for rt5 distribution) vrf forwarding green ip address 10.1.14.14 255.255.255.0 ! interface GigabitEthernet1/0/1 description access interface switchport access vlan 202 switchport mode access ! ! interface GigabitEthernet1/0/30 description core-underlay-interface no switchport ip address 172.16.1.30 255.255.255.0 ip pim sparse-mode ! ! interface Vlan200 description core svi for l3vni vrf forwarding green ip unnumbered Loopback0 ipv6 enable no autostate ! interface Vlan202

VTEP 1	VTEP 2
description access-svi vrf forwarding green ip address 192.168.1.201 255.255.255.0 ipv6 address 2001:DB8:201::201/64 ipv6 enable ! interface nve10 no ip address source-interface Loopback0 host-reachability protocol bgp member vni 5000 vrf green ! router ospf 1 router-id 10.1.1.10 network 10.1.1.0 0.0.0.255 area 0 network 172.16.1.0 0.0.0.255 area 0 ! router bgp 10 bgp router-id interface Loopback0 bgp log-neighbor-changes bgp update-delay 1 no bgp default ipv4-unicast neighbor 10.2.2.20 remote-as 10 neighbor 10.2.2.20 update-source Loopback0 ! address-family ipv4 exit-address-family ! address-family l2vpn evpn neighbor 10.2.2.20 activate neighbor 10.2.2.20 send-community both exit-address-family ! address-family ipv4 vrf green advertise l2vpn evpn redistribute connected redistribute static exit-address-family ! address-family ipv6 vrf green redistribute connected redistribute static advertise l2vpn evpn exit-address-family ! ip pim rp-address 10.1.1.10 ! ! end	description access-svi vrf forwarding green ip address 192.168.2.202 255.255.255.0 ipv6 address 2001:DB8:202::202/64 ipv6 enable ! interface nve10 no ip address source-interface Loopback0 host-reachability protocol bgp member vni 5000 vrf green ! router ospf 1 router-id 10.2.2.20 network 10.2.2.0 0.0.0.255 area 0 network 172.16.1.0 0.0.0.255 area 0 ! router bgp 10 bgp router-id interface Loopback0 bgp log-neighbor-changes bgp update-delay 1 no bgp default ipv4-unicast neighbor 10.1.1.10 remote-as 10 neighbor 10.1.1.10 update-source Loopback0 ! address-family ipv4 exit-address-family ! address-family l2vpn evpn neighbor 10.1.1.10 activate neighbor 10.1.1.10 send-community both exit-address-family ! address-family ipv4 vrf green advertise l2vpn evpn redistribute connected redistribute static exit-address-family ! address-family ipv6 vrf green redistribute connected redistribute static advertise l2vpn evpn exit-address-family ! ip pim rp-address 10.1.1.10 ! ! end

The following examples provide outputs for **show** commands on VTEP 1 and VTEP 2 in the topology configured above.

- show nve peers, on page 16
- show bgp l2vpn evpn all, on page 16
- show ip route vrf, on page 17
- show platform software fed switch active matm mactable vlan, on page 18

show nve peers

VTEP 1

The following example shows the output for the **show nve peers** command on VTEP 1:

```
VTEP1# show nve peers
Interface  VNI      Type Peer-IP          RMAC/Num_RTs   eVNI     state flags UP time
nve10      5000     L3CP 10.2.2.20        380e.4d9b.6a4a 5000       UP  A/M/4 00:38:37
nve10      5000     L3CP 10.2.2.20        380e.4d9b.6a4a 5000       UP  A/-/6 00:03:16
```

VTEP 2

The following example shows the output for the **show nve peers** command on VTEP 2:

```
VTEP2# show nve peers
Interface  VNI      Type Peer-IP          RMAC/Num_RTs   eVNI     state flags UP time
nve10      5000     L3CP 10.1.1.10        a0f8.4910.bce2 5000       UP  A/-/4 00:38:53
nve10      5000     L3CP 10.1.1.10        a0f8.4910.bce2 5000       UP  A/M/6 00:38:53
```

show bgp l2vpn evpn all

VTEP 1

The following example shows the output for the **show bgp l2vpn evpn all** all command on VTEP 1:

```
VTEP1# show bgp l2vpn evpn all
BGP table version is 26, local router ID is 10.1.1.10
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
              x best-external, a additional-path, c RIB-compressed,
              t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

     Network          Next Hop            Metric LocPrf Weight Path
Route Distinguisher: 103:2 (default for vrf green)
 *>   [5][103:2][0][24][10.1.13.0]/17
                       0.0.0.0                  0         32768 ?
 *>   [5][103:2][0][24][192.168.1.0]/17
                       0.0.0.0                  0         32768 ?
 *>   [5][103:2][0][64][2001:DB8:201::]/29
                       ::                       0         32768 ?
Route Distinguisher: 104:2
 *>i  [5][104:2][0][24][10.1.14.0]/17
                       10.2.2.20                0    100      0 ?
 *>i  [5][104:2][0][24][192.168.2.0]/17
                       10.2.2.20                0    100      0 ?
 *>i  [5][104:2][0][64][2001:DB8:202::]/29
                       10.2.2.20                0    100      0 ?
```

VTEP 2

The following example shows the output for the **show bgp l2vpn evpn all** command on VTEP 2:

```
VTEP2# show bgp l2vpn evpn all
BGP table version is 12, local router ID is 10.2.2.20
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
              x best-external, a additional-path, c RIB-compressed,
              t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

     Network          Next Hop            Metric LocPrf Weight Path
Route Distinguisher: 103:2
 *>i  [5][103:2][0][24][10.1.13.0]/17
                      10.1.1.10                0    100      0 ?
 *>i  [5][103:2][0][24][192.168.1.0]/17
                      10.1.1.10                0    100      0 ?
 *>i  [5][103:2][0][64][2001:DB8:201::]/29
                      10.1.1.10                0    100      0 ?
Route Distinguisher: 104:2 (default for vrf green)
 *>   [5][104:2][0][24][10.1.14.0]/17
                      0.0.0.0                  0         32768 ?
 *>   [5][104:2][0][24][192.168.2.0]/17
                      0.0.0.0                  0         32768 ?
 *>   [5][104:2][0][64][2001:DB8:202::]/29
     Network          Next Hop            Metric LocPrf Weight Path
                      ::                       0         32768 ?
```

show ip route vrf

VTEP 1

The following example shows the output for the **show ip route vrf** command on VTEP 1:

```
VTEP1# show ip route vrf green
Routing Table: green
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

Gateway of last resort is not set

      10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
C        10.1.13.0/24 is directly connected, Loopback13
L        10.1.13.13/32 is directly connected, Loopback13
B        10.1.14.0/24 [200/0] via 10.2.2.20, 00:42:01, Vlan200
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.1.0/24 is directly connected, Vlan201
L        192.168.1.201/32 is directly connected, Vlan201
B     192.168.2.0/24 [200/0] via 10.2.2.20, 00:06:00, Vlan200
```

VTEP 2

The following example shows the output for the **show ip route vrf** command on VTEP 2:

```
VTEP2# show ip route vrf green
Routing Table: green
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

Gateway of last resort is not set

      10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
B        10.1.13.0/24 [200/0] via 10.1.1.10, 00:42:38, Vlan200
C        10.1.14.0/24 is directly connected, Loopback14
L        10.1.14.14/32 is directly connected, Loopback14
B     192.168.1.0/24 [200/0] via 10.1.1.10, 00:42:38, Vlan200
      192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.2.0/24 is directly connected, Vlan202
L        192.168.2.202/32 is directly connected, Vlan202
```

show platform software fed switch active matm mactable vlan

VTEP 1

The following example shows the output for the **show platform software fed switch active matm mactable vlan 200** command on VTEP 1:

Note The MAC address of the peer's core SVI interface must be present in the core VLAN.

```
VTEP1# show platform software fed switch active matm macTable vlan 200
VLAN   MAC                  Type  Seq#   EC_Bi  Flags  machandle          siHandle
      riHandle           diHandle             *a_time  *e_time  ports

-------------------------------------------------------------------------------------------------------------------------------
200    a0f8.4910.bce2      0x8002      0  19880     64  0x7f5d8503fd48      0x7f5d852b6d28
      0x0                0x5234                      0        0  Vlan200

200    380e.4d9b.6a4a   0x1000001      0      0     64  0x7f5d85117598      0x7f5d85110f78
      0x7f5d851b9648      0x0                         0        0  RLOC 10.2.2.20 adj_id 22


Total Mac number of addresses:: 2
```

VTEP 2

The following example shows the output for the **show platform software fed switch active matm mactable vlan 200** command on VTEP 2:

Note The MAC address of the peer's core SVI interface must be present in the core VLAN.

```
VTEP2# show platform software fed switch active matm macTable vlan 200
VLAN   MAC                  Type  Seq#   EC_Bi  Flags  machandle          siHandle
      riHandle            diHandle              *a_time  *e_time  ports

200    380e.4d9b.6a4a      0x8002      0  42949     64  0x7f40e15fd308      0x7f40e15f49d8
      0x0                 0x0                         0        0  Vlan200

200    a0f8.4910.bce2   0x1000001      0      0     64  0x7f40e193c478      0x7f40e1938168
      0x7f40e1937bf8      0x0                         0        0  RLOC 10.1.1.10 adj_id 86


Total Mac number of addresses:: 2
```

Verifying EVPN VXLAN Layer 3 Overlay Network

The following table lists the **show** commands that are used to verify a Layer 3 VXLAN overlay network:

Table 2: Commands to Verify EVPN VXLAN Layer 3 Overlay Network

Command	Purpose
show nve vni	Displays information about VXLAN network identifier members associated with an NVE interface.
show nve vni *vni-id* **detail**	Displays detailed NVE interface state information for a VXLAN network identifier member.
show nve peers	Displays NVE interface state information for peer leaf switches.
show mac address-table vlan *vlan-id*	Displays MAC addresses for a VLAN.
show platform software fed switch active matm macTable vlan *vlan-id*	Displays MAC addresses for a VLAN from MAC address table manager database for Forwarding Engine Driver (FED).
show ip route vrf *vrf-name*	Displays the IP routing table associated with a specific VRF.
show ip cef vrf *vrf-name*	Displays entries in the Cisco Express Forwarding (CEF) table associated with a VRF.
show arp vrf *vrf-name*	Displays entries in the Address Resolution Protocol (ARP) table associated with a VRF.
show bgp l2vpn evpn route-type 5	Displays BGP information for route type 5 of Layer 2 VPN EVPN address family.

Command	Purpose
show bgp l2vpn evpn all	Displays all BGP information for L2VPN EVPN address family.