

配置和验证使用 MP-BGP EVPN 控制平面的 VXLAN。

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简介

本文描述了使用MP-BGP EVPN控制平面的VXLAN配置，它显示了一个示例网络场景及其配置，其中包含相关输出，以供验证和更好地了解。

先决条件

要求

Cisco 建议您了解以下主题：

- MPLS 第 3 层 VPN
- MP-BGP 当然会有所帮助。

使用的组件

本文档不限于特定的软件和硬件版本。

本文档不限于特定的软件和硬件版本。本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

背景信息

VXLAN 旨在实现网络虚拟化。它是 UDP 封装形式的 MAC。第 2 层基础设施扩展到第 3 层底层网络上，以提供简化的服务，不受数据中心内服务器的物理和地理位置限制。

本文档介绍带 MP-BGP EVPN 控制平面的 VXLAN。这意味着在重叠基础设施中使用 BGP 协议来发送和接收更新。

传统的网络部署中会使用 STP，这会导致某些上行链路永久处于阻塞状态。在 VXLAN 设计中，所有上行链路均正常运行，并且 ECMP 得到利用，因为底层基础设施是 IP 网络。

本文档不全面讨论这些细节，但会讨论下面的一些重要术语。

VXLAN - 虚拟可扩展局域网。

MP-BGP — 多协议 BGP。

EVPN — 以太网 VPN。

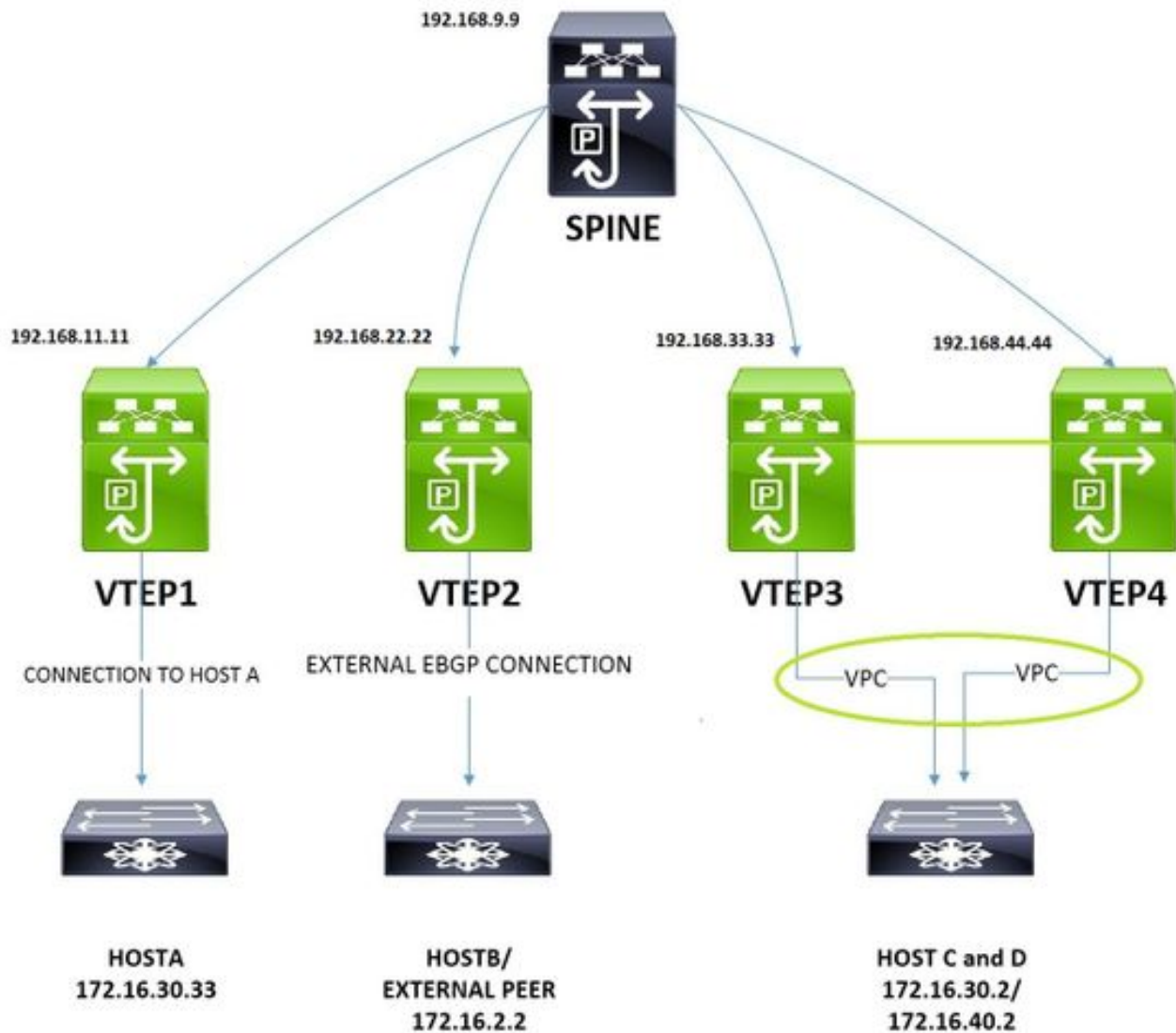
VTEP — 虚拟隧道终端。也称为枝叶。这是数据包的封装和解封位置。

主干 - 这与 MPLS L3 VPN 中的路由反射器非常相似。此设备从一个 VTEP 获取更新并将其传递到其他 VTEP。

VNI - VXLAN 网络标识符。这主要用于为第 2 层边界提供隔离。此字段的长度为 24 位，因此它消除了传统 VLAN 存在的范围限制。VTEP 中的 VNI 被“映射”到传统 VLAN。后面将讨论这一点。

配置

网络图



上图用于配置和验证方面。此图从 VXLAN 基础设施的角度介绍了非 VPC、VPC、VNI 内、VNI 间和外部连接配置。

配置

VTEP1

! Enabling features

```

nv overlay evpn
feature ospf
feature bgp
feature pim
feature interface-vlan
feature vn-segment-vlan-based
feature lacp
feature vpc
feature nv overlay
!
fabric forwarding anycast-gateway-mac 0001.0001.0001 ! This is needed for seamless VM mobility
across VTEPS, this configuration is same on all VTEPS.
ip pim rp-address 192.168.9.9 group-list 224.0.0.0/4 ! SPINE is the RP.
!
ip pim ssm range 232.0.0.0/8

```

```

!
vlan 1,10,30,40,100,200
!
vlan 10 ! VLAN 10 is used as layer3 VNI to route Inter-VNI traffic.
name L3-VNI-VLAN-10
vn-segment 10000010
vlan 30 ! The Host A resides on Vlan 30, The below command 'maps' vlan 30 with VNID 10000030.
vn-segment 10000030
!
vrf context EVPN-L3-VNI-VLAN-10 ! Defining layer3 vrf for Inter-VNI traffic.
vni 10000010
rd auto
address-family ipv4 unicast
route-target both auto
route-target both auto evpn
!
interface Vlan10 ! Layer3 VNI associated interface vlan does not have an ip address.
no shutdown
vrf member EVPN-L3-VNI-VLAN-10
ip forward
!
interface Vlan30 ! Associating the Host A Vlan with layer3 vrf.
no shutdown
vrf member EVPN-L3-VNI-VLAN-10
ip address 172.16.30.1/24
fabric forwarding mode anycast-gateway ! This is needed for seamless VM mobility across VTEPS, same on all VTEPS.
!
interface nve1 ! Nve is logical interface where VXLAN packets are encapsulated and decapsulated.
no shutdown
source-interface loopback2
host-reachability protocol bgp ! This means BGP control plane is used to exchange updates.
member vni 10000010 associate-vrf ! associate-vrf is used for for layer3 vni.
member vni 10000030
suppress-arp
mcast-group 239.1.1.10 ! A vlan or set of vlans mapped to VNI can be given identical multicast address, this is used for controlled flooding of arp requests.
!
interface Ethernet1/2 ! Ospf with PIM is used as Underlay.
description "Going to Spine"
no switchport
ip address 192.168.19.1/24
ip router ospf UNDERLAY area 0.0.0.0
ip pim sparse-mode
no shutdown
!
interface Ethernet1/11 ! Port to Host A.
switchport mode trunk
!
interface loopback2 ! Loopback for BGP Peering.
description "Loopback for "BGP"
ip address 192.168.11.11/32
ip router ospf UNDERLAY area 0.0.0.0
ip pim sparse-mode
!
router ospf UNDERLAY
!
router bgp 65000
address-family ipv4 unicast
address-family l2vpn evpn
neighbor 192.168.9.9 ! Peering with SPINE.
remote-as 65000
update-source loopback2
address-family ipv4 unicast

```

```
address-family l2vpn evpn
send-community extended
vrf EVPN-L3-VNI-VLAN-10
address-family ipv4 unicast
advertise l2vpn evpn
!
evpn
vni 10000030 l2
rd auto ! RD is default calculated as VNI:BGP Router ID
route-target import auto ! RT is default calculated as BGP AS:VNI
route-target export auto
```

VTEP2

```
!
nv overlay evpn
feature ospf
feature bgp
feature pim
feature interface-vlan
feature vn-segment-vlan-based
feature lacp
feature vpc
feature nv overlay
!
fabric forwarding anycast-gateway-mac 0001.0001.0001
!
ip pim rp-address 192.168.9.9 group-list 224.0.0.0/4
!
ip pim ssm range 232.0.0.0/8
vlan 1,10,30,40,100
!
vlan 10 ! This VTEP is dedicated for external connectivity, there is only layer3 VNI config.
name L3-VNI-VLAN-10
vn-segment 10000010
!
vrf context EVPN-L3-VNI-VLAN-10 ! Defining layer3 vrf for Inter-VNI traffic.
vni 10000010
rd auto
address-family ipv4 unicast
route-target both auto
route-target both auto evpn
!
interface Vlan10 ! Layer3 VNI associated interface vlan does not have an ip address.
no shutdown
vrf member EVPN-L3-VNI-VLAN-10
ip forward
!
interface Vlan100 ! This vlan is used to peer with external EBGP Peer.
no shutdown
vrf member EVPN-L3-VNI-VLAN-10
ip address 192.168.1.2/24
!
interface nve1
no shutdown
source-interface loopback2
host-reachability protocol bgp
member vni 10000010 associate-vrf
!
interface Ethernet1/2 ! Ospf and PIM are used in Underlay.
description "Going to Spine"
no switchport
ip address 192.168.29.2/24
```

```

ip router ospf UNDERLAY area 0.0.0.0
ip pim sparse-mode
no shutdown
!
interface Ethernet1/12 ! Port to External Peer.
switchport mode trunk
!
interface loopback2
ip address 192.168.22.22/32
ip router ospf UNDERLAY area 0.0.0.0
ip pim sparse-mode
!
router ospf UNDERLAY
!
router bgp 65000
address-family ipv4 unicast
address-family l2vpn evpn
neighbor 192.168.9.9 ! Peering with SPINE.
remote-as 65000
update-source loopback2
address-family ipv4 unicast
address-family l2vpn evpn
send-community extended
vrf EVPN-L3-VNI-VLAN-10
address-family ipv4 unicast
advertise l2vpn evpn
neighbor 192.168.1.1 ! Peering with External Peer, under vrf.
remote-as 65111
update-source Vlan100
address-family ipv4 unicast

```

VTEP3

针对 VTEP3 和 VTEP1 的配置几乎完全相同。唯一的区别是 VPC 以及用于 vlan 40 的额外第 2 层 VNI。

```

!
nv overlay evpn
feature ospf
feature bgp
feature pim
feature interface-vlan
feature vn-segment-vlan-based
feature lacp
feature vpc
feature nv overlay
!
fabric forwarding anycast-gateway-mac 0001.0001.0001
!
ip pim rp-address 192.168.9.9 group-list 224.0.0.0/4
!
ip pim ssm range 232.0.0.0/8
!
vlan 1,10,20,30,40
!
vlan 10
name L3-VNI-VLAN-10
vn-segment 10000010
!
vlan 30
vn-segment 10000030
!

```

```
vlan 40 ! New host vlan 40.
vn-segment 10000040
!
vpc domain 2 ! Vpc Configs.
peer-keepalive destination 10.197.204.103 source 10.197.204.106
!
interface Vlan10
no shutdown
vrf member EVPN-L3-VNI-VLAN-10
ip forward
!
interface Vlan30
no shutdown
vrf member EVPN-L3-VNI-VLAN-10
ip address 172.16.30.1/24
!
fabric forwarding mode anycast-gateway
!
interface Vlan40
no shutdown
vrf member EVPN-L3-VNI-VLAN-10
ip address 172.16.40.1/24
!
fabric forwarding mode anycast-gateway
!
interface port-channel2
switchport mode trunk
vpc 2
!
interface port-channel34
switchport mode trunk
spanning-tree port type network
vpc peer-link
!
interface nve1
no shutdown
source-interface loopback2
host-reachability protocol bgp
member vni 10000010 associate-vrf
member vni 10000030
suppress-arp
mcast-group 239.1.1.10
member vni 10000040 !New layer2 VNI for Vlan 40.
suppress-arp
mcast-group 239.1.1.20
!
interface Ethernet1/1 ! Connected to VTEP4.
switchport mode trunk
channel-group 34 mode active
!
interface Ethernet1/2
description "going to Spine"
no switchport
ip address 192.168.39.3/24
ip router ospf UNDERLAY area 0.0.0.0
ip pim sparse-mode
no shutdown
!
interface Ethernet1/13 ! Connected to N5K, which simulates Host C and D.
switchport mode trunk
channel-group 2 mode active
!
interface loopback2
description "loopback for Bgp"
```

```

ip address 192.168.33.33/32
ip address 192.168.33.34/32 secondary! For other VTEPs VTEP3 and VTEP4 will look as single entity.
ip router ospf UNDERLAY area 0.0.0.0!This secondary address is needed in Vpc designs.
!
router ospf UNDERLAY
!
router bgp 65000
address-family ipv4 unicast
address-family l2vpn evpn
neighbor 192.168.9.9 remote-as 100
remote-as 65000
update-source loopback2
address-family ipv4 unicast
address-family l2vpn evpn
send-community extended
vrf EVPN-L3-VNI-VLAN-10
address-family ipv4 unicast
advertise l2vpn evpn
!
evpn
vni 10000030 l2
rd auto
route-target import auto
route-target export auto
vni 10000040 l2
rd auto
route-target import auto
route-target export auto

```

VTEP4

```

!
nv overlay evpn
feature ospf
feature bgp
feature pim
feature interface-vlan
feature vn-segment-vlan-based
feature lacp
feature vpc
feature nv overlay
!
fabric forwarding anycast-gateway-mac 0001.0001.0001
!
ip pim rp-address 192.168.9.9 group-list 224.0.0.0/4
!
ip pim ssm range 232.0.0.0/8
!
vlan 1,10,20,30,40
!
vlan 10
name L3-VNI-VLAN-10
vn-segment 10000010
!
vlan 30
vn-segment 10000030
!
vlan 40
vn-segment 10000040
!
vrf context EVPN-L3-VNI-VLAN-10

```



```
vni 10000010
rd auto
address-family ipv4 unicast
route-target both auto
route-target both auto evpn
!
interface Vlan10
no shutdown
vrf member EVPN-L3-VNI-VLAN-10
ip forward
!
interface Vlan30
no shutdown
vrf member EVPN-L3-VNI-VLAN-10
ip address 172.16.30.1/24
!
fabric forwarding mode anycast-gateway
!
interface Vlan40
no shutdown
vrf member EVPN-L3-VNI-VLAN-10
ip address 172.16.40.1/24
!
fabric forwarding mode anycast-gateway
!
interface port-channel2
switchport mode trunk
vpc 2
!
interface port-channel34
switchport mode trunk
spanning-tree port type network
vpc peer-link
!
interface nve1
no shutdown
source-interface loopback2
host-reachability protocol bgp
member vni 10000010 associate-vrf
member vni 10000030
suppress-arp
mcast-group 239.1.1.10
member vni 10000040
suppress-arp
mcast-group 239.1.1.20
!
interface Ethernet1/1 ! Connected to VTEP3.
switchport mode trunk
channel-group 34 mode active
!
interface Ethernet1/2
description "going to spine"
no switchport
ip address 192.168.49.4/24
ip router ospf UNDERLAY area 0.0.0.0
ip pim sparse-mode
no shutdown
!
interface Ethernet1/13 ! Connected to N5K, which simulates Host C and D.
switchport mode trunk
channel-group 2 mode active
!
router ospf UNDERLAY
!
```

```
router bgp 65000
address-family ipv4 unicast
address-family l2vpn evpn
neighbor 192.168.9.9 remote-as 100
remote-as 65000
update-source loopback2
address-family ipv4 unicast
address-family l2vpn evpn
send-community extended
vrf EVPN-L3-VNI-VLAN-10
address-family ipv4 unicast
advertise l2vpn evpn
!
evpn
vni 10000030 l2
rd auto
route-target import auto
route-target export auto
vni 10000040 l2
rd auto
route-target import auto
route-target export auto
```

主干

```
!
nv overlay evpn
feature ospf
feature bgp
feature pim
feature interface-vlan
feature vn-segment-vlan-based
feature lacp
feature vpc
feature nv overlay
!
ip pim rp-address 192.168.9.9 group-list 224.0.0.0/4
!
ip pim ssm range 232.0.0.0/8
!
interface Ethernet1/1 ! To VTEP1.
ip address 192.168.19.9/24
ip router ospf UNDERLAY area 0.0.0.0
ip pim sparse-mode
no shutdown
!
interface Ethernet1/2 ! To VTEP2.
ip address 192.168.29.9/24
ip router ospf UNDERLAY area 0.0.0.0
ip pim sparse-mode
no shutdown
!
interface Ethernet1/3 ! To VTEP3.
ip address 192.168.39.9/24
ip router ospf UNDERLAY area 0.0.0.0
ip pim sparse-mode
no shutdown
!
interface Ethernet1/4 ! To VTEP4.
ip address 192.168.49.9/24
ip router ospf UNDERLAY area 0.0.0.0
ip pim sparse-mode
no shutdown
```

```

!
interface loopback1 ! SPINE is RP(Rendezvous Point).
ip address 192.168.9.9/32
ip router ospf UNDERLAY area 0.0.0.0
ip pim sparse-mode
!
router ospf UNDERLAY
!
router bgp 65000
log-neighbor-changes
address-family ipv4 unicast
address-family l2vpn evpn
retain route-target all
template peer VTEP-PEERS
remote-as 65000
update-source loopback1
address-family ipv4 unicast
send-community both
route-reflector-client ! Spine treats VTEPs as Route-Reflector Clients.
address-family l2vpn evpn
send-community both
route-reflector-client
neighbor 192.168.11.11 ! VTEP1.
inherit peer VTEP-PEERS
neighbor 192.168.22.22 ! VTEP2.
inherit peer VTEP-PEERS
neighbor 192.168.33.33 ! VTEP3.
inherit peer VTEP-PEERS
neighbor 192.168.44.44 ! VTEP4.
inherit peer VTEP-PEERS

```

主机 A

主机 A 用 3750 交换机模拟。

```

! This port is the uplink to VTEP1.
interface GigabitEthernet1/0/1
switchport trunk encapsulation dot1q
switchport mode trunk
!
interface Vlan30
ip address 172.16.30.33 255.255.255.0
!
! Below the default route to VTEP1.
ip route 0.0.0.0 0.0.0.0 172.16.30.1

```

主机 B

主机 B 是外部对等设备（此示例中使用的是 N5K）。

```

!
router bgp 65111
address-family ipv4 unicast
!
network 172.16.2.2/32 ! Advertsing the external subnet to VXLAN infrastructure.
neighbor 192.168.1.2 remote-as 65000 ! EBGP Peering with VTEP2.
address-family ipv4 unicast
!
interface loopback1
ip address 172.16.2.2/32

```

```
!  
interface Ethernet1/19 ! Uplink port to VTEP2.  
switchport mode trunk  
!  
interface Vlan100  
no shutdown  
ip address 192.168.1.1/24
```

主机 C 和 D

主机 C 和 D 用 Nexus5k 模拟 (将 IP 地址保留在不同的 vrf 中) 。

```
!  
vrf context vni30 ! This vrf simulates the HOST C.  
ip route 0.0.0.0/0 172.16.30.1  
vrf context vni40 ! This vrf simulates the HOST D.  
ip route 0.0.0.0/0 172.16.40.1  
!  
interface Vlan30 ! Addressing for HOST C.  
no shutdown  
vrf member vni30  
ip address 172.16.30.2/24  
!  
interface Vlan40 ! Addressing for HOST D.  
no shutdown  
vrf member vni40  
ip address 172.16.40.2/24  
!  
interface Ethernet1/20 ! Uplink port to VTEP3 in Port-Channel.  
switchport mode trunk  
channel-group 2 mode active  
!  
interface Ethernet1/21 ! Uplink port to VTEP4 in Port-Channel.  
switchport mode trunk  
channel-group 2 mode active< /pre>
```

验证

从主机 A 到外部主机 B 的连接

```
HOST_A#ping 172.16.2.2  
Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 172.16.2.2, timeout is 2 seconds:  
!!!!  
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/4/9 ms
```

从主机 A 到主机 C 的连接 (内部 VNI)

```
HOST_A#ping 172.16.30.2  
Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 172.16.30.2, timeout is 2 seconds:  
!!!!  
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/4/9 ms
```

从主机 A 到主机 D 的连接 (VNI 间)

```
HOST_A#ping 172.16.40.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.40.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/9 ms
```

主机 B 的路由表 (外部对等体)

```
N5K-5672-1# show ip route bgp
IP Route Table for VRF "default"
'*' denotes best ucast next-hop
 '**' denotes best mcast next-hop
 '[x/y]' denotes [preference/metric]
 '%<string>' in via output denotes VRF <string>
172.16.30.2/32, ubest/mbest: 1/0, pending ! Host route for Host C.
 *via 192.168.1.2, [20/0], 00:00:22, bgp-65100, external, tag 65000,
172.16.30.33/32, ubest/mbest: 1/0, pending ! Host route for Host A.
 *via 192.168.1.2, [20/0], 00:00:22, bgp-65100, external, tag 65000,
172.16.40.2/32, ubest/mbest: 1/0, pending ! Host route for Host D.
 *via 192.168.1.2, [20/0], 00:00:22, bgp-65100, external, tag 65000,
```

可以观察到主机路由已成功通告到此外部 BGP 对等体。

验证控制平面。

- 此命令将显示具有 VNID 的传统 VLAN 的“映射”。

```
VTEP1# show vxlan
Vlan VN-Segment
==== =====
10 10000010
30 10000030
40 10000040
```

- 接下来检查是否在 VTEP 上本地获知 MAC。

```
VTEP1# show mac address-table vlan 30
Legend:
* - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
age - seconds since last seen,+ - primary entry using vPC Peer-Link,
(T) - True, (F) - False
VLAN MAC Address Type age Secure NTFY Ports
-----+-----+-----+-----+-----+-----+-----
* 30 0006.f63f.e3c1 dynamic 0 F F Eth1/11 ! Mac of HOST A
* 30 8c60.4ff2.f541 dynamic 0 F F nve1(192.168.33.34)! Mac of HOST C installed into mac
address table, it was learned from BGP.
G 30 e00e.da2a.2393 static - F F sup-eth1(R)
```

- 接下来检查路由是否已安装到 I2rib 中。

```
VTEP1# show l2route evpn mac evi 30
Mac Address Prod Next Hop (s)
-----
0006.f63f.e3c1 Local Eth1/11 ! Mac of HOST A installed into l2rib.
8c60.4ff2.f541 BGP 192.168.33.34 ! Mac of HOST C installed into l2rib learnt via BGP.
```

```
VTEP1# show l2route evpn mac-ip evi 30
Mac Address Prod Host IP Next Hop (s)
```

```
-----
0006.f63f.e3c1 HMM 172.16.30.33 N/A
8c60.4ff2.f541 BGP 172.16.30.2 192.168.33.34 ! Mac+IP of Host C learnt across the Vxlan Fabric.
```

```
VTEP1# show l2route evpn mac-ip evi 40
Mac Address Prod Host IP Next Hop (s)
```

```
-----
8c60.4ff2.f541 BGP 172.16.40.2 192.168.33.34 ! Mac+IP of Host D learnt across the Vxlan Fabric.
```

- 接下来检查 I2rib 是否将更新导出到 I2vpn evpn。

```
VTEP1# show bgp l2vpn evpn vni-id 10000030
BGP routing table information for VRF default, address family L2VPN EVPN
BGP table version is 31, local router ID is 192.168.11.11
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redirect, I-injected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup
```

```
Network Next Hop Metric LocPrf Weight Path
Route Distinguisher: 192.168.11.11:32797 (L2VNI 10000030)
*>l[2]:[0]:[0]:[48]:[0006.f63f.e3c1]:[0]:[0.0.0.0]/216 ! Mac of Host A in update.
192.168.11.11 100 32768 i
*>i[2]:[0]:[0]:[48]:[8c60.4ff2.f541]:[0]:[0.0.0.0]/216
192.168.33.34 100 0 i
* i 192.168.33.34 100 0 i
*>l[2]:[0]:[0]:[48]:[0006.f63f.e3c1]:[32]:[172.16.30.33]/272 ! Mac and IP of Host A in update.
192.168.11.11 100 32768 i
* i[2]:[0]:[0]:[48]:[8c60.4ff2.f541]:[32]:[172.16.30.2]/272 ! Mac and IP of Host C in update
from Spine.
192.168.33.34 100 0 i
*>i 192.168.33.34 100 0 i
```

- 接下来检查路由是否已通告到主干。

```
VTEP1# show bgp l2vpn evpn nei 192.168.9.9 advertised-routes
Peer 192.168.9.9 routes for address family L2VPN EVPN:
BGP table version is 31, local router ID is 192.168.11.11
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redirect, I-injected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup
```

```
Network Next Hop Metric LocPrf Weight Path
Route Distinguisher: 192.168.11.11:32797 (L2VNI 10000030)
*>l[2]:[0]:[0]:[48]:[0006.f63f.e3c1]:[0]:[0.0.0.0]/216
192.168.11.11 100 32768 i
*>l[2]:[0]:[0]:[48]:[0006.f63f.e3c1]:[32]:[172.16.30.33]/272 ! Mac and IP advertised to Spine.
192.168.11.11 100 32768 i
```

- 接下来检查从主干接收的路由。

```
VTEP1# show bgp l2vpn evpn nei 192.168.9.9 routes
Peer 192.168.9.9 routes for address family L2VPN EVPN:
BGP table version is 31, local router ID is 192.168.11.11
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redirect, I-injected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup
```

```

Network Next Hop Metric LocPrf Weight Path
Route Distinguisher: 192.168.11.11:32797 (L2VNI 10000030)
*>i[2]:[0]:[0]:[48]:[8c60.4ff2.f541]:[0]:[0.0.0.0]/216
192.168.33.34 100 0 i
* i 192.168.33.34 100 0 i
* i[2]:[0]:[0]:[48]:[8c60.4ff2.f541]:[32]:[172.16.30.2]/272 ! This is update from Host C in same
VNID.
192.168.33.34 100 0 i
*>i 192.168.33.34 100 0 i
Route Distinguisher: 192.168.11.11:32807 (L2VNI 10000040)
*>i[2]:[0]:[0]:[48]:[8c60.4ff2.f541]:[0]:[0.0.0.0]/216
192.168.33.34 100 0 i
* i 192.168.33.34 100 0 i
* i[2]:[0]:[0]:[48]:[8c60.4ff2.f541]:[32]:[172.16.40.2]/272 ! This is update from Host D
in different VNID.
192.168.33.34 100 0 i
*>i 192.168.33.34 100 0 i
Route Distinguisher: 192.168.11.11:3 (L3VNI 10000010)
*>i[2]:[0]:[0]:[48]:[8c60.4ff2.f541]:[32]:[172.16.30.2]/272
192.168.33.34 100 0 i
* i 192.168.33.34 100 0 i
*>i[2]:[0]:[0]:[48]:[8c60.4ff2.f541]:[32]:[172.16.40.2]/272
192.168.33.34 100 0 i
* i 192.168.33.34 100 0 i
*>i[5]:[0]:[0]:[32]:[172.16.2.2]:[0.0.0.0]/224 ! ! This is update from External Host.
192.168.22.22 100 0 65100 i

```

```

VTEP1# show ip bgp vrf EVPN-L3-VNI-VLAN-10
BGP routing table information for VRF EVPN-L3-VNI-VLAN-10, address family IPv4 Unicast
BGP table version is 5, local router ID is 192.168.1.254
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-injected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup
Network          Next Hop Metric LocPrf Weight Path
*>i172.16.2.2/32 192.168.22.22 100 0 65111 i
*>i172.16.30.2/32 192.168.33.34 100 0 i
* i              192.168.33.34 100 0 i
*>i172.16.40.2/32 192.168.33.34 100 0 i
* i              192.168.33.34 100 0 i

```

- 在 VTEP1 中，仅配置了 VNID 10000030，并且已验证在本地获知主机 A 的 MAC 和 IP，且也通告为 evpn 路由。此外还观察到，主机 C 中的更新也已收到并安装在此处。
- 在转发流量前，nve 对等体也应处于启动状态。

```

VTEP1# show nve peers
Interface Peer-IP State LearnType Uptime Router-Mac
-----
nve1 192.168.22.22 Up CP 01:39:15 0062.ecbf.5325 ! VTEP2
nve1 192.168.33.34 Up CP 01:40:09 f8c2.8823.275f ! VTEP3 and VTEP4 appear as single entity
as both are in Vpc.

```

```

VTEP1# sh bgp internal nve-peer-vni
PeerAddress VNI VrfID GatewayMAC TunnelID Encap EgressVNI F
192.168.22.22 10000010 1 0062.ecbf.5325 0xc0a81616 1 0 0
192.168.33.34 10000010 1 0062.ecbf.4e4d 0xc0a82122 1 0 0
192.168.33.34 10000010 1 f8c2.8823.275f 0xc0a82122 1 0 0
192.168.33.34 10000030 1 0000.0000.0000 0x0 1 0 0

```

故障排除

- 如果检查 nve 接口，则应看到封装和解封计数器的增量。

```
VTEP1# show interface nve 1
nve1 is up
admin state is up, Hardware: NVE
MTU 9216 bytes
Encapsulation VXLAN
Auto-mdix is turned off
RX
ucast: 133 pkts, 22344 bytes - mcast: 0 pkts, 0 bytes
TX
ucast: 134 pkts, 22512 bytes - mcast: 0 pkts, 0 bytes
```

- 如果将透明防火墙用于过滤，请确保允许关联端口。

```
VTEP1# show nve vxlan-params
VxLAN Dest. UDP Port: 4789
```

- 检查用于 VNI 间路由的本地 VTEP MAC 地址。当 VTEP 位于 VPC 对中时，将看到辅助地址。

```
VTEP1# show nve interface
Interface: nve1, State: Up, encapsulation: VXLAN
VPC Capability: VPC-VIP-Only [not-notified]
Local Router MAC: e00e.da2a.2393
Host Learning Mode: Control-Plane
Source-Interface: loopback2 (primary: 192.168.11.11, secondary: 0.0.0.0)
```

- 检查远程 VTEPS MAC 地址和对等状态。

```
VTEP1# sh nve internal platform interface nve1 detail
Printing Interface ifindex 0x49000001 detail
|=====|=====|=====|=====|=====|=====|
|Intf |State |PriIP |SecIP |Vnis |Peers|
|=====|=====|=====|=====|=====|=====|
|nve1 |UP |192.168.11.11 |0.0.0.0 |3 |2 | ! Secondary Ip is 0.0.0.0 because this VTEP is not in vpc
SW_BD/VNIs of interface nve1:
=====
|=====|=====|=====|=====|=====|=====|
|Sw BD |Vni |State |Intf |Type|Vrf-ID|Notified
|=====|=====|=====|=====|=====|=====|
|10 |10000010|UP |nve1 |CP |3 |Yes
|30 |10000030|UP |nve1 |CP |0 |Yes
|40 |10000040|UP |nve1 |CP |0 |Yes
|=====|=====|=====|=====|=====|=====|
Peers of interface nve1:
=====
Peer_ip: 192.168.22.22
Peer-ID : 1
State : UP
Learning : Disabled
```



```
TunnelID : 0xc0a81616
MAC : 0062.ecbf.5325
Table-ID : 0x1
Encap : 0x1
Peer_ip: 192.168.33.34 ! For both VTEP3 and VTEP4
Peer-ID : 2
State : UP
Learning : Disabled
TunnelID : 0xc0a82122
MAC : 0062.ecbf.4e4d
Table-ID : 0x1
Encap : 0x1
```

- 检查 VTEP 对等体的对等连接时间和 VNI 信息。

```
VTEP1# show nve peer detail
Details of nve Peers:
-----
Peer-Ip: 192.168.22.22
NVE Interface : nve1
Peer State : Up
Peer Uptime : 00:22:17
Router-Mac : 0062.ecbf.5325
Peer First VNI : 10000010
Time since Create : 00:22:17
Configured VNIs : 10000010,10000030,10000040
Provision State : add-complete ! Hardware ready for forwarding.
Route-Update : Yes
Peer Flags : RmacL2Rib, TunnelPD, DisableLearn
Learnt CP VNIs : 10000010
Peer-ifindex-resp : Yes
-----
Peer-Ip: 192.168.33.34
NVE Interface : nve1
Peer State : Up
Peer Uptime : 00:22:10
Router-Mac : 0062.ecbf.4e4d
Peer First VNI : 10000010
Time since Create : 00:22:10
Configured VNIs : 10000010,10000030,10000040
Provision State : add-complete ! Hardware ready for forwarding.
Route-Update : Yes
Peer Flags : RmacL2Rib, TunnelPD, DisableLearn
Learnt CP VNIs : 10000010,10000030,10000040
Peer-ifindex-resp : Yes
-----
```

- 检查 BGP 如何与 EVI 交互，以及内部信息是如何构建的。以下显示了映射到 VNI 10000030 的 vlan 30 的示例。

```
VTEP1# sh bgp internal evi 10000030
*****
L2RIB bound / VNI Req to L2RIB : Yes / 1
L2VNI Adds / Dels / ALL Dels from L2RIB : 4 / 3 / 1
First L2VNI Add/Del : Dec 17 19:07:41.680736 / Dec 17 19:10:48.455562
Last L2VNI Add/Del : Dec 17 19:11:13.916893 / Dec 17 19:10:48.455792
L3VNI Adds / Dels from L2RIB : 2 / 0 / 1
First L3VNI Add/Del : Dec 17 19:07:41.681313 / never
Last L3VNI Add/Del : Dec 17 19:11:11.838315 / never
First/Last All VNI Del : Dec 17 19:10:48.455542 / Dec 17 19:10:48.455543
ALL VNI Del from L2RIB state (cleanup status) : All VNI Not Start (0x000006)
All VNI down loop count : 0
```

L2RIB is up/registered/local-req: 1/1
L2RIB down: in-prg/up-defer: 0/0
L2RIB register/failures: 1/0
L2RIB deregister/failures: 0/0
L2RIB flow control (#enabled/#disabled): Disabled (0/0)

BGP L2VPN/EVPN RD Information for 192.168.11.11:32797

L2VNI ID : 10000030 (evi_10000030)
#Prefixes Local/BRIB : 2 / 4
#Paths L3VPN->EVPN/EVPN->L3VPN : 129 / 0

=====

BGP Configured VNI Information:

evi_cfg : 0xd87786c8

VNI ID (Index) : 10000030 (1)

RD : 192.168.11.11:32797

Export RTs : 1

ExportRT cfg list:

65000:10000030 (auto)

Import RTs : 1

ImportRT cfg list:

65000:10000030 (auto)

Topo Id : 30

VTEP IP : 192.168.11.11

VTEP VPC IP : 0.0.0.0

Encap Type : 8

Refcount : #00000003

Enabled : Yes ! If this is no then check the NVE interface config for this VNID

Delete Pending : No

Creation Req : No

Future RD : NULL

evi_ctx : 0xd86e554c

RD/Import RT/Export RT : Yes(Auto)/Yes/Yes

MAC First Add/Del : Dec 17 19:11:12.45086 / never

MAC Last Add/Del : Dec 17 19:11:12.45086 / never

MAC IP First Add/Del : Dec 17 19:11:12.54976 / never

MAC IP Last Add/Del : Dec 17 19:11:12.54977 / never

IMET First Add/Del : never / never

IMET Last Add/Del : never / never

=====

+++++

BGP VNI Information for evi_10000030 (0xd86e554c)

L2VNI ID : 10000030 (evi_10000030)

RD (rdinfo) : 192.168.11.11:32797 (0xd8811eb0)

Prefixes (local/total) : 2/4

Created : Dec 17 19:11:12.37640

Last Oper Up/Down : Dec 17 19:11:12.37827 / never

Enabled : Yes

Delete pending : 0

Stale : No

Import pending : 0

Import in progress : 0

Encap : VxLAN

Topo Id : 30

VTEP IP : 192.168.11.11

VTEP VPC IP : 0.0.0.0

Router-MAC : 0000.0000.0000

Active Export RTs : 1

Active Export RT list : 65000:10000030

Config Export RTs : 1

ExportRT cfg list:

65000:10000030 (auto)

Export RT chg/chg-pending : 0/0

Active Import RTs : 1

Active Import RT list : 65000:10000030

Config Import RTs : 1

ImportRT cfg list:

65000:10000030 (auto)

Import RT chg/chg-pending : 0/0

IMET Reg/Unreg from L2RIB : 2/0

MAC Reg/Unreg from L2RIB : 2/0

MAC IP Reg/Unreg from L2RIB : 2/0

IMET Add/Del from L2RIB : 0/0

MAC Add/Del from L2RIB : 1/0

MAC IP Add/Del from L2RIB : 1/0

IMET Dnld/Wdraw to L2RIB : 0/0

MAC Dnld/Wdraw to L2RIB : 1/0

MAC IP Dnld/Wdraw to L2RIB : 1/0

- 当收到更新时，无论是 VNI 间更新还是 VNI 内的更新，请确保接收正确的 RT (路由目标)，并且接收更新的 VTEP 具有相关配置。此处将分析来自 SPINE 的 VTEP3 中更新的 RT 一致性。上面的输出中显示了 VTEP1 的 RT 和 RD 的本地状态。

```
SPINE# show bgp l2vpn evpn 172.16.30.2 ! Update from Spine
BGP routing table information for VRF default, address family L2VPN EVPN
Route Distinguisher: 3.3.3.3:32797
BGP routing table entry for [2]:[0]:[0]:[48]:[8c60.4ff2.f541]:[32]:[172.16.30.2]
/272, version 25
Paths: (1 available, best #1)
Flags: (0x000202) on xmit-list, is not in l2rib/evpn, is not in HW,
Advertised path-id 1
Path type: internal, path is valid, is best path, remote nh not installed, no
labeled nexthop
AS-Path: NONE, path sourced internal to AS
192.168.33.34 (metric 5) from 192.168.33.33 (3.3.3.3)
Origin IGP, MED not set, localpref 100, weight 0
Received label 10000030 1000001
Extcommunity: RT:65000:10000010 RT:65000:10000030 SOO:192.168.33.34:0 ENC
AP:8 Router MAC:0062.ecbf.4e4d
Path-id 1 advertised to peers:
192.168.11.11 192.168.22.22 192.168.44.44
```