Configuration et vérification VXLAN avec plan de contrôle EVPN MP-BGP.

Contenu

Introduction

Ce document décrit la configuration VXLAN à l'aide du plan de contrôle EVPN MP-BGP. Il présente un exemple de scénario de réseau et sa configuration avec des résultats pertinents pour la vérification et une meilleure compréhension.

Conditions préalables

Conditions requises

Cisco vous recommande de prendre connaissance des rubriques suivantes :

- VPN de couche 3 MPLS
- Le MP-BGP serait certainement utile.

Components Used

Ce document n'est pas limité à des versions de matériel et de logiciel spécifiques.

Ce document n'est pas limité à des versions de matériel et de logiciel spécifiques. The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Informations générales

VXLAN est conçu pour fournir la virtualisation du réseau. Il s'agit de MAC dans l'encapsulation UDP. L'infrastructure de couche 2 est étendue sur le réseau de sous-couche de couche 3 pour fournir un service simplifié qui ne dépend pas de l'emplacement physique et géographique des serveurs dans les data centers.

Ce document décrit le VXLAN avec le plan de contrôle EVPN MP-BGP. Cela signifie que le protocole BGP est utilisé dans l'infrastructure de superposition pour envoyer et recevoir des mises à jour.

Dans les déploiements réseau traditionnels, le protocole STP a été utilisé, ce qui a entraîné un blocage permanent de certaines liaisons ascendantes. Dans la conception VXLAN, toutes les liaisons ascendantes sont opérationnelles et ECMP est exploité car l'infrastructure sous-jacente est un réseau IP.

L'examen de tous les détails n'entre pas dans le cadre de ce document, mais certaines terminologies importantes sont présentées ci-dessous.

VXLAN - Virtual Extensible LAN.

MP-BGP - Multiprotocol BGP.

EVPN - VPN Ethernet.

VTEP : point d'extrémité du tunnel virtuel. Également appelée feuille. Il s'agit de l'endroit où les paquets sont encapsulés et décapsulés.

Spine : très similaire à Route-Reflector dans les VPN de couche 3 MPLS. Ce périphérique prend les mises à jour d'un VTEP et les transmet à d'autres VTEP.

VNI : identificateur de réseau VXLAN. Il sert principalement à isoler les limites de couche 2. Ce champ a une longueur de 24 bits, ce qui lui permet de dépasser la limite de plage des vlan traditionnels. Un VNI dans un VTEP est 'mappé' à un vlan traditionnel. Nous en discuterons plus tard.

Configuration

Diagramme du réseau
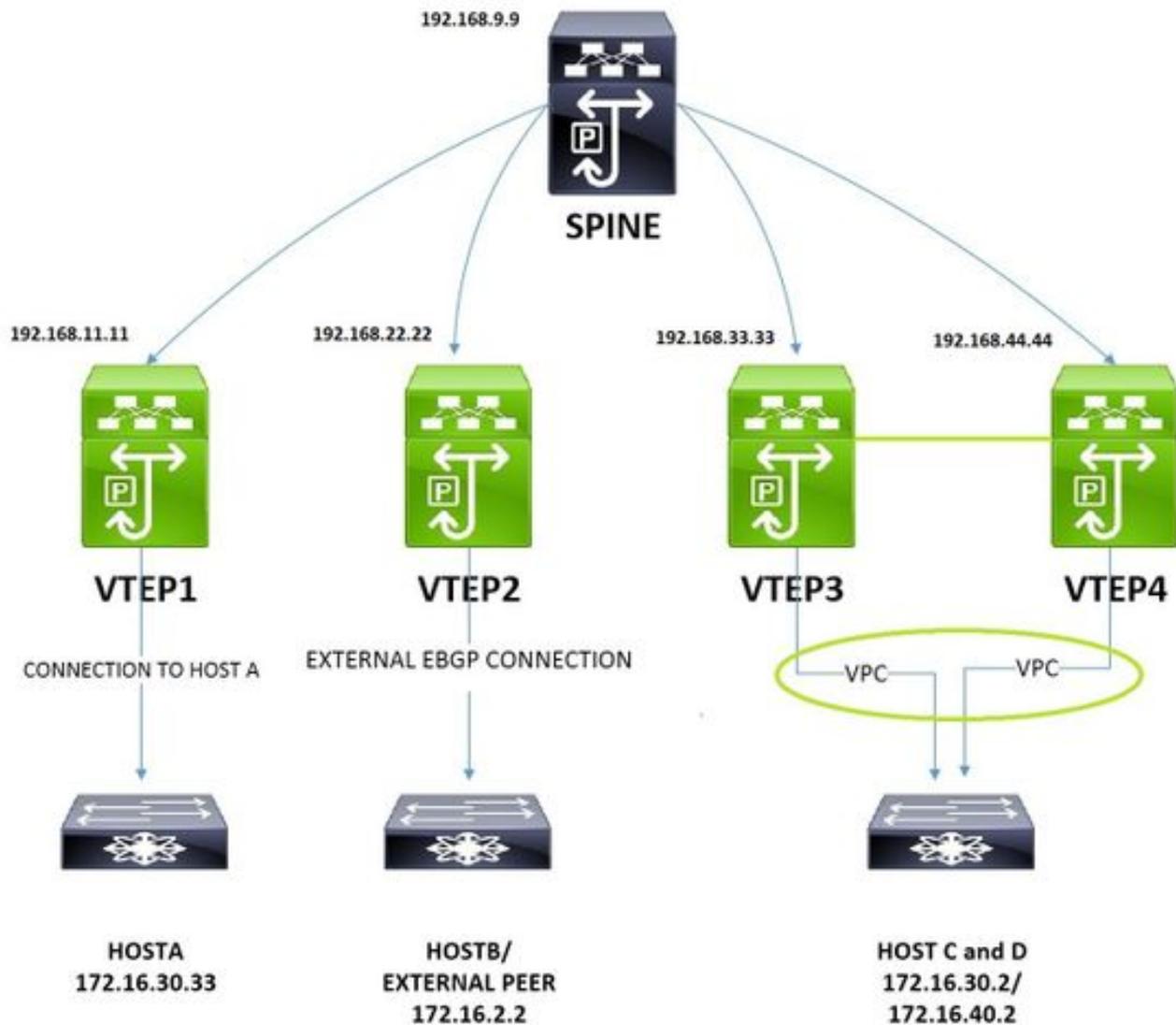
L'image affichée est utilisée pour les aspects de configuration et de vérification. Cela couvre les configurations de connectivité non-vpc, vpc, intra-vni, inter-vni et externe du point de vue de l'infrastructure VXLAN.

Configuration

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

Les configurations pour VTEP3 et VTEP1 sont presque identiques. Seule la différence est le VPC et un VNI de couche 2 supplémentaire pour le vlan 40.

```
!
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
```

ESPÈCE

```
!
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
```

HÔTE A

L'hôte A est simulé par un commutateur 3750.

```
! 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
```

HÔTE B

L'hôte B est le périphérique d'appairage externe, N5K est utilisé ici.

```
!
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
```

HÔTES C et D

Les hôtes C et D sont simulés par Nexus5k , conservant les adresses IP dans des vrfs distincts.

```
!
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>
```

Vérification

Connectivité de l'hôte A à l'hôte externe B

```
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
```

Connectivité de l'hôte A à l'hôte C (Intra-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
```

Connectivité de l'hôte A à l'hôte D (Inter-VNI)

```
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
```

Table de routage de l'hôte B (homologue externe)

```
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,
```

Il est possible d'observer que les routes d'hôte ont été correctement annoncées à cet homologue BGP externe.

Vérification du plan de contrôle.

- Cette commande affiche le « mappage » des VLAN traditionnels avec des VNID.

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

- La prochaine étape consiste à vérifier que mac est appris localement sur VTEP.

```
 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)
```

- L'étape suivante consiste à vérifier que la route est installée dans l2rib.

```
 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.
```

- L'étape suivante consiste à vérifier que l2rib exporte la mise à jour vers l2vpn 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-redist, I-i
njected
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
```

- L'étape suivante consiste à vérifier que les routes sont annoncées à Spine.

```
 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-redist, I-i
njected
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
```

- L'étape suivante consiste à vérifier les routes reçues de Spine.

```
 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-redist, I-i
njected
```

```
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
```

- Dans VTEP1, seul VNID 1000030 est configuré et il a été vérifié que mac et ip de l'hôte A
  sont appris localement et annoncés comme evpn route. Il a également été observé que la
  mise à jour de l'hôte C a également été reçue et installée ici.

- Les homologues nve doivent également être actifs avant que le trafic ne puisse être transféré.

```
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
192.168.33.34 10000040 1 0000.0000.0000 0x0        1    0    0
```

Dépannage

- Si nve interface est cochée, des incréments de compteurs pour l'encapsulation et la décapsulation doivent être affichés.

```
 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
```

- Si un pare-feu transparent est utilisé pour le filtrage, assurez-vous que le port associé est autorisé.

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

- Vérifier l'adresse MAC VTEP locale utilisée pour le routage inter-VNI. L'adresse secondaire apparaît lorsque le VTEP se trouve dans une paire de vpc.

```
 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)
```

- Pour vérifier les adresses MAC VTEPS distantes et l'état de l'appairage.

```
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
```

- Pour vérifier l'heure d'appairage et les informations VNI pour les homologues VTEP.

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

- Pour vérifier comment BGP interagit avec l'interface EVI et les informations internes sont créées. L'exemple de vlan 30 mappé à VNI 10000030 est illustré ici.

```
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
```

- Lorsqu'une mise à jour est reçue indépendamment du fait qu'il s'agit d'une mise à jour Inter-VNI ou Intra-VNI, assurez-vous que les RT (Route Targets) corrects sont reçus et que VTEP recevant la mise à jour a les configurations appropriées. Une mise à jour de VTEP3 via SPINE sera analysée ici pour assurer la cohérence RT. L'état local de RT et RD pour VTEP1 a été indiqué dans les sorties ci-dessus.

```
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
```