

# Configuración y Verificación de VXLAN con el Plano de Control EVPN MP-BGP

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## Introducción

Este documento describe la configuración de VXLAN mediante el plano de control EVPN MP-BGP.

## Prerequisites

### Requirements

Cisco recomienda que tenga conocimiento sobre estos temas:

- VPNs de Capa 3 MPLS
- MP-BGP también ayudaría.

## Componentes Utilizados

Este documento no tiene restricciones específicas en cuanto a versiones de software y de hardware.

La información que contiene este documento se creó a partir de los dispositivos en un ambiente de laboratorio específico. Todos los dispositivos que se utilizan en este documento se pusieron en funcionamiento con una configuración verificada (predeterminada). Si tiene una red en vivo, asegúrese de entender el posible impacto de cualquier comando.

## Antecedentes

Este documento también muestra un ejemplo de escenario de red y su configuración con resultados relevantes para la verificación y mejor comprensión.

VXLAN está diseñado para proporcionar virtualización de red. Es MAC en encapsulación UDP. La infraestructura de capa 2 se amplía a través de la red subyacente de capa 3 para proporcionar un servicio simplificado que no depende de la ubicación física y geográfica de los servidores en los Data Centers.

Este documento describe VXLAN con el Plano de Control EVPN MP-BGP. Esto significa que el protocolo BGP se utiliza en la infraestructura de superposición para enviar y recibir actualizaciones.

En las implementaciones de red tradicionales se utilizaba STP, lo que provocaba que algunos enlaces ascendentes se bloquearan permanentemente. En el diseño de VXLAN, todos los enlaces ascendentes están operativos y ECMP se aprovecha, ya que la infraestructura subyacente es la red IP.

El examen de todos los detalles queda fuera del alcance de este documento, aunque a continuación se indican algunas terminologías importantes.

VXLAN: LAN virtual ampliable

MP-BGP: BGP multiprotocolo

EVPN - Ethernet VPN

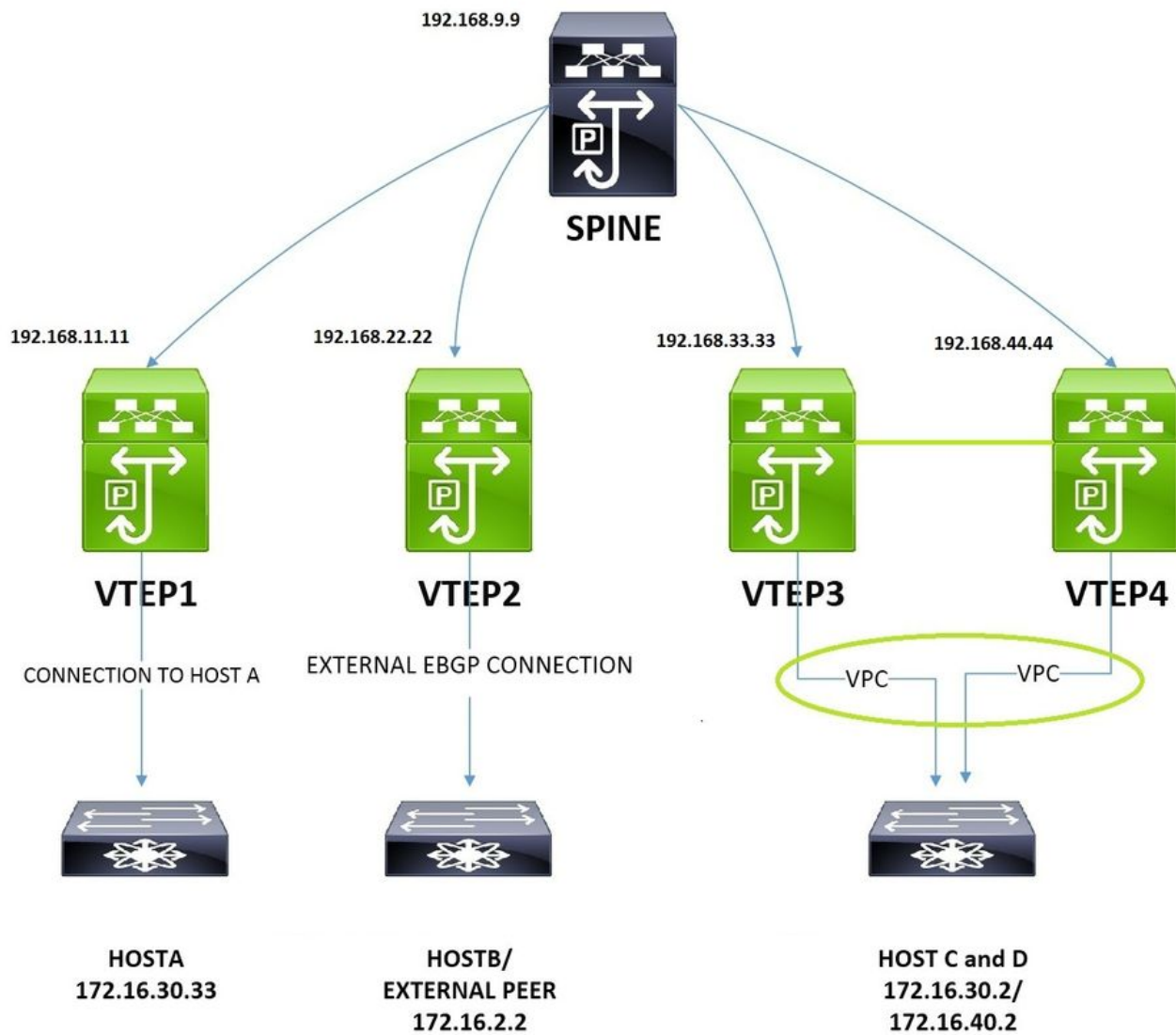
VTEP: Punto final del túnel virtual. También conocido como la hoja. Este es el lugar donde los paquetes se encapsulan y desencapsulan.

Columna - Esto es muy similar a Route-Reflector en MPLS L3 VPNs. Este dispositivo toma las actualizaciones de un VTEP y las pasa a otro VTEP.

VNI: identificador de red VXLAN. Esto se utiliza principalmente para proporcionar aislamiento para los límites de la capa 2. Este campo tiene una longitud de 24 bits, por lo que supera la limitación de rango de las vlan tradicionales. Una VNI en un VTEP se asigna a una vlan tradicional. Esto se discutirá más adelante.

# Configurar

## Diagrama de la red



La imagen mostrada se utiliza para los aspectos de configuración y verificación. Esto cubre las configuraciones de conectividad externa, inter-vni, intra-vpc, vpc e inter-vni desde la perspectiva de la infraestructura VXLAN.

## Configuración

VTEP1

```
<#root>
```

!

## 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 contr
```

!

```
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 12
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

```
<#root>
```

```
!
```

```
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

Las configuraciones para VTEP3 y VTEP1 son casi idénticas. La única diferencia es VPC y un VNI de capa 2 adicional para vlan 40.

```
<#root>
```

```
!
```

```
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 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

<#root>

!

```
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
```

## COLUMNNA VERTEBRAL

```
<#root>
```

```
!
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
```

## HOST A

El host A es simulado por un switch 3750.

```
<#root>
```

```
! 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
```

## HOST B

El host B es el dispositivo de iguales externo. N5K se utiliza aquí.

```
<#root>
```

```
!
```

```
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
```

## HOST C y D

Los hosts C y D son simulados por Nexus5k , manteniendo las direcciones IP en vrfs distintos.

```
<#root>
```

```
!
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>
```

## Verificación

### Conectividad del Host A al Host B Externo

```
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
```

## Conectividad del Host A al HOST 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
```

## Conectividad del host A al host 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
```

## Tabla de enrutamiento del host B (par externo)

<#root>

```
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,
```

Se puede observar que las rutas del host se han anunciado correctamente a este par BGP externo.

## Verificación del plano de control

- Este comando muestra la asignación de VLAN tradicionales con VNID.

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

- El siguiente paso es verificar que mac se aprenda localmente en VTEP.

<#root>

```
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)
```

- El siguiente paso es verificar que la ruta esté instalada en I2rib.

<#root>

```
VTEP1# show l2route evpn mac evi 30
Mac Address Prod Next Hop (s)
-----
0006.f63f.e3c1
Local Eth1/11
! Mac of HOST A
i
```

nstalled into l2rib.

8c60.4ff2.f541

BGP 192.168.33.34

! Mac of HOST C installed into l2rib learnt via BGP.

<#root>

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.

<#root>

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.

- El siguiente paso es verificar que l2rib exporta la actualización a 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-injected  
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup

<#root>

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

- El siguiente paso es comprobar que las rutas se anuncian a 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
```

```
<#root>
```

```
Network Next Hop Metric LocPrf Weight Path
```

```
Route Distinguisher: 192.168.11.11:32797 (L2VNI 10000030)
```

```
*>|2]:[0]:[0]:[48]:[0006.f63f.e3c1]:[0]:[0.0.0.0]/216
```

```
192.168.11.11 100 32768 i
```

```
*>|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
```

- El siguiente paso es verificar las rutas recibidas desde Spine.

```
<#root>
```

```
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)
```

```
*>i2]:[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
```

```
* i2]:[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

<#root>

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
*>i
172.16.2.2/32
  192.168.22.22  100      0      65111 i
*>i
172.16.30.2/32
  192.168.33.34  100      0      i
* i              192.168.33.34  100      0      i
*>i
172.16.40.2/32
  192.168.33.34  100      0      i
* i              192.168.33.34  100      0      i
```

- En VTEP1, solo se configura VNID 10000030 y se ha verificado que mac e ip del Host A se aprenden localmente y también se anuncian como ruta evpn. También se ha observado que la actualización del Host C también se ha recibido e instalado aquí.

- Los pares nve también pueden estar activos antes de que se pueda reenviar el tráfico.

<#root>

```
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.

<#root>

```
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

## Troubleshoot

- Si se marca nve interface, se pueden ver incrementos de contadores para encapsulación y desencapsulación.

<#root>

```
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 se está utilizando un firewall transparente para el filtrado, asegúrese de que el puerto asociado está permitido.

<#root>

```
VTEP1# show nve vxlan-params
```

```
VxLAN Dest. UDP Port: 4789
```

- Para verificar la dirección MAC de VTEP local que se utiliza para el ruteo Inter-VNI. La dirección secundaria se observa cuando el VTEP está en un par vpc.

<#root>

```
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)
```

- Para verificar las direcciones MAC de VTEPS remotas y el estado de peering.

<#root>

```
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

```

- Para comprobar el tiempo de análisis y la información de VNI para los pares 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  
-----

- Para verificar cómo BGP interactúa con EVI y cómo se genera la información interna. Aquí se muestra un ejemplo de vlan 30 asignada a VNI 10000030.

<#root>

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/De1 from L2RIB : 0/0
MAC Add/De1 from L2RIB : 1/0
MAC IP Add/De1 from L2RIB : 1/0
IMET Dn1d/Wdraw to L2RIB : 0/0
MAC Dn1d/Wdraw to L2RIB : 1/0
MAC IP Dn1d/Wdraw to L2RIB : 1/0
```

- Cuando se recibe una actualización, independientemente del hecho de que se trate de una actualización Inter-VNI o Intra-VNI, asegúrese de que se reciben los objetivos de ruta (RT) correctos y de que VTEP que recibe la actualización tiene configuraciones relevantes. Una actualización de VTEP3 que viene a través de la COLUMNA VERTEBRAL se analiza aquí para la consistencia de RT. El estado local de RT y RD para VTEP1 se ha mostrado en estos resultados.

```
<#root>
```

```
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
```





## Acerca de esta traducción

Cisco ha traducido este documento combinando la traducción automática y los recursos humanos a fin de ofrecer a nuestros usuarios en todo el mundo contenido en su propio idioma.

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