تكوين شبكة VXLAN والتحقق منها باستخدام EVPN MP-BGP في مستوى التحكم

المحتويات

المقدمة

يصف هذا المستند تكوين شبكة VXLAN باستخدام مستوى التحكم في EVPN MP-BGP.

المتطلبات الأساسية

المتطلبات

توصي Cisco بأن تكون لديك معرفة بالمواضيع التالية:

- شبكات VPNs من الطبقة 3
- وسوف يساعد أيضا بروتوكول الحدود متعدد البروتوكولات (MP-BGP).

المكونات المستخدمة

لا يقتصر هذا المستند على إصدارات برامج ومكونات مادة معينة.

تم إنشاء المعلومات الواردة في هذا المستند من الأجهزة الموجودة في بيئة معملية خاصة. بدأت جميع الأجهزة المُستخدمة في هذا المستند بتكوين ممسوح (افتراضي). إذا كانت شبكتك قيد التشغيل، فتأكد من فهمك للتأثير المحتمل لأي أمر.

معلومات أساسية

كما تعرض هذه الوثيقة سيناريوهات شبكة معينة وتكوينها مع المخرجات ذات الصلة للتحقق ولفضل الفهم.

UDP. تم تصميم شبكة VXLAN لتوفير المحاكاة الظاهرية للشبكة. هو MAC في تضمين يتم توسيع البنية الأساسية من المستوى الثاني عبر شبكة فرعية من المستوى الثالث لتوفير خدمة نشطة لا تعتمد على الموقع المادي والجغرافي للخوادم في مراكز البيانات.

يعني هذا وهو. EVPN MP-BGP يصف هذا المستند شبكة VXLAN مستوى التحكم في مع إستخدام بروتوكول BGP في البنية الأساسية المتداخلة للإرسال والتحديثات واستقبالها.

في عملنا نشر الشبكة التقليدية التي تم إستخدام بروتوكول الشجرة المتفرعة نكون تصميم في VXLAN. دائما لكنها حظر ما تي تم التوصلات التي بشكل لكل دائما. في تصميم (STP)، ينتج عن ذلك بعض الوصلات التي تم حظرها بشكل البنية الأساسية تكون ثيح ECMP من الاستفادة ويتم لتشغيل قيد الوصلات جميع IP. شبكة هي الأساسية الأساسية.

لا تشمل مناقشة جميع التفاصيل لنطاق هذه الوثيقة،إلا أن بعض المصطلحات الهامة ترد أدناه.

VXLAN - شبكة LAN الظاهرية الموسعة

MP-BGP - BGP متعدد البروتوكولات

EVPN - Ethernet VPN

VTEP - نقطة نهاية النفق الظاهري. يعرف أيضا باسم المكان الذي يتم فيه هذا. بالروقة التضمين فك ومزج الحزم.

من ثيدحتلا ذخأي ةادأ اذه L3 MPLS VPN تاكبشلا يف راسملا سكاعلا ادج لثامم اذه - سكاعلا VTEP. رخآ ىلإ ىلع هو ررميو VTEP دحاو

VNI - يعرف شبكة VXLAN. يستخدم هذا بشكل أساسي لكل شبكة لتوفير لعزل حدود دودح النطاق الطبقي تعين. التقليدية VLAN تاكبش قاطن دودح ىطختي كلذل تب 24 هلوط لقحلا اذه. الثانية VNI يف VTEP ىلإ VLAN تقليدي ام اذهو. لاحقا هشقانن.

التكوين

الرسم التخطيطي للشبكة

يتم إستخدام الصورة الموضحة لجوانب التكوين والتحقق. وهذا يغطي تكوينات الاتصال غير الافتراضية (VPC) و vpc و intra-vni و inter-vni و external من منظور البنية الأساسية لشبكة VXLAN.

التكوين
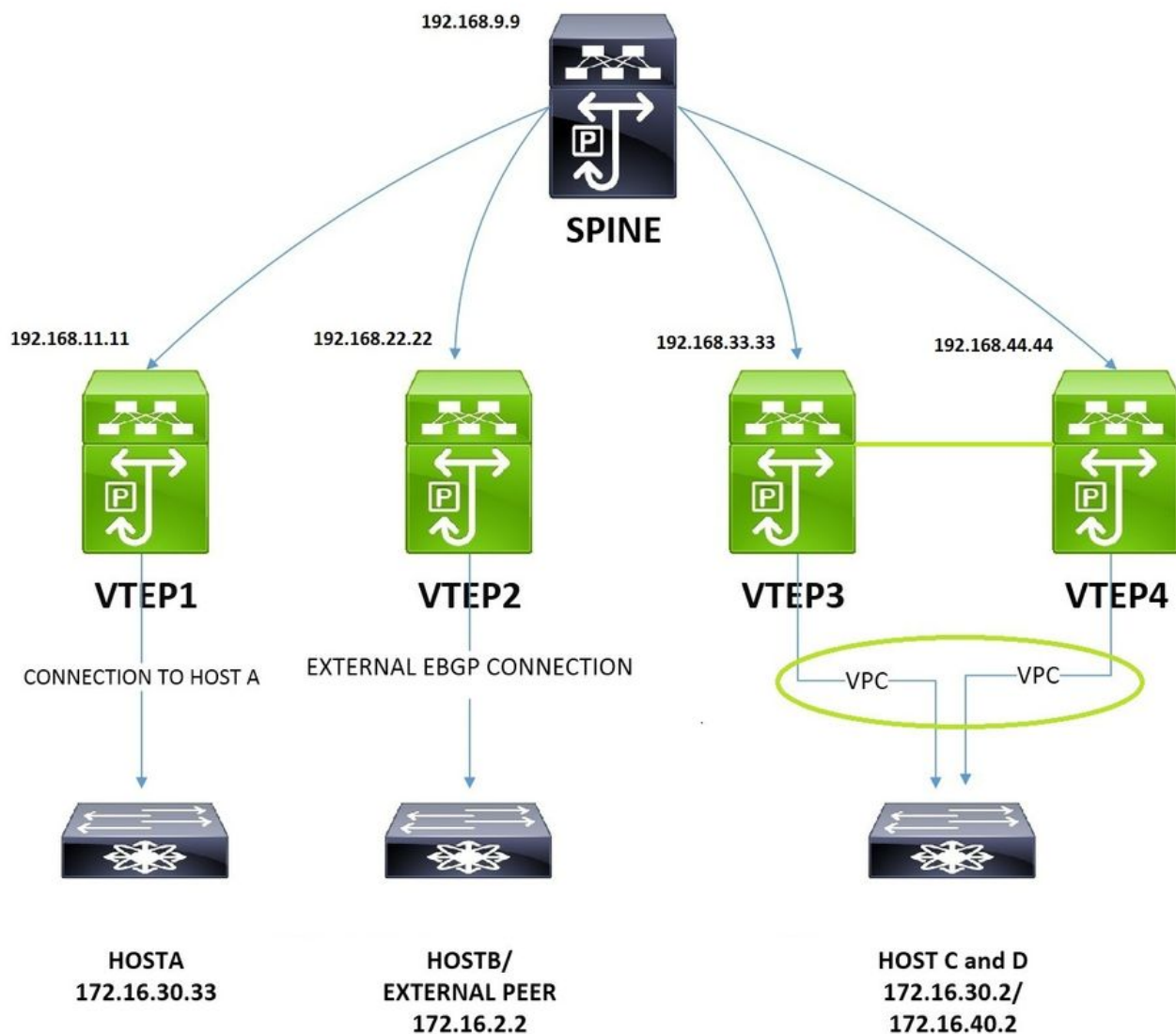
VTEP1

```
<#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 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

<#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

ال configure لـ VTEP3 و VTEP1 تقريبا متطابق. الفرق فقط هو VPC وطبقة إضافية VNI 2 لشبكة VLAN رقم 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
```

عمود فقري

<#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
```

المضيف A

يتم محاكاة المضيف A بواسطة محول 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
```

المضيف ب

المضيف B هو جهاز نظير خارجي. يتم إستخدام N5K هنا.

<#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

المضيف ج و د

يتم محاكاة المضيف C و D بواسطة Nexus5k، مع الاحتفاظ بعنوانين IP في بروتوكولات VRFS منفصلة.

<#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>
```

التحقق من الصحة

الاتصال من المضيف (أ) إلى المضيف الخارجي (ب)


```
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
```


الاتصال من المضيف A إلى المضيف 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
```

الاتصال من المضيف A إلى المضيف D (بين شبكات 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
```

جدول توجيه المضيف B (النظير الخارجي)

<#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,
```

ويمكن ملاحظة أنه هنا تم الإعلان بنجاح عن حاجتنب مسارات المضيف لنظير BGP الخارجي هذا.

فحص مسترى محكم

- يبدأ هذا الأمر التعيين من VLANs تقليدي مع VNIDs.

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

- التالي هو التحقق من أن كل ماك يعرف محليا على 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)
```

- تتمثل الخطوة التالية في التحقق من تثبيت المسار في l2rib.

<#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.

- تتمثل الخطوة التالية في التحقق من أن l2rib يصدر التحديث إلى EVPN لـ L2VPN.

 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

```
<#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
```

- تتمثل الخطوة التالية في التحقق من الإعلان عن الموجهات إلى العمود الرئيسي.

```
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)


```
*>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

- تتمثل الخطوة التالية في فحص المسارات التي يتم استقبالها من العامود الرئيسي.

<#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)
*>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

<#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
```

- في VTEP1، تشكل VNID 1000030 فقط، وتم التحقق من أن MAC و IP من المضيف A يتم التعرف عليهم محليا، كما يتم الإعلان عنهم كمسار EVPN. ولوحظ أيضا أن الاستكمال الوارد من المضيف جيم قد تم إستلامه وتثبيته هنا.

- كما يمكن رفع نظائر NVE قبل إعادة توجيه حركة المرور.

<#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
```

استكشاف الأخطاء وإصلاحها

- إذا تم التحقق من واجهة NVE، فيمكن حينئذٍ رؤية زيادات في العدادات لعملية التضمين وفك الكبسلة.

<#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
```

- إذا كان هناك جدار حماية شفاف قيد الاستخدام للتصفية، فتأكد من السماح بالمنفذ

المقترن.

<#root>

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

VxLAN Dest. UDP Port: 4789

- للتحقق من عنوان MAC لـ VTEP المحلي الذي يتم إستخدامه للتوجيه بين شبكات VNI. أي عنوان ثانوي عندما يكون الـ VTEP في زوج 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)

- للتحقق من عناوين MAC الخاصة بـ VTEPS البعيدة وحالة نظير.

<#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
```

- للتحقق من وقت ودقيق التدقيق ومعلومات VNI الخاصة بأقران 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
----------------------------------------
```

- للتحقق من كيفية تفاعل BGP مع EVI (EVI) وبناء المعلومات الداخلية. يتم عرض
  مثال شبكة VLAN رقم 30 التي تم تعيينها على VNI 10000030 هنا.

<#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/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
```

- عند تلقي تحديث، بغض النظر عن كونه تحديث بين شبكات VNI أو داخل شبكات VNI،
  تأكد من إستلام أهداف المسار الصحيحة (RT) ومن أن VTEP الذي يتلقى التحديث لديه
  تكوينات ذات صلة. يتم هنا تحليل تحديث من VTEP3 الوارد عبر العمود الفقري
  لتنسيق VTEP1. وقد أظهرت هذه النوابج حالة RD و RT المحليتين لـ VTEP1.

  `<#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
```

حول هذه الترجمة

ترجمت Cisco هذا المستند باستخدام مجموعة من التقنيات الآلية
والبشرية لتقديم دعم للمستخدمين في جميع أنحاء العالم
بمحتوى دعم بلغتهم الخاصة. يُرجى ملاحظة أن أفضل ترجمة آلية لن تكون دقيقة كما
هو الحال مع الترجمة الاحترافية التي يقدمها مترجم محترف. تُخلي
Systems مسؤوليتها عن دقة هذه الترجمات وتوصي بالرجوع دائمًا إلى
المستند الإنجليزي الأصلي (الرابط متوفر).