

在Catalyst 9000交換機上配置服務VRF EVPN VxLAN

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簡介

本檔案介紹不同案例中EVPN（乙太網路VPN）VxLAN（虛擬可擴充區域網路）的路由洩漏組態。

必要條件

建議您熟悉單播EVPN VxLAN功能BGP。

需求

本指南假設BGP、NVE對等體已經正確。如果基本EVPN VxLAN啟動存在問題（單播ping故障、BGP、NVE對等體關閉等），請根據需要參考BGP、EVPN、路由/交換機故障排除指南。

注意：服務VRF配置示例僅支援IPv4。

採用元件

本文中的資訊係根據以下軟體和硬體版本：

- C9300
- C9400
- C9500
- C9600

本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除（預設）的組態來啟動。如果您的網路運作中，請確保您瞭解任何指令可能造成的影響。



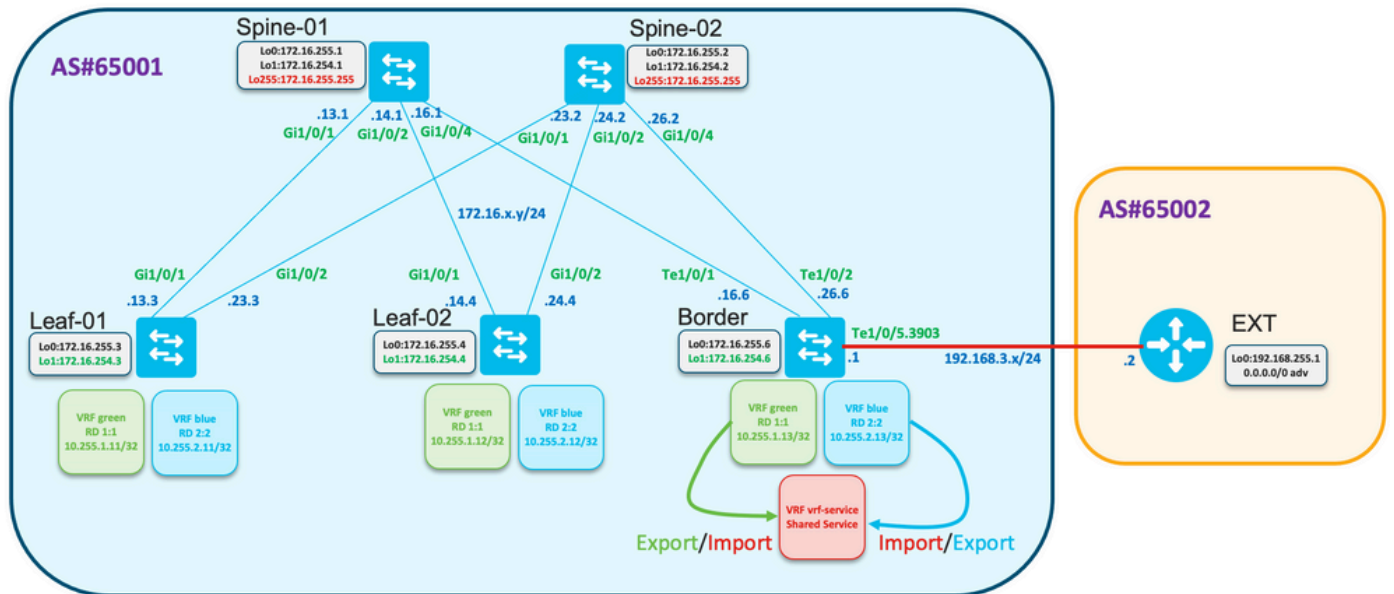
注意：有關用於在其他Cisco平台上啟用這些功能的命令，請參閱相應的配置指南。

設定

在構建「共用VRF」服務或將邊界節點連線到防火牆的情況下，廣泛使用了路由洩漏功能。通常，邊界枝葉是配置路由洩漏的節點。

- Cisco IOS® XE上的EVPN/VXLAN VRF之間的路由洩漏在BGP級別沒有照常執行。使用EVPN（簡易虛擬網路）功能。

網路圖表



通用路由洩漏

在本示例中，計畫在邊界節點上配置從VRF「綠色」和「藍色」到VRF「vrf-service」的路由洩漏

。

檢查邊界上的路由表中是否存在VRF「綠色」和「藍色」：

```
<#root>
```

```
Border#
```

```
show ip route vrf green
```

```
<...snip...>
```

```

10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
B    10.1.1.0/24 [200/0] via 172.16.254.3, 01:19:43, Vlan901
B    10.1.2.0/24 [200/0] via 172.16.254.3, 01:19:43, Vlan901
B    10.255.1.11/32 [200/0] via 172.16.254.3, 01:19:43, Vlan901
B    10.255.1.12/32 [200/0] via 172.16.254.4, 01:19:43, Vlan901
C    10.255.1.13/32 is directly connected, Loopback11

```

```
Border#
```

```
show ip route vrf blue
```

```
<...snip...>
```

```

10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
B    10.2.1.0/24 [200/0] via 172.16.254.3, 01:20:28, Vlan902
B    10.2.2.0/24 [200/0] via 172.16.254.3, 01:20:28, Vlan902
B    10.255.2.11/32 [200/0] via 172.16.254.3, 01:20:28, Vlan902
B    10.255.2.12/32 [200/0] via 172.16.254.4, 01:20:28, Vlan902
C    10.255.2.13/32 is directly connected, Loopback12

```

將從VRF「綠色」導入到VRF「vrf服務」的所有路由的配置

```
<#root>

vrf definition vrf-service
 rd 3:3
 !
 address-family ipv4

   route-replicate from vrf green unicast all

   route-target export 3:3
   route-target import 3:3
 exit-address-family
```

驗證邊界上VRF「vrf-service」的路由表是否包含來自VRF「綠色」的路由

```
<#root>

Border#

show ip route vrf vrf-service

Routing Table: vrf-service
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, m - OMP
       n - NAT, Ni - NAT inside, No - NAT outside, Nd - NAT DIA
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       H - NHRP, G - NHRP registered, g - NHRP registration summary
       o - ODR, P - periodic downloaded static route, l - LISP
       a - application route
       + - replicated route, % - next hop override, p - overrides from Pfr
       & - replicated local route overrides by connected

Gateway of last resort is not set

    10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

B   +   10.1.1.0/24 [200/0] via 172.16.254.3, 00:00:42, Vlan901
B   +   10.1.1.11/32 [200/0] via 172.16.254.3, 00:00:28, Vlan901
B   +   10.255.1.11/32 [200/0] via 172.16.254.3, 01:32:49, Vlan901
B   +   10.255.1.12/32 [200/0] via 172.16.254.4, 01:32:49, Vlan901

C   +   10.255.1.13/32 is directly connected, Loopback11
C     10.255.3.13/32 is directly connected, Loopback13
```

觀察到，從VRF「綠色」的路由被複製到VRF「vrf-service」，並在路由表中標籤為「+」。

使用過濾的路由洩漏

路由複製可以透過過濾來完成。路由對映用於此目的。

僅將字首10.255.2.12從VRF「blue」複製到VRF「vrf-service」。

```
ip prefix-list PL-BLUE-2-VRF-SERVICE permit 10.255.2.12/32
!
route-map RM-BLUE-2-VRF-SERVICE permit 10
  match ip address prefix-list PL-BLUE-2-VRF-SERVICE
```

使用篩選器配置複製

<#root>

```
vrf definition vrf-service
  rd 3:3
  !
  address-family ipv4

    route-replicate from vrf green unicast all

    route-replicate from vrf blue unicast all route-map RM-BLUE-2-VRF-SERVICE

  route-target export 3:3
  route-target import 3:3
exit-address-family
```

觀察VRF「vrf-service」的路由表包含源自VRF「blue」的字首10.255.2.12/32：

<#root>

Border#

```
show ip route vrf VRF-SERVICE
```

<...snip...>

```
      10.0.0.0/8 is variably subnetted, 7 subnets, 2 masks
B   +   10.1.1.0/24 [200/0] via 172.16.254.3, 00:09:38, Vlan901
B   +   10.1.1.11/32 [200/0] via 172.16.254.3, 00:09:24, Vlan901
B   +   10.255.1.11/32 [200/0] via 172.16.254.3, 01:41:45, Vlan901
B   +   10.255.1.12/32 [200/0] via 172.16.254.4, 01:41:45, Vlan901
C   +   10.255.1.13/32 is directly connected, Loopback11

B   +   10.255.2.12/32 [200/0] via 172.16.254.4, 01:41:45, Vlan902 <--
C      10.255.3.13/32 is directly connected, Loopback13
```

僅預設路由通告和預設路由跟蹤

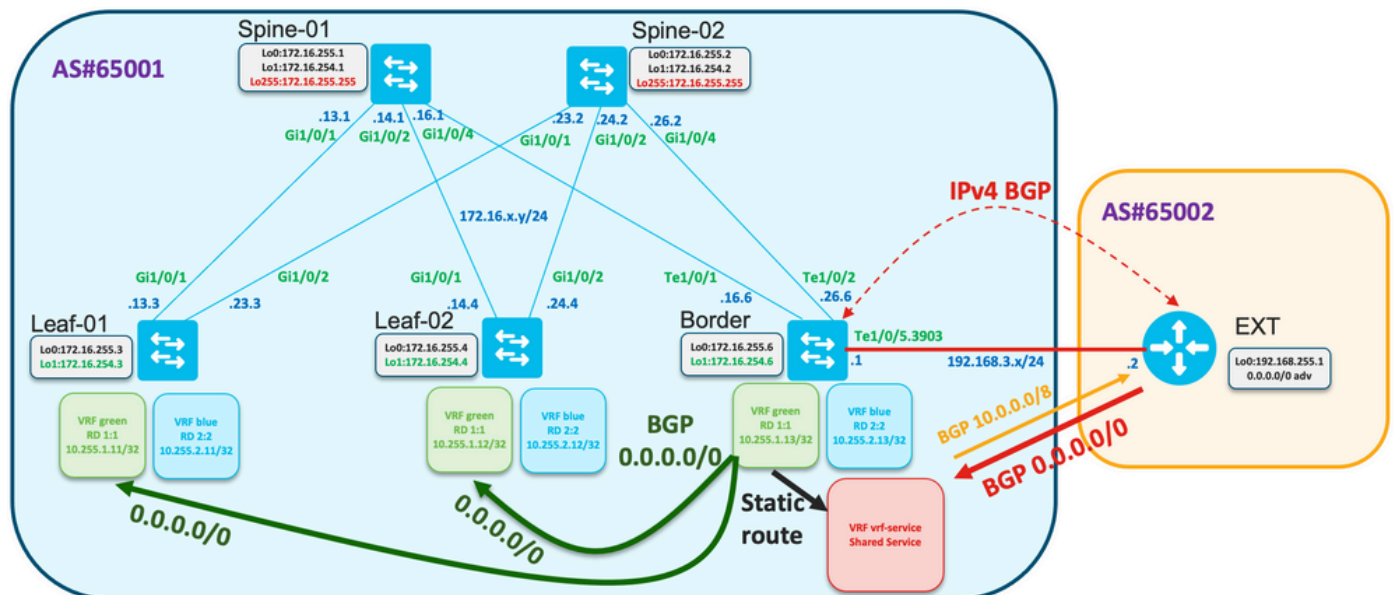
透過外部網路連線到枝葉的主機之間透過邊界建立連線。

- 通常，Border僅接收預設路由或預設路由加上彙總路由。
- 為了最佳化枝葉上的路由表，可以只通告來自邊界的預設路由。

預設路由在VRF「vrf-service」/「Shared service」中接收。

- 此路由可以複製到VRF「綠色」中，但無法重新通告複製的路由。需要在BGP中為VRF「綠色」配置預設路由通告。
- 可以配置帶有跟蹤對象的靜態路由，以避免當通告VRF「綠色」中的預設路由而沒有VRF「vrf-服務」中的預設路由時出現黑洞情況。

檢視拓撲



驗證邊界節點上是否收到預設路由：

```
<#root>
```

```
Border#
```

```
show ip route vrf vrf-service 0.0.0.0
```

```
Routing Table: red
```

```
Routing entry for 0.0.0.0/0, supernet
```

```
Known via "bgp 65001", distance 20, metric 0, candidate default path
```

```
Tag 65002, type external
```

```
Last update from 192.168.3.2 00:13:32 ago
```

```
Routing Descriptor Blocks:
```

```
* 192.168.3.2, from 192.168.3.2, 00:13:32 ago
```

```
opaque_ptr 0x7FA2A139FE50
```

```
Route metric is 0, traffic share count is 1
```

```
AS Hops 1
```

```
Route tag 65002
```

```
MPLS label: none
```

```
<#root>
```

```
Border#
```

```
show ip cef vrf vrf-service 0.0.0.0/0
```

```
0.0.0.0/0
```

```
  nexthop 192.168.3.2 TenGigabitEthernet1/0/5.3903
```

路徑1 檢查VRF 「vrf服務」中的預設路由的可達性。

```
track 1 ip route 0.0.0.0 0.0.0.0 reachability
ip vrf vrf-service
```

驗證預設路由存在於VRF 「vrf-service」中，且跟蹤對象為「Up」。

```
<#root>
```

```
Border#
```

```
show track 1
```

```
Track 1
```

```
  IP route 0.0.0.0 0.0.0.0 reachability
```

```
  Reachability is Up (BGP)
```

```
    2 changes, last change 00:23:12
```

```
  VPN Routing/Forwarding table "vrf-service"
```

```
  First-hop interface is TenGigabitEthernet1/0/5.3903
```

```
  Tracked by:
```

```
    Static IP Routing 0
```

在VRF中配置預設路由「綠色」，使用跟蹤選項

```
!
ip route vrf green 0.0.0.0 0.0.0.0 TenGigabitEthernet1/0/5.3903 192.168.3.2 track 1
!
```

```
<#root>
```

```
Border#
```



```
show ip route vrf green 0.0.0.0
```

```
Routing Table: green
Routing entry for 0.0.0.0/0, supernet
  Known via "static", distance 1, metric 0, candidate default path
  Redistributing via bgp 65001
  Advertised by bgp 65001
  Routing Descriptor Blocks:
  * 192.168.3.2, via TenGigabitEthernet1/0/5.3903
    Route metric is 0, traffic share count is 1
```

預設路由通告在VRF「綠色」的BGP進程下配置

```
<#root>

router bgp 65001
!
<...snip...>
!
address-family ipv4 vrf green
  advertise l2vpn evpn
  redistribute static
  redistribute connected

  default-information originate

exit-address-family
!
<...snip...>
```

驗證是否將預設路由通告給L2VPN EVPN AF (類似於路由型別5) 並透過交換矩陣傳播

```
<#root>

Border#

show bgp l2vpn evpn rd 1:1 route-type 5 0 0.0.0.0 0

BGP routing table entry for [5][1:1][0][0][0.0.0.0]/17, version 622
Paths: (1 available, best #1, table EVPN-BGP-Table)
  Advertised to update-groups:
    2
  Refresh Epoch 1
  Local, imported path from base
    192.168.3.2 (via vrf red) from 0.0.0.0 (172.16.255.6)
      Origin incomplete, metric 0, localpref 100, weight 32768, valid, external, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, local vtep: 172.16.254.6, VNI Label 5090
      Extended Community: RT:1:1 ENCAP:8 Router MAC:0C75.BD67.EF48
      rx pathid: 0, tx pathid: 0x0
      Updated on Jul 8 2022 10:41:40 UTC
```

檢查枝葉-01上的EVPN、路由和cef資訊

```
<#root>
```

```
Leaf-01#
```

```
show bgp l2vpn evpn rd 1:1 route-type 5 0 0.0.0.0 0
```

```
BGP routing table entry for [5][1:1][0][0][0.0.0.0]/17, version 595
```

```
Paths: (2 available, best #2, table EVPN-BGP-Table)
```

```
Not advertised to any peer
```

```
Refresh Epoch 7
```

```
Local
```

```
172.16.254.6 (metric 3) (via default) from 172.16.255.2 (172.16.255.2)
```

```
Origin incomplete, metric 0, localpref 100, valid, internal
```

```
EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 50901, MPLS VPN Label 0
```

```
Extended Community: RT:1:1 ENCAP:8 Router MAC:0C75.BD67.EF48
```

```
Originator: 172.16.255.6, Cluster list: 172.16.255.2
```

```
rx pathid: 0, tx pathid: 0
```

```
Updated on Jul 8 2022 10:41:40 UTC
```

```
Refresh Epoch 7
```

```
Local
```

```
172.16.254.6 (metric 3) (via default) from 172.16.255.1 (172.16.255.1)
```

```
Origin incomplete, metric 0, localpref 100, valid, internal, best
```

```
EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 50901, MPLS VPN Label 0
```

```
Extended Community: RT:1:1 ENCAP:8 Router MAC:0C75.BD67.EF48
```

```
Originator: 172.16.255.6, Cluster list: 172.16.255.1
```

```
rx pathid: 0, tx pathid: 0x0
```

```
Updated on Jul 8 2022 10:41:40 UTC
```

```
Leaf-01#
```

```
show ip route vrf green 0.0.0.0
```

```
Routing Table: green
```

```
Routing entry for 0.0.0.0/0, supernet
```

```
Known via "bgp 65001", distance 200, metric 0, candidate default path, type internal
```

```
Last update from 172.16.254.6 on Vlan901, 02:07:17 ago
```

```
Routing Descriptor Blocks:
```

```
* 172.16.254.6 (default), from 172.16.255.1, 02:07:17 ago, via Vlan901
```

```
opaque_ptr 0x7FC3606F4D80
```

```
Route metric is 0, traffic share count is 1
```

```
AS Hops 0
```

```
MPLS label: none
```

```
Leaf-01#
```

```
show ip cef vrf green 0.0.0.0/0
```

```
0.0.0.0/0
```

```
nexthop 172.16.254.6 Vlan901
```

從交換矩陣到外部網路的反向路由源自BGP，就像總結路由一樣

```
<#root>
```

```
!
```

```
ip route vrf vrf-service 10.0.0.0 255.0.0.0 Null0
```

```
!
```

```
router bgp 65001
<...snip...>
!
address-family ipv4 vrf vrf-service
  advertise l2vpn evpn

  aggregate-address 10.0.0.0 255.0.0.0 summary-only

  redistribute static
  redistribute connected
  neighbor 192.168.3.2 remote-as 65002
  neighbor 192.168.3.2 activate
exit-address-family
!
<...snip...>
```

檢查VRF「綠色」中枝葉-01上的路由表並ping遠端IP地址192.168.255.1

```
<#root>
```

```
Leaf-01#
```

```
show ip route vrf green 192.168.255.1
```

```
Routing Table: green
% Network not in table
```

```
Leaf-01#
```

```
show ip route vrf green 0.0.0.0
```

```
Routing Table: green
Routing entry for 0.0.0.0/0, supernet
  Known via "bgp 65001", distance 200, metric 0, candidate default path, type internal
  Last update from 172.16.254.6 on Vlan901, 05:15:19 ago
  Routing Descriptor Blocks:
  * 172.16.254.6 (default), from 172.16.255.1, 05:15:19 ago, via Vlan901
    opaque_ptr 0x7FC3606F4D80
    Route metric is 0, traffic share count is 1
    AS Hops 0
    MPLS label: none
```

```
Leaf-01#
```

```
show ip cef vrf green 0.0.0.0/0
```

```
0.0.0.0/0
  nexthop 172.16.254.6 Vlan901
```

```
Leaf-01#
```

```
ping vrf green 192.168.3.2 source 10.255.1.11
```

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.3.2, timeout is 2 seconds:
Packet sent with a source address of 10.255.1.11
```

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms

如果VRF「vrf-service」中的邊界上丟失了預設路由，則跟蹤對象將關閉，VRF「綠色」中的靜態路由將從RIB中刪除，並在BGP中通告的預設路由也將刪除

<#root>

Border

Border#

show ip route vrf vrf-service 0.0.0.0

Routing Table: vrf-service
% Network not in table

Border#

show track 1

Track 1

IP route 0.0.0.0 0.0.0.0 reachability

Reachability is Down (no ip route) <-- Track object is down

3 changes, last change 00:03:15
VPN Routing/Forwarding table "vrf-service"
First-hop interface is unknown
Tracked by:
Static IP Routing 0

Border#

show ip route vrf green 0.0.0.0

Routing Table: green
% Network not in table

Border#

show bgp l2vpn evpn rd 1:1 route-type 5 0 0.0.0.0 0

% Network not in table

Leaf

Leaf-01#

show ip route vrf green 0.0.0.0

Routing Table: green
% Network not in table

必須過濾從VRF「綠色」到VRF「vrf-service」的預設路由

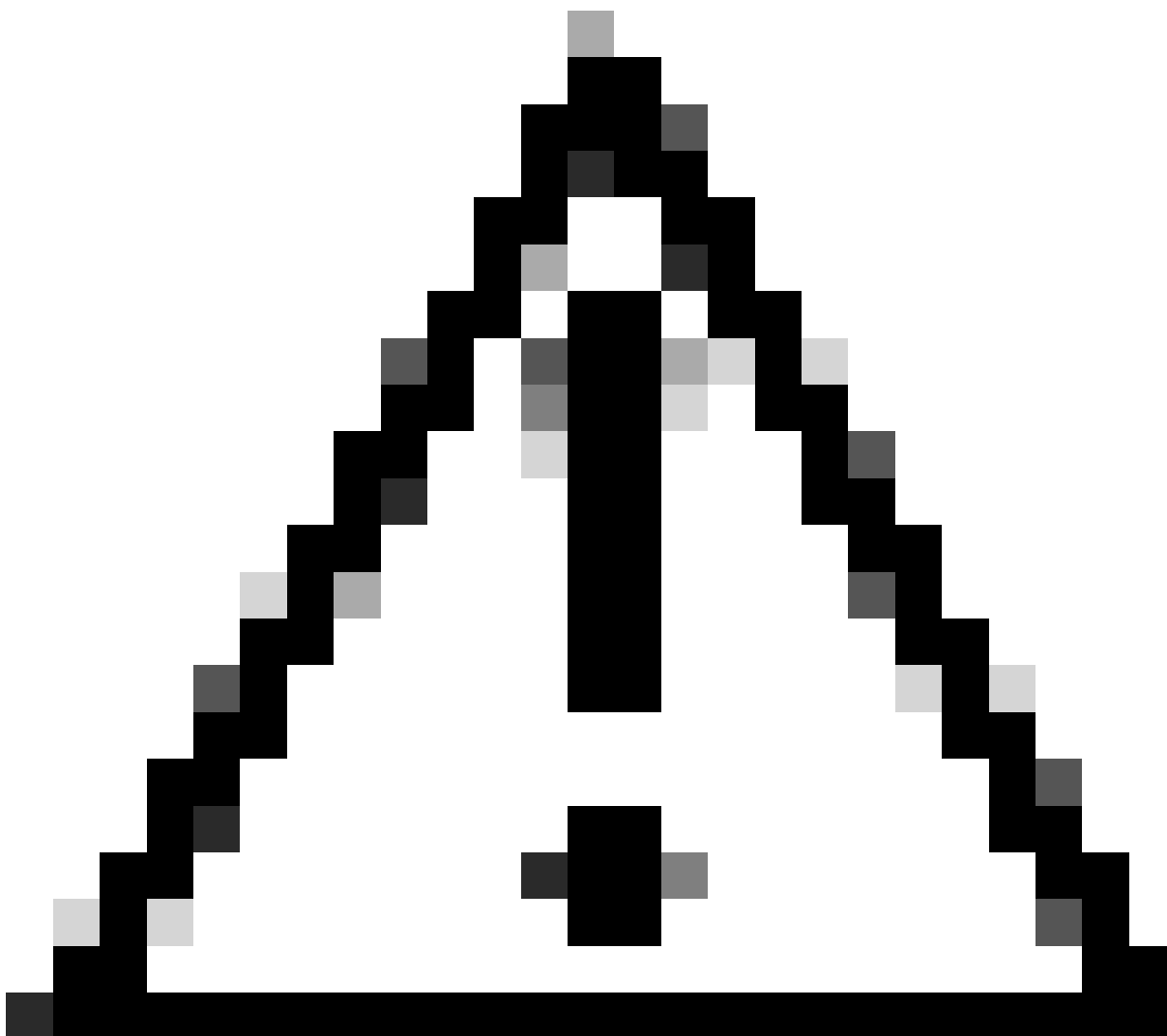
```
<#root>
```

```
vrf definition vrf-service
rd 3:3
!
address-family ipv4

    route-replicate from vrf green unicast all route-map RM-GREEN-2-VRF-SERVICE

    route-target export 3:3
    route-target import 3:3
exit-address-family

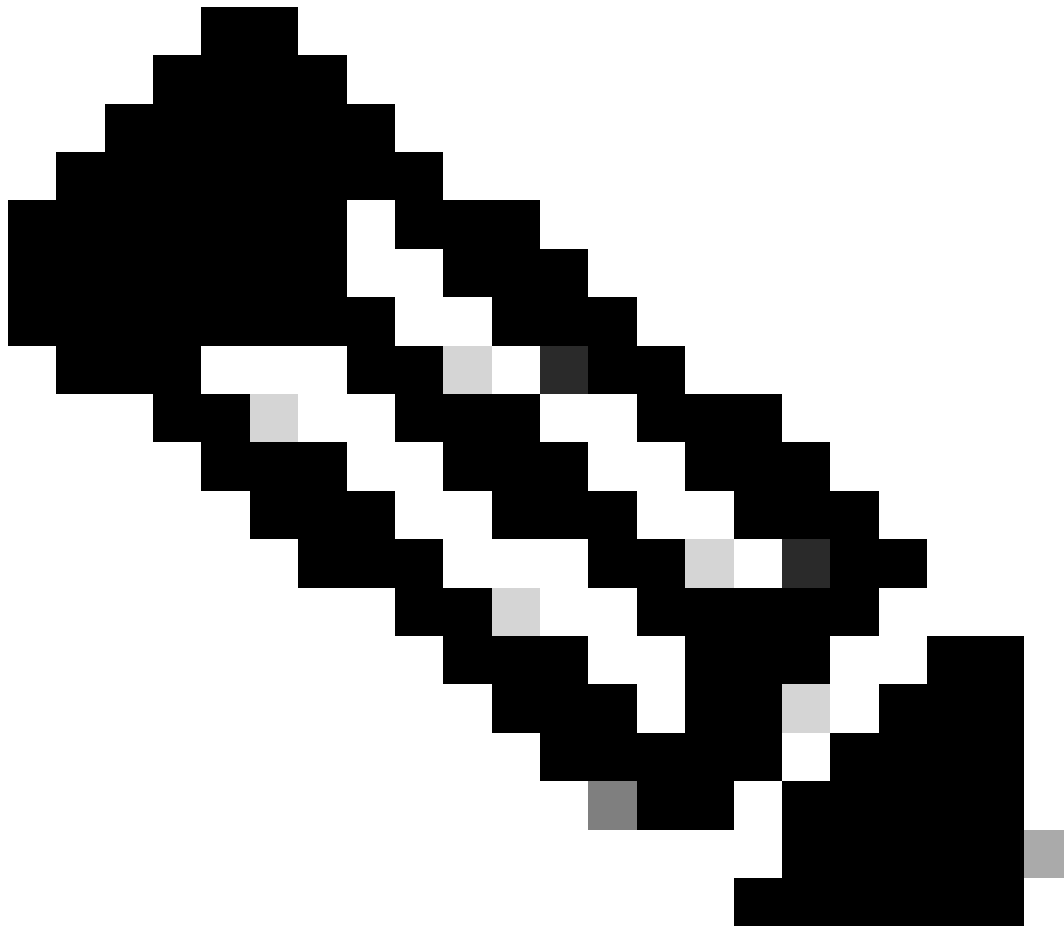
ip prefix-list PL-DEFAULT seq 5 permit 0.0.0.0/0
!
route-map RM-GREEN-2-VRF-SERVICE deny 10
    match ip address prefix-list PL-DEFAULT
!
route-map RM-GREEN-2-VRF-SERVICE permit 20
```



注意：由於丟失預設路由與跟蹤對象關閉之間的延遲，靜態預設路由將從VRF「綠色」複製到VRF「vrf服務」，並保持跟蹤對象正常運行。因此，預設路由會通告給交換矩陣並遮蔽流量。

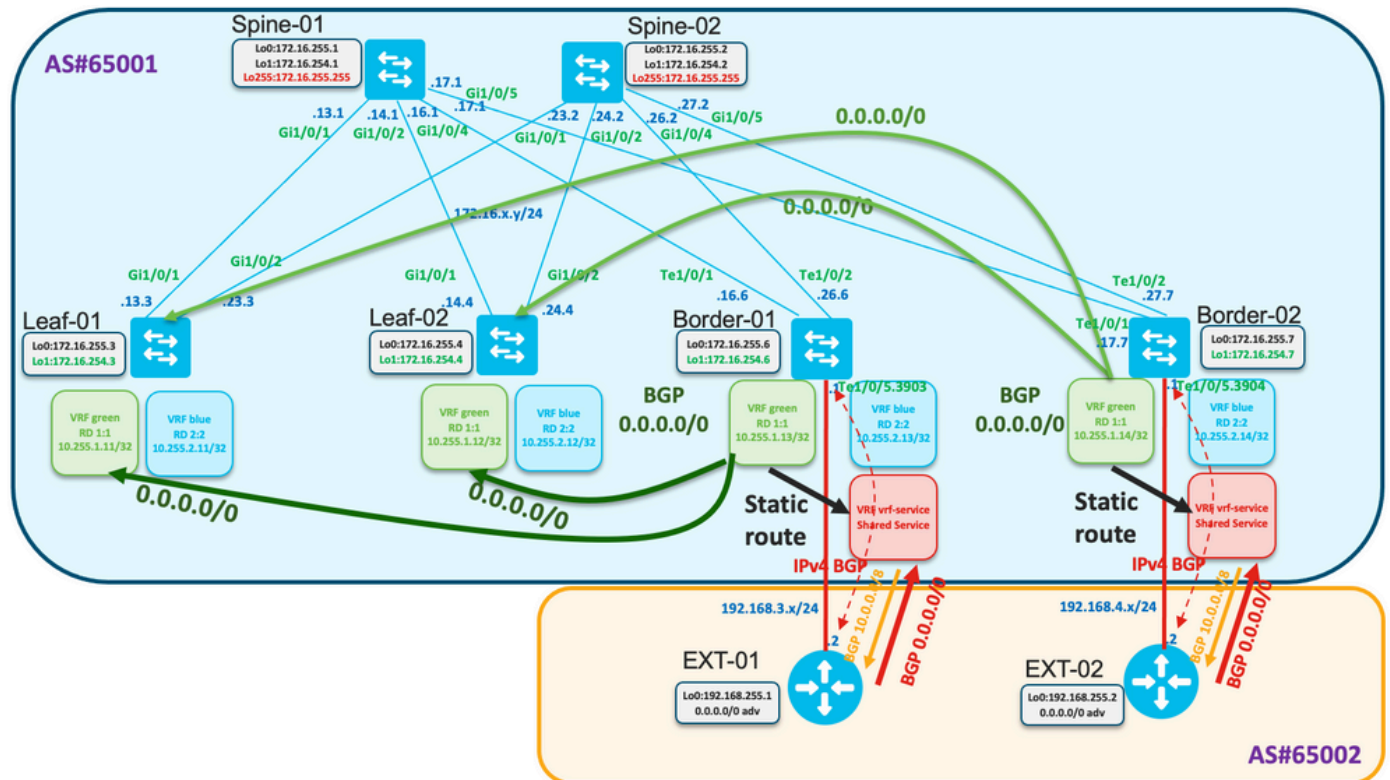
僅預設路由通告具有冗餘邊界

本節提供使用多餘框線的範例。



注意：在此示例中，我們使用了BGP其他路徑功能。另一個選擇是，在Border-01和Border-02上使用不同的RD可用於將兩個預設路由從兩個邊界通告到枝葉。

檢視拓撲



Border-01和Border-02分別接收來自EXT-01和EXT-02的預設路由。

從Border-01

```
<#root>
```

```
Border-01#
```

```
show ip route vrf vrf-service 0.0.0.0
```

```
Routing Table: vrf-service
Routing entry for 0.0.0.0/0, supernet
  Known via "bgp 65001", distance 20, metric 0, candidate default path
  Tag 65002, type external
  Last update from 192.168.3.2 00:00:06 ago
Routing Descriptor Blocks:
  * 192.168.3.2, from 192.168.3.2, 00:00:06 ago
    opaque_ptr 0x7F68E5AC02A0
    Route metric is 0, traffic share count is 1
    AS Hops 1
    Route tag 65002
    MPLS label: none
```

```
Border-01#
```

```
show ip cef vrf vrf-service 0.0.0.0/0
```

```
0.0.0.0/0
  nexthop 192.168.3.2 TenGigabitEthernet1/0/5.3903
```


從Border-02

<#root>

Border-02#

```
show ip route vrf vrf-service 0.0.0.0
```

Routing Table: vrf-service

Routing entry for 0.0.0.0/0, supernet

Known via "bgp 65001", distance 20, metric 0, candidate default path

Tag 65002, type external

Last update from 192.168.4.2 01:22:08 ago

Routing Descriptor Blocks:

* 192.168.4.2, from 192.168.4.2, 01:22:08 ago

opaque_ptr 0x7FE529FF3D48

Route metric is 0, traffic share count is 1

AS Hops 1

Route tag 65002

MPLS label: none

Border-02#

```
show ip cef vrf vrf-service 0.0.0.0/0
```

0.0.0.0/0

nexthop 192.168.4.2 TenGigabitEthernet1/0/5.3904

在雙邊界配置中使用的方法與之前示例中的方法相同-帶跟蹤的靜態預設路由。

配置Border-01/02路徑，為vrf「綠色」中的預設路由配置靜態路由，為通告配置bgp配置。

<#root>

```
track 1 ip route 0.0.0.0 0.0.0.0 reachability
```

```
ip vrf vrf-service
```

```
!
```

```
ip route vrf green 0.0.0.0 0.0.0.0 TenGigabitEthernet1/0/5.3903 192.168.3.2 track 1
```

```
!
```

```
router bgp 65001
```

```
!
```

```
<...snip...>
```

```
!
```

```
address-family ipv4 vrf green
```

```
advertise l2vpn evpn
```

```
redistribute static
```

```
redistribute connected
```

```
default-information originate
```

```
exit-address-family
```

```
!
```

```
<...snip...>
```

驗證主幹上是否收到來自兩個邊界的預設路由

```
<#root>
```

```
Spine-01#
```

```
show bgp l2vpn evpn
```

```
BGP table version is 25, local router ID is 172.16.255.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found
```

Network	Next Hop	Metric	LocPrf	Weight	Path
Route Distinguisher: 1:1					
* ia [5][1:1][0][0][0.0.0.0]/17					
	172.16.254.7	0	100	0	?
*>i	172.16.254.6	0	100	0	?
* i	172.16.254.6	0	100	0	?

```
<...snip...>
```

```
Spine-02#
```

```
show bgp l2vpn evpn
```

```
BGP table version is 75, local router ID is 172.16.255.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found
```

Network	Next Hop	Metric	LocPrf	Weight	Path
Route Distinguisher: 1:1					
* i [5][1:1][0][0][0.0.0.0]/17					
	172.16.254.6	0	100	0	?
* ia	172.16.254.7	0	100	0	?
*>i	172.16.254.6	0	100	0	?

```
<...snip...>
```

在主幹上配置以傳播兩個預設路由BGP additional-path

```
<#root>
```

```
router bgp 65001
```

```
!
```

```
<...snip...>
```

```
!
```

```
address-family l2vpn evpn
```

```

bgp additional-paths select all best 2
  bgp additional-paths send receive
<...snip...>
  neighbor 172.16.255.3 advertise additional-paths best 2
<...snip...>
  neighbor 172.16.255.4 advertise additional-paths best 2
!
<...snip...>

```

觀察此配置是否更改了預設僅最佳傳輸，而是同時通告兩條路由

```

<#root>
Spine-01#
show bgp l2vpn evpn neighbors 172.16.255.3 advertised-routes

BGP table version is 25, local router ID is 172.16.255.1
Status codes: s suppressed, d damped, h history, * valid,
> best
, i - internal,
      r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
      x best-external,

a additional-path
, c RIB-compressed,
      t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1

*>i  [5][1:1][0][0][0.0.0.0]/17
                172.16.254.6          0    100    0 ?

<-- best path

* ia [5][1:1][0][0][0.0.0.0]/17
                172.16.254.7          0    100    0 ?

<-- additional path (note the a flag indicating this)
<...snip...>

```

觀察在枝葉上，我們看到4個BGP預設路由

<#root>

Leaf-01#

sh bgp l2vpn evpn

BGP table version is 63, local router ID is 172.16.255.3

Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
x best-external, a additional-path, c RIB-compressed,
t secondary path, L long-lived-stale,

Origin codes: i - IGP, e - EGP, ? - incomplete

RPKI validation codes: V valid, I invalid, N Not found

Network	Next Hop	Metric	LocPrf	Weight	Path
---------	----------	--------	--------	--------	------

Route Distinguisher: 1:1 (default for vrf green)

* i	[5][1:1][0][0][0.0.0.0]/17				
	172.16.254.7	0	100	0	?
* ia	172.16.254.7	0	100	0	?
*>i	172.16.254.6	0	100	0	?
* i	172.16.254.6	0	100	0	?

<...snip...>

Leaf-01#

sh bgp l2vpn evpn route-type 5 0 0.0.0.0 0

BGP routing table entry for [5][1:1][0][0][0.0.0.0]/17, version 64

Paths: (4 available, best #3, table EVPN-BGP-Table)

Not advertised to any peer

Refresh Epoch 4

Local

172.16.254.7 (metric 3) (via default) from 172.16.255.2 (172.16.255.2)

Origin incomplete, metric 0, localpref 100, valid, internal

EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 50901, MPLS VPN Label 0

Extended Community: RT:1:1 ENCAP:8 Router MAC:0C75.BD68.E548

Originator: 172.16.255.7, Cluster list: 172.16.255.2

rx pathid: 0x1, tx pathid: 0

Updated on Aug 24 2022 16:52:56 UTC

Refresh Epoch 1

Local

172.16.254.7 (metric 3) (via default) from 172.16.255.1 (172.16.255.1)

Origin incomplete, metric 0, localpref 100, valid, internal

EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 50901, MPLS VPN Label 0

Extended Community: RT:1:1 ENCAP:8 Router MAC:0C75.BD68.E548

Originator: 172.16.255.7, Cluster list: 172.16.255.1

rx pathid: 0x1, tx pathid: 0

Updated on Aug 24 2022 16:49:48 UTC

Refresh Epoch 1

Local

172.16.254.6 (metric 3) (via default) from 172.16.255.1 (172.16.255.1)

Origin incomplete, metric 0, localpref 100, valid, internal, best

EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 50901, MPLS VPN Label 0

Extended Community: RT:1:1 ENCAP:8 Router MAC:0C75.BD67.EF48

Originator: 172.16.255.6, Cluster list: 172.16.255.1

rx pathid: 0x0, tx pathid: 0x0

Updated on Aug 24 2022 16:49:48 UTC

Refresh Epoch 4

Local

172.16.254.6 (metric 3) (via default) from 172.16.255.2 (172.16.255.2)

```
Origin incomplete, metric 0, localpref 100, valid, internal
EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 50901, MPLS VPN Label 0
Extended Community: RT:1:1 ENCAP:8 Router MAC:0C75.BD67.EF48
Originator: 172.16.255.6, Cluster list: 172.16.255.2
rx pathid: 0x0, tx pathid: 0
Updated on Aug 24 2022 16:52:56 UTC
```

枝葉上的配置如下所示

```
<#root>

router bgp 65001
!
<...snip...>
!
  address-family l2vpn evpn

    bgp additional-paths receive

<...snip...>
!
  address-family ipv4 vrf green

    import path selection all
    maximum-paths ibgp 2

<...snip...>
```

驗證在枝葉路由表上，我們看到兩條通往兩個邊界的路由

```
<#root>

Leaf-01#

show ip route vrf green

Routing Table: green
<...snip...>

Gateway of last resort is 172.16.254.7 to network 0.0.0.0

B*    0.0.0.0/0 [200/0] via 172.16.254.7, 00:02:15, Vlan901
        [200/0] via 172.16.254.6, 00:02:15, Vlan901
<...snip...>

Leaf-01#

show ip cef vrf green 0.0.0.0/0

0.0.0.0/0
  nexthop 172.16.254.6 Vlan901
  nexthop 172.16.254.7 Vlan901
```

觀察在預設路由從Border-01丟失的情況下會發生什麼情況。

```
<#root>
```

```
Border-01#
```

```
show ip route vrf vrf-service 0.0.0.0
```

```
Routing Table: vrf-service  
% Network not in table
```

曲目關閉

```
<#root>
```

```
Border-01#
```

```
show track 1
```

```
Track 1  
IP route 0.0.0.0 0.0.0.0 reachability  
  
Reachability is Down (no ip route)  
  
5 changes, last change 00:00:56  
VPN Routing/Forwarding table "vrf-service"  
First-hop interface is unknown  
Tracked by:  
Static IP Routing 0
```

在脊椎上，我們只看到來自Border-02的路線

```
<#root>
```

```
Spine-01#
```

```
show bgp l2vpn evpn
```

```
BGP table version is 27, local router ID is 172.16.255.1  
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,  
r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,  
x best-external, a additional-path, c RIB-compressed,  
t secondary path, L long-lived-stale,  
Origin codes: i - IGP, e - EGP, ? - incomplete  
RPKI validation codes: V valid, I invalid, N Not found
```

```
Network          Next Hop          Metric LocPrf Weight Path  
Route Distinguisher: 1:1  
* i [5][1:1][0][0][0.0.0.0]/17  
172.16.254.7      0 100 0 ?  
*>i 172.16.254.7 0 100 0 ?  
<...snip...>
```

在枝葉上，我們只看到來自Border-02的路由

```
<#root>
```

```
Leaf-01#
```

```
show bgp l2vpn evpn
```

```
BGP table version is 68, local router ID is 172.16.255.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found
```

```
      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
*>i  [5][1:1][0][0][0.0.0.0]/17
      172.16.254.7          0      100      0 ?
* i   172.16.254.7          0      100      0 ?
<...snip...>
```

```
Leaf-01#
```

```
sh bgp l2vpn evpn route-type 5 0 0.0.0.0 0
```

```
BGP routing table entry for [5][1:1][0][0][0.0.0.0]/17, version 68
Paths: (2 available, best #1, table EVPN-BGP-Table)
  Not advertised to any peer
  Refresh Epoch 1
  Local
    172.16.254.7 (metric 3) (via default) from 172.16.255.1 (172.16.255.1)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 50901, MPLS VPN Label 0
      Extended Community: RT:1:1 ENCAP:8 Router MAC:0C75.BD68.E548
      Originator: 172.16.255.7, Cluster list: 172.16.255.1
      rx pathid: 0x0, tx pathid: 0x0
      Updated on Aug 24 2022 17:17:31 UTC
  Refresh Epoch 4
  Local
    172.16.254.7 (metric 3) (via default) from 172.16.255.2 (172.16.255.2)
      Origin incomplete, metric 0, localpref 100, valid, internal
      EVPN ESI: 00000000000000000000, Gateway Address: 0.0.0.0, VNI Label 50901, MPLS VPN Label 0
      Extended Community: RT:1:1 ENCAP:8 Router MAC:0C75.BD68.E548
      Originator: 172.16.255.7, Cluster list: 172.16.255.2
      rx pathid: 0x0, tx pathid: 0
      Updated on Aug 24 2022 17:17:31 UTC
```

路由表中Leaf-01上的CEF中僅存在一條路由

```
<#root>
```

```
Leaf-01#
```

```
show ip route vrf green
```

Routing Table: green

<...snip...>

Gateway of last resort is 172.16.254.7 to network 0.0.0.0

B* 0.0.0.0/0 [200/0] via 172.16.254.7, 00:04:02, Vlan901

<...snip...>

Leaf-01#

```
show ip cef vrf green 0.0.0.0/0
```

```
0.0.0.0/0
```

```
  nexthop 172.16.254.7 Vlan901
```

相關資訊

- [技術支援與文件 - Cisco Systems](#)
- [BGP EVPN VXLAN配置指南, Cisco IOS XE阿姆斯特丹版17.3.x \(Catalyst 9500交換機 \)](#)
- [BGP EVPN VXLAN的功能歷史記錄](#)

關於此翻譯

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