

Configurazione e verifica di EVPN/VxLAN in un ambiente multisito

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Introduzione

In questo documento viene descritto come configurare e verificare Ethernet VPN/Virtual Extensible LAN Multisite Environment con gli switch Cisco Nexus serie 9000.

Prerequisiti

Requisiti

Cisco raccomanda la conoscenza dei seguenti argomenti:

- VPN Layer 3 Multiprotocol Label Switching (MPLS)
- Multiprotocollo - Border Gateway Protocol (MP-BGP)
- VPN Ethernet (EVPN)

Componenti usati

Le informazioni fornite in questo documento si basano sulle seguenti versioni software e hardware:

foglia1#	N5K-C5672UP-16G-SUP	sistema: versione 7.3(0)N1(1)
foglia2#	N9K-C92160YC-X	NXOS: versione 9.2(3)

dorso1#	N9K-C9396PX	NXOS: versione 9.2(3)
dorso2#	N9K-C9396PX	NXOS: versione 9.2(3)
MultisitoBG1#	N9K-C93108TC-EX	NXOS: versione 9.2(3)
MultisitoBG2#	N9K-C93108TC-FX	NXOS: versione 9.3(1)
multisitespine2#	N9K-C9372TX-E	NXOS: versione 9.2(3)
Multistespine1#	N9K-C92160YC-X	NXOS: versione 9.2(3)
FogliaMultiplo1#	N9K-C93108TC-EX	NXOS: versione 7.0(3)I7(5)

Le informazioni discusse in questo documento fanno riferimento a dispositivi usati in uno specifico ambiente di emulazione. Su tutti i dispositivi menzionati nel documento la configurazione è stata ripristinata ai valori predefiniti. Se la rete è operativa, valutare attentamente eventuali conseguenze derivanti dall'uso dei comandi.

Prodotti correlati

Requisiti minimi di software e hardware EVPN Multi-Site border gateway.

Articolo	Requisito
Hardware Cisco Nexus	• Cisco Nexus 9300 piattaforma EX
	• Cisco Nexus 9300 piattaforma FX
	• Cisco Nexus 9332C piattaforma
	• Piattaforma Cisco Nexus 9364C
	• Piattaforma Cisco Nexus 9500 con scheda di linea X9700-EX
	• Piattaforma Cisco Nexus 9500 con scheda di linea X9700-FX
Software Cisco NX-OS	Software Cisco NX-OS versione 7.0(3)I7(1) o successive

I requisiti hardware e software per i nodi interni del sito VXLAN (Virtual Extensible LAN) BGP EVPN rimangono gli stessi di quelli senza EVPN Multi-Site BGW

Premesse

Il centro dati è un pool di risorse che contiene la potenza di elaborazione, lo storage e le applicazioni necessarie per supportare qualsiasi ambiente aziendale. È fondamentale pianificare correttamente la progettazione dell'infrastruttura del centro dati. Ora scopri quali sono i requisiti critici e come vengono risolti. Le moderne installazioni di infrastrutture IT e centri dati richiedono disponibilità elevata, scalabilità a velocità più elevate, prestazioni elevate e operatività costante.

Alcuni requisiti vitali esplorati nello spazio di progettazione/architettura DC:

- Densità porta, è migliorata da FEX.
- La capacità di elaborazione è migliorata dalla virtualizzazione hardware (UCS).

- La larghezza di banda uplink del layer di accesso è stata migliorata da FI, Port-Channel.
- Ridondanza a livello di chassis migliorata da vPC.
- Il fabric SDN è stato migliorato da ACI, automatizzando la sovrapposizione e la sovrapposizione in un fabric.
- DCNM migliora l'installazione rapida e il supporto di nuovi servizi.
- I requisiti di larghezza di banda per le applicazioni a lungo raggio sono migliorati dal servizio di fibra scura o lunghezza d'onda.
- In tutti i casi in cui la ridondanza geografica e la scalabilità sono attributi chiave per il throbbing/scaling out dell'ambiente del centro dati, Multi-Site VxLAN/EVPN ci aiuta ad avere soluzioni DCI migliori.

In che modo è utile l'accesso su più siti

La connettività esterna include la connessione del centro dati al resto della rete: a Internet, alla WAN o al campus. Tutte le opzioni fornite per la connettività esterna sono compatibili con più tenant e si concentrano sul trasporto di layer 3 verso i domini di rete esterni.

- EVPN è una soluzione VPN all-in-one di nuova generazione.
- Non solo funziona con molte altre tecnologie VPN, ma è anche migliore.
- Integrazione con le reti legacy.
- Annuncio/estensione selettiva:
 - Estendere le uniche VLAN/subnet specifiche di L2 che possono essere estese utilizzando route di tipo 2.
 - Estendi gli unici domini L3 - È possibile estendere domini L3 specifici utilizzando route di tipo 5.
- Rilevamento automatico del gruppo di ridondanza utilizzando route di tipo 4.
- Aliasing, Ritiro di massa di indirizzi, Indicazione SH/AA MH utilizzando le rotte di tipo 1.
- Rilevamento automatico degli endpoint del tunnel multicast e del tipo di tunnel MCAST che utilizzano route di tipo 3.

Altri vantaggi

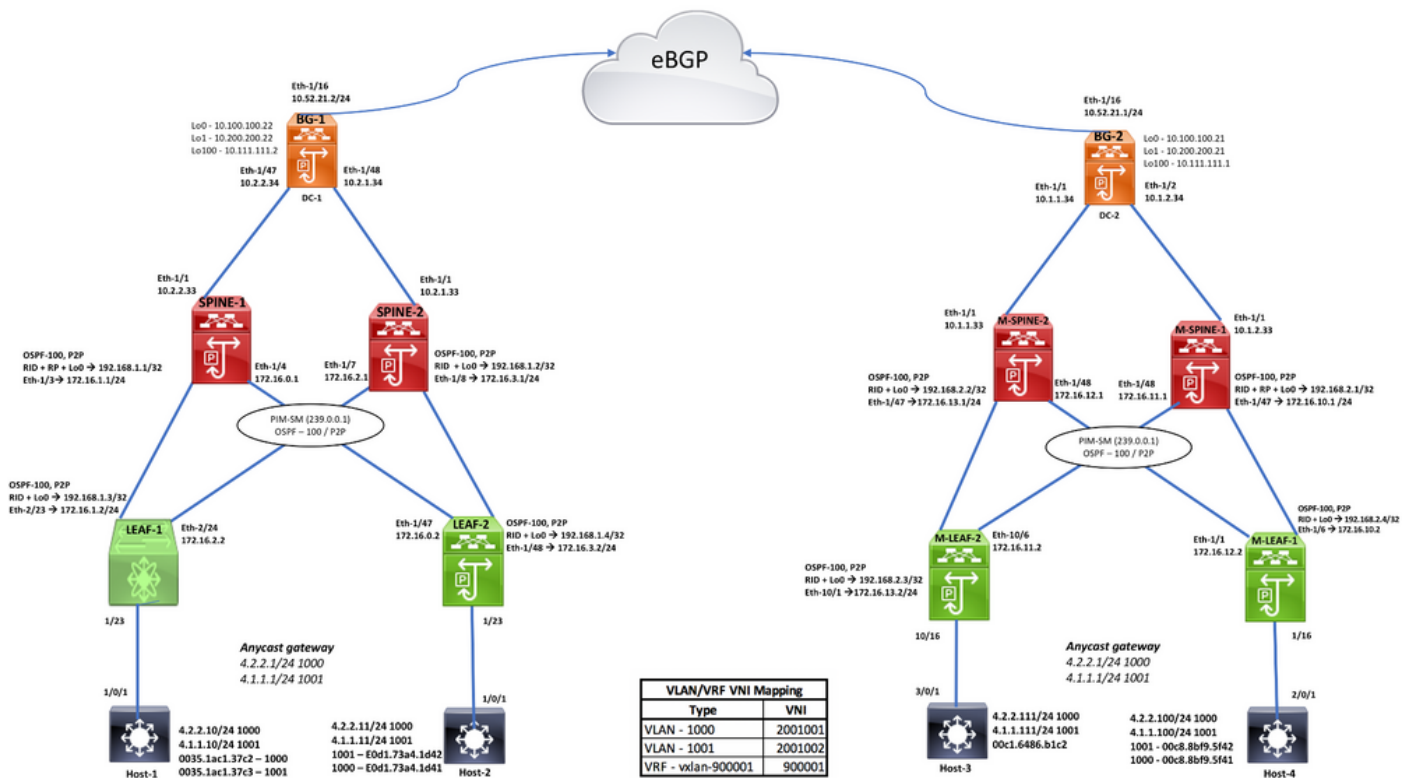
- Bilanciamento del carico di lavoro tra data center e cloud.

- Risposta proattiva alle interruzioni: riduce i rischi di disastri in avvicinamento, quali uragani, inondazioni e così via.
- Manutenzione e migrazioni dei data center: eventi pianificati pianificati per un determinato periodo di tempo, integrazione con reti legacy.
- Backup e disaster recovery aaS.

Topologie supportate

- Modello da BGW a Cloud
- BGW tra i modelli Spine e Super-Spine
- BGW sul modello Spine
- Modello back-to-back BGW

Topologia



Configurazione

DC-1, LEAF-1 CONFIGURATION

<p>Enable Features</p> <pre>install feature-set fabric feature-set fabric hostname leaf1 feature fabric forwarding nv overlay evpn feature ospf feature bgp feature pim feature interface-vlan feature fabric access feature nv overlay feature vn-segment-vlan-based</pre>	<p>VLAN-VNI Mapping</p> <pre>vlan 1 vlan 101 vn-segment 900001 vlan 1000 vn-segment 2001002 vlan 1001 vn-segment 2001001</pre> <p>VLAN Config</p> <pre>interface Vlan101 no shutdown vrf member vxlan-900001 ip forward</pre> <p>Interface Vlan1000</p> <pre>no shutdown mtu 9216 vrf member vxlan-900001 ip address 4.2.2.1/24 ipv6 address 4:2:0::1/64 fabric forwarding mode anycast-gateway</pre> <p>Interface Vlan1001</p> <pre>no shutdown mtu 9216 vrf member vxlan-900001 ip address 4.1.1.1/24 ipv6 address 4:1:0::1/64 fabric forwarding mode anycast-gateway</pre> <p>Anycast GW mapping</p> <pre>fabric forwarding anycast-gateway-mac 0000.2222.3333</pre> <p>Static RP Config</p> <pre>ip pim rp-address 192.168.1.1 group-list 224.0.0.0/4 ip pim rp-address 192.168.1.2 group-list 224.0.0.0/4 ip pim ssm range 232.0.0.0/8 ip multicast multipath none</pre>	<p>VTEP Config</p> <pre>interface nve1 no shutdown source-interface loopback0 host-reachability protocol bgp member vni 900001 associate-vrf member vni 2001001 suppress-arp mcast-group 239.0.0.1 member vni 2001002 suppress-arp mcast-group 239.0.0.1</pre>	<p>LEAF to SPINE interfaces/OSPF Config</p> <pre>interface Ethernet2/23 no switchport ip address 172.16.1.2/24 ip ospf network point-to-point ip router ospf 100 area 0.0.0.0 ip pim sparse-mode</pre> <p>interface Ethernet2/24</p> <pre>no switchport ip address 172.16.2.2/24 ip ospf network point-to-point ip router ospf 100 area 0.0.0.0 ip pim sparse-mode</pre> <p>Interface loopback0</p> <pre>ip address 192.168.1.3/24 ip router ospf 100 area 0.0.0.0 ip pim sparse-mode</pre> <p>router ospf 100</p> <pre>router-id 192.168.1.3</pre>	<p>BGP Config</p> <pre>router bgp 200 router-id 192.168.1.3 address-family ipv4 unicast address-family l2vpn evpn neighbor 192.168.1.1 remote-as 200 update-source loopback0 address-family ipv4 unicast address-family l2vpn evpn send-community extended neighbor 192.168.1.2 remote-as 200 update-source loopback0 address-family ipv4 unicast address-family l2vpn evpn send-community extended</pre> <p>evpn</p> <pre>vni 2001001 l2 <<<<<< L2VNI Config rd auto route-target import auto route-target export auto vni 2001002 l2 rd auto route-target import auto route-target export auto</pre> <p>vrf context vxlan-900001</p> <pre>vni 900001 <<<<<< L3VNI Config rd auto address-family ipv4 unicast route-target both auto route-target both auto evpn address-family ipv6 unicast route-target both auto route-target both auto evpn</pre>
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DC-1 SPINE -1 Configuration

Enabling Features, RP Config	OSPF Configuration	BGP/EVPN Configuration
<pre>hostname spine1 boot n9000 bootflash:/n9000-9.2.3.bin</pre> <p>nv overlay evpn</p> <pre>feature ospf feature bgp feature pim feature interface-vlan feature vn-segment-vlan-based feature nv overlay</pre> <p>ip pim rp-address 192.168.1.1 group-list 224.0.0.0/4</p>	<pre>interface Ethernet1/1 no switchport ip address 10.2.2.33/30 ip ospf network point-to-point ip router ospf 100 area 0.0.0.0 ip pim sparse-mode no shutdown</pre> <pre>interface Ethernet1/3 no switchport ip address 172.16.1.1/24 ip ospf network point-to-point ip router ospf 100 area 0.0.0.0 ip pim sparse-mode no shutdown</pre> <pre>interface Ethernet1/4 no switchport ip address 172.16.0.1/24 ip ospf network point-to-point ip router ospf 100 area 0.0.0.0 ip pim sparse-mode no shutdown</pre> <pre>interface loopback0 ip address 192.168.1.1/32 ip router ospf 100 area 0.0.0.0 ip pim sparse-mode</pre> <p>router ospf 100</p> <pre>router-id 192.168.1.1</pre>	<pre>router bgp 200 router-id 192.168.1.1 address-family ipv4 unicast address-family l2vpn evpn neighbor 10.100.100.22 remote-as 200 update-source loopback0 address-family ipv4 unicast address-family l2vpn evpn send-community send-community extended route-reflector-client neighbor 192.168.1.3 remote-as 200 update-source loopback0 address-family ipv4 unicast send-community extended route-reflector-client address-family l2vpn evpn send-community extended route-reflector-client neighbor 192.168.1.4 remote-as 200 update-source loopback0 address-family ipv4 unicast send-community extended route-reflector-client address-family l2vpn evpn send-community extended route-reflector-client</pre>

DC-1 Border Gateway-1 Configuration			
Enabling Features, RouteMap, B-G Config	VLAN,VNI,VTEP Config	OSPF Configuration	BGP/EVPN Configuration
hostname MultisiteBG1 boot nxos bootflash:/nxos.9.2.3.bin nv overlay evpn feature ospf feature bgp feature pim feature fabric forwarding feature interface-vlan feature vn-segment-vlan-based feature lldp feature nv overlay evpn multisite border-gateway 200 delay-restore time 300 route-map RMAP-REDIST-DIRECT permit 10 match tag 54321	VLAN-VNI Mapping vlan 101 vn-segment 900001 vlan 1000 vn-segment 2001002 vlan 1001 vn-segment 2001001	interface Ethernet1/47 ip address 10.2.2.34/30 ip ospf network point-to-point ip router ospf 100 area 0.0.0.0 ip pim sparse-mode evpn multisite fabric-tracking no shutdown	router bgp 200 router-id 10.100.100.22 address-family ipv4 unicast redistribute direct route-map RMAP-REDIST-DIRECT neighbor 10.52.21.1 remote-as 100 update-source Ethernet1/16 address-family ipv4 unicast neighbor 10.100.100.21 remote-as 100 update-source loopback0 ebgp-multihop 5 peer-type fabric-external address-family l2vpn evpn send-community send-community extended rewrite-evpn-rt-asn neighbor 192.168.1.1 remote-as 200 update-source loopback0 address-family l2vpn evpn send-community send-community extended neighbor 192.168.1.2 remote-as 200 update-source loopback0 address-family l2vpn evpn send-community send-community extended
	VTEP Config interface nve1 no shutdown host-reachability protocol bgp source-interface loopback1 multisite border-gateway interface loopback100 member vni 900001 associate-vrf member vni 2001001 multisite ingress-replication ingress-replication protocol bgp member vni 2001002 multisite ingress-replication ingress-replication protocol bgp	Core-Facing Interface Config interface Ethernet1/16 mtu 9216 ip address 10.52.21.2/30 tag 54321 evpn multisite dci-tracking no shutdown	interface loopback0 ip address 10.100.100.22/32 tag 54321 ip router ospf 100 area 0.0.0.0 ip pim sparse-mode interface loopback1 ip address 10.200.200.22/32 tag 54321 ip router ospf 100 area 0.0.0.0 ip pim sparse-mode interface loopback100 ip address 10.111.111.2/32 tag 54321 ip router ospf 100 area 0.0.0.0 router ospf 100 router-id 10.100.100.22

DC-2 Border Gateway-2 Configuration			
Enabling Features, RouteMap, B-G Config	VLAN,VNI,VTEP Config	OSPF Configuration	BGP/EVPN Configuration
boot nxos bootflash:/nxos.9.3.0.221.bin hostname MultisiteBG2 nv overlay evpn feature ospf feature bgp feature pim feature fabric forwarding feature interface-vlan feature vn-segment-vlan-based feature lldp feature nv overlay evpn multisite border-gateway 100 delay-restore time 300 vlan 1,101,1000-1001 vlan 101 vn-segment 900001 vlan 1000 vn-segment 2001002 vlan 1001 vn-segment 2001001 route-map RMAP-REDIST-DIRECT permit 10 match tag 54321 interface Ethernet1/16 mtu 9216 ip address 10.52.21.1/30 tag 54321 evpn multisite dci-tracking no shutdown	interface Vlan101 no shutdown vrf member vxlan-900001 ip forward interface nve1 no shutdown host-reachability protocol bgp source-interface loopback1 multisite border-gateway interface loopback100 member vni 900001 associate-vrf member vni 2001001 multisite ingress-replication ingress-replication protocol bgp member vni 2001002 multisite ingress-replication ingress-replication protocol bgp vrf context vxlan-900001 vni 900001 rd auto address-family ipv4 unicast route-target both auto route-target both auto evpn address-family ipv6 unicast route-target both auto route-target both auto evpn	interface Ethernet1/1 description SITE-INTERNAL INTERFACE mtu 9216 medium p2p ip address 10.1.1.34/30 ip ospf network point-to-point ip router ospf 100 area 0.0.0.0 ip pim sparse-mode evpn multisite fabric-tracking no shutdown interface Ethernet1/2 description SITE-INTERNAL INTERFACE mtu 9216 medium p2p ip address 10.1.2.34/30 ip ospf network point-to-point ip router ospf 100 area 0.0.0.0 ip pim sparse-mode evpn multisite fabric-tracking no shutdown interface loopback0 description RID AND BGP PEERING ip address 10.100.100.21/32 tag 54321 ip router ospf 100 area 0.0.0.0 ip pim sparse-mode interface loopback1 description NVE INTERFACE (PIP VTEP) ip address 10.200.200.21/32 tag 54321 ip router ospf 100 area 0.0.0.0 ip pim sparse-mode interface loopback100 description MULTI-SITE INTERFACE (VIP VTEP) ip address 10.111.111.1/32 tag 54321 ip router ospf 100 area 0.0.0.0 router ospf 100 router-id 10.100.100.21	router bgp 100 router-id 10.100.100.21 address-family ipv4 unicast redistribute direct route-map RMAP-REDIST-DIRECT maximum-paths 4 neighbor 10.52.21.2 remote-as 200 update-source Ethernet1/16 address-family ipv4 unicast neighbor 10.100.100.22 remote-as 200 update-source loopback0 ebgp-multihop 5 peer-type fabric-external address-family l2vpn evpn send-community send-community extended rewrite-evpn-rt-asn neighbor 192.168.2.1 remote-as 100 update-source loopback0 address-family l2vpn evpn send-community send-community extended neighbor 192.168.2.2 remote-as 100 update-source loopback0 address-family l2vpn evpn send-community send-community extended evpn vni 2001001 l2 rd auto route-target import auto route-target export auto vni 2001002 l2 rd auto route-target import auto route-target export auto

DC-2 SPINE -1 Configuration

Enabling Features, RP Config	OSPF Configuration	BGP/EVPN Configuration
<pre> boot nxos bootflash:/nxos.9.2.3.bin hostname MultisteSpine1 nv overlay evpn feature ospf feature bgp feature pim feature interface-vlan feature vn-segment-vlan-based feature nv overlay ip pim rp-address 192.168.2.1 group-list 224.0.0.0/4 </pre>	<pre> interface Ethernet1/1 mtu 9216 ip address 10.1.2.33/30 ip ospf network point-to-point ip router ospf 100 area 0.0.0.0 ip pim sparse-mode no shutdown interface Ethernet1/47 ip address 172.16.10.1/24 ip ospf network point-to-point ip router ospf 100 area 0.0.0.0 ip pim sparse-mode no shutdown interface Ethernet1/48 ip address 172.16.11.1/24 ip ospf network point-to-point ip router ospf 100 area 0.0.0.0 ip pim sparse-mode no shutdown interface loopback0 ip address 192.168.2.1/32 ip router ospf 100 area 0.0.0.0 ip pim sparse-mode router ospf 100 router-id 192.168.2.1 </pre>	<pre> router bgp 100 router-id 192.168.2.1 address-family ipv4 unicast address-family l2vpn evpn neighbor 10.100.100.21 remote-as 100 update-source loopback0 address-family l2vpn evpn send-community send-community extended route-reflector-client neighbor 192.168.2.3 remote-as 100 update-source loopback0 address-family ipv4 unicast send-community extended route-reflector-client address-family l2vpn evpn send-community extended route-reflector-client neighbor 192.168.2.4 remote-as 100 update-source loopback0 address-family ipv4 unicast send-community extended route-reflector-client address-family l2vpn evpn send-community extended route-reflector-client </pre>

DC-2, LEAF -1 Configuration

Enabling Features, RP, VTEP Config	VLAN,VNI Configuration	OSPF Configuration	BGP/EVPN Configuration
<pre> boot nxos bootflash:/nxos.7.0.3.17.5.bin hostname MultisteLeaf1 nv overlay evpn feature ospf feature bgp feature pim feature fabric forwarding feature interface-vlan feature vn-segment-vlan-based feature lldp feature nv overlay fabric forwarding anycast-gateway-mac 0000.2222.3333 ip pim rp-address 192.168.2.1 group-list 224.0.0.0/4 interface nve1 no shutdown host-reachability-protocol bgp source-interface loopback0 member vni 900001 associate-vrf member vni 2001001 suppress-arp mcast-group 239.0.0.1 member vni 2001002 suppress-arp mcast-group 239.0.0.1 </pre>	<pre> vlan 101 vn-segment 900001 vlan 1000 vn-segment 2001002 vlan 1001 vn-segment 2001001 interface Vlan101 no shutdown vrf member vxlan-900001 ip forward interface Vlan1000 no shutdown vrf member vxlan-900001 ip address 4.2.2.1/24 ipv6 address 4:2:0:1::1/64 fabric forwarding mode anycast-gateway interface Vlan1001 no shutdown vrf member vxlan-900001 ip address 4.1.1.1/24 ipv6 address 4:1:0:1::1/64 fabric forwarding mode anycast-gateway vrf context vxlan-900001 vni 900001 rd auto address-family ipv4 unicast route-target both auto route-target both auto evpn address-family ipv6 unicast route-target both auto route-target both auto evpn </pre>	<pre> interface Ethernet1/1 ip address 172.16.12.2/24 ip ospf network point-to-point ip router ospf 100 area 0.0.0.0 ip pim sparse-mode no shutdown interface Ethernet1/6 ip address 172.16.10.2/24 ip ospf network point-to-point ip router ospf 100 area 0.0.0.0 ip pim sparse-mode no shutdown interface Ethernet1/16 switchport switchport mode trunk no shutdown interface loopback0 ip address 192.168.2.4/32 ip router ospf 100 area 0.0.0.0 ip pim sparse-mode router ospf 100 router-id 192.168.2.4 </pre>	<pre> router bgp 100 router-id 192.168.2.4 address-family ipv4 unicast address-family l2vpn evpn neighbor 192.168.2.1 remote-as 100 update-source loopback0 address-family ipv4 unicast address-family l2vpn evpn send-community extended neighbor 192.168.2.2 remote-as 100 update-source loopback0 address-family ipv4 unicast address-family l2vpn evpn send-community extended evpn vni 2001001 l2 rd auto route-target import auto route-target export auto vni 2001002 l2 rd auto route-target import auto route-target export auto </pre>

Verifica

LEAF-1 VERIFICATION

<pre>leaf1# show cdp neighbors Capability Codes: R - Router, T - Trans-Bridge, B - Source-Route S - Switch, H - Host, I - IGMP, r - Repeater, V - VoIP-Phone, D - Remotely-Managed-Device, s - Supports-STP-Dispute Device-ID Local Intrfce Hldtme Capability Platform MX066-H-01-SM.cisco.com mgmt0 142 S I WS-C2960X-48T ToLeaf1 Eth1/23 163 S I WS-C3750X-24S spine1(SAL1948U4Y1) Eth2/23 156 R S s N9K-C9396PX spine2(SAL1949UELD) Eth2/24 152 R S s N9K-C9396PX leaf1# leaf1# sh ip int brief exclude down IP Interface Status for VRF "default"(1) Interface IP Address Interface Status Lo0 192.168.1.3 protocol-up/link-up/admin-up Eth2/23 172.16.1.2 protocol-up/link-up/admin-up Eth2/24 172.16.2.2 protocol-up/link-up/admin-up leaf1# leaf1# sh nve vrf VRF-Name VNI Interface Gateway-MAC ----- vxlan-900001 900001 nve1 00de.fb01.9fc1 leaf1# sh nve vxlan-params VxLAN Dest. UDP Port: 4789</pre>	<pre>leaf1# show ip pim rp PIM RP Status Information for VRF "default" BSR disabled Auto-RP disabled BSR RP Candidate policy: None BSR RP policy: None Auto-RP Announcement policy: None Auto-RP Discovery policy: None RP: 192.168.1.1, (0), uptime: 3w1d priority: 0, RP-source: (local), group ranges: 224.0.0.0/4 RP: 192.168.1.2, (0), uptime: 3w1d priority: 0, RP-source: (local), group ranges: 224.0.0.0/4 leaf1# leaf1# sh nve interface Interface: nve1, State: Up, encapsulation: VXLAN VPC Capability: VPC-VFP-Only [not-notified] Local Router MAC: 00de.fb01.9fc1 Host Learning Mode: Control-Plane Source-Interface: loopback0 (primary: 192.168.1.3, secondary: 0) leaf1#</pre>	<pre>leaf1# sh nve peers Interface Peer-IP State LearnType Uptime Router-Mac ----- nve1 10.111.111.2 Up CP 3w1d 0200.0a6f.6f02 nve1 10.200.200.22 Up CP 3w1d n/a nve1 192.168.1.4 Up CP 3w1d 7079.b33e.8123 leaf1# leaf1# show nve vni Codes: CP - Control Plane DP - Data Plane UC - Unconfigured SA - Suppress ARP SU - Suppress Unknown Unicast Interface VNI Multicast-group State Mode Type [BD/VRF] Flags ----- nve1 900001 n/a Up CP L3 [vxlan-900001] nve1 2001001 239.0.0.1 Up CP L2 [1001] SA nve1 2001002 239.0.0.1 Up CP L2 [1000] SA leaf1# leaf1# sh vrf vxlan-900001 DETAIL VRF-Name: vxlan-900001, VRF-ID: 3, State: Up VFNID: unknown RD: 192.168.1.3:3 VNI: 900001, State: Up Max Routes: 0 Mid-Threshold: 0 Table-ID: 0x80000003, AF: IPv6, Fwd-ID: 0x80000003, State: Up Table-ID: 0x00000003, AF: IPv4, Fwd-ID: 0x00000003, State: Up</pre>
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CONTROL PLANE LEARNING: Destination Prefix is 4.2.2.100 <====> 00c8.8bf9.5f41 <====> Vlan1000 <====> VNI2001002

<pre>Destination Prefix is learnt on host-connected LEAF 192.168.2.4 MultiteLeaf1# sh ip route 4.2.2.100 vrf vxlan-900001 IP Route Table for VRF "vxlan-900001" *** denotes best ucast next-hop *** denotes best mcast next-hop *[x/y] denotes [preference/metric] *<string>* in via output denotes VRF <string> 4.2.2.100/32, ubest/mbest: 1/0, attached *via 4.2.2.100, Vlan1000, [190/0], 4w2d, hhm MultiteLeaf1# sh bgp l2vpn evpn summary BGP summary information for VRF default, address family L2VPN EVPN BGP router identifier 192.168.2.4, local AS number 100 BGP table version is 56, L2VPN EVPN config peers 2, capable peers 2 36 network entries and 50 paths using 7968 bytes of memory BGP attribute entries (26/4160), BGP AS path entries (1/6) BGP community entries (0/0), BGP clusterlist entries (2/8) Neighbor V AS MgP/RdW MgP/Est TblVer Inq OutQ Up/Down State/PfxRcd 192.168.2.1 4 100 44038 44029 56 0 0 4w2d 14 192.168.2.2 4 100 44037 44030 56 0 0 4w2d 14 MultiteLeaf1# MultiteLeaf1# sh nve peers Interface Peer-IP State LearnType Uptime Router-Mac ----- nve1 10.111.111.1 Up CP 4w2d 0200.0a6f.6f01 nve1 10.200.200.21 Up CP 4w2d n/a MultiteLeaf1# show nve vni Codes: CP - Control Plane DP - Data Plane UC - Unconfigured SA - Suppress ARP SU - Suppress Unknown Unicast MC - Crossconnect MS-IR - Multisite Ingress Replication Interface VNI Multicast-group State Mode Type [BD/VRF] Flags ----- nve1 900001 n/a Up CP L3 [vxlan-900001] nve1 2001001 239.0.0.1 Up CP L2 [1001] SA nve1 2001002 239.0.0.1 Up CP L2 [1000] SA MultiteLeaf1#</pre>	<pre>Host-Connected Leaf is advertising this prefix to its SPINE (192.168.2.1) MultiteLeaf1# sh bgp l2vpn evpn neighbors 192.168.2.1 advertised-routes Peer 192.168.2.1 routes for address family L2VPN EVPN: BGP table version is 56, Local Router ID is 192.168.2.4 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= njected Origin codes: i - IGP, e - EGP, ? - incomplete, ! - multipath, & - backup Network Next Hop Metric LocPrf Weight Path Route Distinguisher: 10.100.100.21:33767 Route Distinguisher: 10.100.100.21:33768 Route Distinguisher: 10.100.100.22:33767 Route Distinguisher: 10.100.100.22:33768 Route Distinguisher: 192.168.1.3:33767 Route Distinguisher: 192.168.1.3:33768 Route Distinguisher: 192.168.1.4:33767 Route Distinguisher: 192.168.1.4:33768 Route Distinguisher: 192.168.2.4:33767 (L2VNI 2001002) >>i(2):(0):(0):(48):(00c8.8bf9.5f41):(0):(0.0.0.0)/216 192.168.2.4 100 32768 i >>i(2):(0):(0):(48):(00c8.8bf9.5f41):(32):(4.2.2.100)/272 192.168.2.4 100 32768 i Route Distinguisher: 192.168.2.4:33768 (L2VNI 2001001) >>i(2):(0):(0):(48):(00c8.8bf9.5f42):(0):(0.0.0.0)/216 192.168.2.4 100 32768 i >>i(2):(0):(0):(48):(00c8.8bf9.5f42):(32):(4.1.1.100)/272 192.168.2.4 100 32768 i Route Distinguisher: 192.168.2.4:3 (L3VNI 900001) >>i(2):(0):(0):(48):(00c8.8bf9.5f42):(32):(4.1.1.100)/272 192.168.2.4 100 32768 i MultiteLeaf1#</pre>	<pre>SPINE is advertising the same prefix to Border Gateway (BG-2== 10.100.100.21) MultiteSpine1# sh bgp l2vpn evpn neighbors 10.100.100.21 advertised-routes Peer 10.100.100.21 routes for address family L2VPN EVPN: BGP table version is 26, Local Router ID is 192.168.2.1 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= njected Origin codes: i - IGP, e - EGP, ? - incomplete, ! - multipath, & - backup, 2 - b est2 Network Next Hop Metric LocPrf Weight Path Route Distinguisher: 10.100.100.21:27001 Route Distinguisher: 10.100.100.21:33767 Route Distinguisher: 10.100.100.22:33767 Route Distinguisher: 10.100.100.21:33768 Route Distinguisher: 10.100.100.22:33767 Route Distinguisher: 10.100.100.22:33768 Route Distinguisher: 10.100.100.22:33768 Route Distinguisher: 192.168.1.3:33767 Route Distinguisher: 192.168.1.3:33768 Route Distinguisher: 192.168.1.4:33767 Route Distinguisher: 192.168.1.4:33768 Route Distinguisher: 192.168.2.4:33767 >>i(2):(0):(0):(48):(00c8.8bf9.5f41):(0):(0.0.0.0)/216 192.168.2.4 100 0 i >>i(2):(0):(0):(48):(00c8.8bf9.5f41):(32):(4.2.2.100)/272 192.168.2.4 100 0 i Route Distinguisher: 192.168.2.4:33768 >>i(2):(0):(0):(48):(00c8.8bf9.5f42):(0):(0.0.0.0)/216 192.168.2.4 100 0 i >>i(2):(0):(0):(48):(00c8.8bf9.5f42):(32):(4.1.1.100)/272 192.168.2.4 100 0 i MultiteSpine1#</pre>
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eBGP Neighborship between Border Gateways

MultisiteBG2# sh bgp l2vpn evpn summary												MultisiteBG1# sh bgp l2vpn evpn summary																																																																																											
BGP summary information for VRF default, address family L2VPN EVPN												BGP summary information for VRF default, address family L2VPN EVPN																																																																																											
BGP router identifier 10.100.100.21, local AS number 100												BGP router identifier 10.100.100.22, local AS number 200																																																																																											
BGP table version is 60, L2VPN EVPN config peers 3, capable peers 3												BGP table version is 82, L2VPN EVPN config peers 3, capable peers 3																																																																																											
43 network entries and 47 paths using 8160 bytes of memory												37 network entries and 45 paths using 7296 bytes of memory																																																																																											
BGP attribute entries [37/6068], BGP AS path entries [1/6]												BGP attribute entries [37/6068], BGP AS path entries [1/6]																																																																																											
BGP community entries [0/0], BGP clusterlist entries [2/8]												BGP community entries [0/0], BGP clusterlist entries [4/16]																																																																																											
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Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd																																																																																														
10.100.100.22	4	200	44066	44039	60	0	0	4w2d 12																																																																																															
192.168.2.1	4	100	44050	44037	60	0	0	4w2d 4																																																																																															
192.168.2.2	4	100	44048	44037	60	0	0	4w2d 4																																																																																															
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Neighbor	T	AS	PfxRcd	Type-2	Type-3	Type-4	Type-5																																																																																																
10.100.100.22	E	200	12	10	2	0	0																																																																																																
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192.168.2.2	I	100	4	4	0	0	0																																																																																																
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10.100.100.21	E	100	8	6	2	0	0																																																																																																
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192.168.1.2	I	200	8	8	0	0	0																																																																																																
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7 network entries and 8 paths using 1800 bytes of memory												7 network entries and 8 paths using 1692 bytes of memory																																																																																											
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MultisiteBG2# sh bgp ipv4 unicast neighbors 10.52.21.2 advertised-routes												MultisiteBG1# show bgp ipv4 unicast neighbors 10.52.21.1 advertised-routes																																																																																											
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MultisiteBG2#												MultisiteBG1#																																																																																											

Route exchange between Border Gateways (B.G-2 ==> B.G-1)												In DC-1, Route advertisement from BG-1 to SPINE-1																																																																																																																																																																																																																																																																																									
MultisiteBG2# sh bgp l2vpn evpn neighbors 10.100.100.22 advertised-routes												MultisiteBG1# sh bgp l2vpn evpn neighbors 192.168.1.1 advertised-routes																																																																																																																																																																																																																																																																																									
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*>e[2]:[0]:[0]:[48]:[00c8.8bf9.5f42]:[32]:[4.1.1.100]/272	10.111.111.1	2000		0	100 i																																																																																																																																																																																																																																																																																																
MultisiteBG2#												MultisiteBG1#																																																																																																																																																																																																																																																																																									

CONTROL PLANE VERIFICATION AT DC-1 (Spine-1, Leaf-1): Destination Prefix is 4.2.2.100 <====> 00c8.8bf9.5f41 <====> Vlan1000 <====> VNI2001002

spine1# sh bgp ipv4 unicast summary

```
BGP summary information for VRF default, address family IPv4 Unicast
BGP router identifier 192.168.1.1, local AS number 200
BGP table version is 3, IPv4 Unicast config peers 3, capable peers 2
0 network entries and 0 paths using 0 bytes of memory
BGP attribute entries [0/0], BGP AS path entries [0/0]
BGP community entries [0/0], BGP clusterlist entries [0/0]
```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
10.100.100.22	4	200	43997	43988	0	0	0	4w2d 0	(No Cap)
192.168.1.3	4	200	43986	43984	3	0	0	4w2d 0	
192.168.1.4	4	200	43990	43987	3	0	0	4w2d 0	

spine1# sh ip route 10.100.100.22

```
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>

10.100.100.22/32, ubest/mbest: 1/0
 *via 10.2.2.34, Eth1/1, [110/41], 4w2d, ospf-100, intra
spine1#
```

spine1# sh bgp l2vpn evpn summary

```
BGP summary information for VRF default, address family L2VPN EVPN
BGP router identifier 192.168.1.1, local AS number 200
BGP table version is 31, L2VPN EVPN config peers 3, capable peers 3
19 network entries and 19 paths using 4256 bytes of memory
BGP attribute entries [17/2788], BGP AS path entries [1/6]
BGP community entries [0/0], BGP clusterlist entries [0/0]
```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
10.100.100.22	4	200	44002	43993	31	0	0	4w2d 11	
192.168.1.3	4	200	43991	43989	31	0	0	4w2d 4	
192.168.1.4	4	200	43996	43992	31	0	0	4w2d 4	

spine1# sh bgp l2vpn evpn 00c8.8bf9.5f41

```
BGP routing table information for VRF default, address family L2VPN EVPN
Route Distinguisher: 192.168.2.4:33767
BGP routing table entry for [2]:[0]:[0]:[48]:[00c8.8bf9.5f41]:[0]:[0.0.0.0]/216,
version 27
Paths: (1 available, best #1)
Flags: (0x000202) (high32 00000000) on xmit-list, is not in l2rib/evpn, is not i
n HW
Multipath: iBGP
```

```
Advertised path-id 1
Path type: internal, path is valid, is best path, no labeled nexthop
AS-Path: 100 , path sourced external to AS
10.111.111.2 (metric 41) from 10.100.100.22 (10.100.100.22)
Received label 2001002
Extcommunity: RT:200:2001002 ENCAP:8

Path-id 1 advertised to peers:
192.168.1.3 192.168.1.4
BGP routing table entry for [2]:[0]:[0]:[48]:[00c8.8bf9.5f41]:[32]:[4.2.2.100]/2
72, version 29
Paths: (1 available, best #1)
Flags: (0x000202) (high32 00000000) on xmit-list, is not in l2rib/evpn, is not i
n HW
Multipath: iBGP
```

```
Advertised path-id 1
Path type: internal, path is valid, is best path, no labeled nexthop
AS-Path: 100 , path sourced external to AS
10.111.111.2 (metric 41) from 10.100.100.22 (10.100.100.22)
Origin IGP, MED 2000, localpref 100, weight 0
Received label 2001002 900001
Extcommunity: RT:200:900001 RT:200:2001002 ENCAP:8 Router MAC:0200.0a6f.6f
2

Path-id 1 advertised to peers:
192.168.1.3 192.168.1.4
spine1#
```

leaf1# sh bgp l2vpn evpn summary

```
BGP summary information for VRF default, address family L2VPN EVPN
BGP router identifier 192.168.1.1, local AS number 200
BGP table version is 52, L2VPN EVPN config peers 2, capable peers 2
36 network entries and 50 paths using 4864 bytes of memory
BGP attribute entries [32/4408], BGP AS path entries [1/6]
BGP community entries [0/0], BGP clusterlist entries [4/16]
```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
192.168.1.1	4	200	42565	42552	52	0	0	4w1d 14	
192.168.1.2	4	200	42565	42552	52	0	0	4w1d 14	

leaf1# show bgp ip unicast 4.2.2.100 vrf vxlan-900001

```
BGP routing table information for VRF vxlan-900001, address family IPv4 Unicast
BGP routing table entry for 4.2.2.100/32, version 7
Paths: (1 available, best #1)
Flags: (0x00041a) on xmit-list, is in urib, is best urib route, is in HW,
vgnl version 7, (0x100002) on xmit-list

Advertised path-id 1, VPN AF advertised path-id 1
Path type: internal, path is valid, is best path
Imported from 192.168.2.4:33767:[2]:[0]:[0]:[48]:[00c8.8bf9.5f41]:[
32]:[4.2.2.100]/272
AS-Path: 100 , path sourced external to AS
10.111.111.2 (metric 41) from 192.168.1.1 (192.168.1.1)
Origin IGP, MED 2000, localpref 100, weight 0
Received label 2001002 900001
Extcommunity:
RT:200:900001
RT:200:2001002
ENCAP:8
Router MAC:0200.0a6f.6f02
Originator: 10.100.100.22 Cluster list: 192.168.1.1
```

```
VRF advertise information:
Path-id 1 not advertised to any peer

VPN AF advertise information:
Path-id 1 not advertised to any peer
leaf1#
```

Reachability Verification from DC-1 Leaf-1

```
leaf1# show mac address-table | i 00c8.8bf9.5f41 | *Type
VLAN MAC Address Type age Secure NFFP Ports/SWID.SSID.LID
* 1000 00c8.8bf9.5f41 dynamic 0 F F vsw1/10.111.111.2
leaf1#
```

leaf1# show ip interface bri vrf all

```
IP Interface Status for VRF "default"(1)
Interface IP Address Interface Status
Lo0 192.168.1.3 protocol-up/link-up/admin-up
Eth1/18 1.1.1.1 protocol-down/link-down/admin-dc
Eth2/23 172.16.1.2 protocol-up/link-up/admin-up
Eth2/24 172.16.2.2 protocol-up/link-up/admin-up

IP Interface Status for VRF "management"(2)
Interface IP Address Interface Status
mgmt0 10.31.121.19 protocol-up/link-up/admin-up

IP Interface Status for VRF "vxlan-900001"(3)
Interface IP Address Interface Status
Vlan101 forward-enabled protocol-up/link-up/admin-up
Vlan1000 4.2.2.1 protocol-up/link-up/admin-up
Vlan1001 4.1.1.1 protocol-up/link-up/admin-up
leaf1#
```

leaf1# show ip route vrf vxlan-900001 4.2.2.100

```
IP Route Table for VRF "vxlan-900001"
*** denotes best ucast next-hop
*** denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'*<string>' in via output denotes VRF <string>

4.2.2.100/32, ubest/mbest: 1/0
 *via 10.111.111.2&default, [200/2000], 4w2d, bgp-200, internal, tag 100, (m
pls-vpn)seqid 900001 tunnel: 175075074 encap: 1
leaf1#

leaf1# traceroute 10.111.111.2
traceroute to 10.111.111.2 (10.111.111.2), 30 hops max, 40 byte packets
1 172.16.1.1 (172.16.1.1) 1.066 ms 0.816 ms 0.664 ms
2 10.111.111.2 (10.111.111.2) 1 ms 0.74 ms 0.693 ms
leaf1#
```

leaf1# show arp vrf vxlan-900001

```
Flags: * - Adjacencies learnt on non-active FRRP router
+ - Adjacencies synced via CFSOE
# - Adjacencies Throttled for Glean
$ - Static Adjacencies attached to down interface

IP ARP Table for context vxlan-900001
Total number of entries: 2
Address Age MAC Address Interface
4.1.1.1.10 00:03:15e 0035.lac1.37c3 Vlan1001
4.2.2.10 00:13:10 0035.lac1.37c2 Vlan1000
leaf1#
```

leaf1# show l2route evpn mac-ip evi 1000

Mac Address	Prod Host IP	Next Hop (s)
0035.lac1.37c2 HW	4.2.2.10	N/A
00c8.8bf9.5f41 BGP	4.2.2.100	10.111.111.2
e0d1.73a4.1d61 BGP	4.2.2.11	192.168.1.4

leaf1# show nve internal bgp rnh database | i Encap|10.111.111.2

VNI	Peer-IP	Peer-Mac	Tunnel-ID	Encap	(A/S)	Flags
900001	10.111.111.2	0200.0a6f.6f02	0xa6f6f02	vxlan	(1/0)	0
200100110.111.111.2	0000.0000.0000	0x0	vxlan	(1/0)	0	
200100210.111.111.2	0000.0000.0000	0x0	vxlan	(1/0)	0	

Host Reachability Verification from DC-1 to DC-2

```
ToLeaf1# show ip int br | e down
Interface IP-Address OK? Method Status Protocol
Vlan1000 4.2.2.10 YES NVRAM up up
Vlan1001 4.1.1.10 YES NVRAM up up
GigabitEthernet1/0/1 unassigned YES unset up up
ToLeaf1#
```

ToLeaf1# ping 4.2.2.100

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 4.2.2.100, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/4/9 ms
ToLeaf1#
```

ToLeaf1# show ip arp 4.2.2.100

Protocol	Address	Age (min)	Hardware Addr	Type	Interface
Internet	4.2.2.100	54	00c8.8bf9.5f41	ARPA	Vlan1000

toMultistateLeaf1# sh ip interf bri | ex down

Interface	IP-Address	OK?	Method	Status	Protocol
Vlan1000	4.2.2.100	YES	NVRAM	up	up
Vlan1001	4.1.1.100	YES	NVRAM	up	up
GigabitEthernet2/0/1	unassigned	YES	unset	up	up

toMultistateLeaf1# sh ip arp 4.2.2.100

Protocol	Address	Age (min)	Hardware Addr	Type	Interface
Internet	4.2.2.100	-	00c8.8bf9.5f41	ARPA	Vlan1000

```

Leaf-1 MAC Address Verification
leaf1# sh mac address-table vlan 1000
Legend:
 * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
 age - seconds since last seen,+ - primary entry using vPC Peer-Link
 VLAN   MAC Address   Type   age   Secure NTFY   Ports/SWID.SSID.LID
-----
 * 1000  0000.2222.3333  static 0      F F sup-eth2
 * 1000  0035.1a1c.37c2  dynamic 730    F F Eth1/23
 * 1000  005d.738e.a337  static 0      F F nve1/10.111.111.2
 * 1000  00c8.8bf9.5f41  dynamic 0      F F nve1/10.111.111.2
 * 1000  6cb2.ae91.38bf  static 0      F F nve1/10.200.200.22
 * 1000  e0d1.73a4.1d41  dynamic 0      F F nve1/192.168.1.4
leaf1#

leaf1# sh system internal l2rib event-history mac | i 0035.1a1c.37c2
[04/24/20 13:10:09.721 UTC 3 4173] Received MAC ROUTE msg: addr: (1000-0035.1a1c.37c2) vni: 0 admin_dist: 0 seq_num: 0 rt_flags: L soo: 0 dg_count: 0 res: 0 esi: (F) nh_count: 1
[04/24/20 13:10:09.721 UTC 6 4173] (1000,0035.1a1c.37c2,3):MAC route created with seq num:0, flags:L (), soo:0, peerid:0
[04/24/20 13:10:09.732 UTC c 4173] (1000,0035.1a1c.37c2,3):Encoding MAC best route (ADD, client id 4)
[04/24/20 13:10:09.871 UTC e 4173] (1000,0035.1a1c.37c2):Bound MAC-IP(4.2.2.10) to MAC, Total MAC-IP linked: 1

leaf1# show system internal l2rib event-history mac | i 0035.1a1c.37c3
[04/24/20 13:10:09.721 UTC 8 4173] Received MAC ROUTE msg: addr: (1001-0035.1a1c.37c3) vni: 0 admin_dist: 0 seq_num: 0 rt_flags: L soo: 0 dg_count: 0 res: 0 esi: (F) nh_count: 1
[04/24/20 13:10:09.721 UTC b 4173] (1001,0035.1a1c.37c3,3):MAC route created with seq num:0, flags:L (), soo:0, peerid:0
[04/24/20 13:10:09.732 UTC d 4173] (1001,0035.1a1c.37c3,3):Encoding MAC best route (ADD, client id 4)
[04/24/20 13:10:09.871 UTC f 4173] (1001,0035.1a1c.37c3):Bound MAC-IP(4.1.1.10) to MAC, Total MAC-IP linked: 1

leaf1# sh system internal l2rib event-history mac-ip | i 0035.1a1c.37c2
[04/24/20 13:10:09.871 UTC 2 4173] Received MAC-IP ROUTE msg: addr: (1000-0035.1a1c.37c2) host ip: 4.2.2.10 vni: 0 L3 info: 900001 rt_flags: 0 admin_dist: 7 seq_num: 0 soo: 0 nh_count: 0
[04/24/20 13:10:09.871 UTC 3 4173] (1000,0035.1a1c.37c2,4.2.2.10):MAC-IP entry created
[04/24/20 13:10:09.871 UTC 4 4173] (1000,0035.1a1c.37c2,4.2.2.10,12):MAC-IP route created with flags 0, L3 vrf 900001, seq 0, admin dist 7, soo 0
[04/24/20 13:10:09.882 UTC 9 4173] (1000,0035.1a1c.37c2,4.2.2.10,12):Encoding MAC-IP best route (ADD, client id 4)
leaf1#

leaf1# show system internal l2rib event-history mac-ip | i 0035.1a1c.37c3
[04/24/20 13:10:09.871 UTC 6 4173] Received MAC-IP ROUTE msg: addr: (1001-0035.1a1c.37c3) host ip: 4.1.1.10 vni: 0 L3 info: 900001 rt_flags: 0 admin_dist: 7 seq_num: 0 soo: 0 nh_count: 0
[04/24/20 13:10:09.871 UTC 7 4173] (1001,0035.1a1c.37c3,4.1.1.10):MAC-IP entry created
[04/24/20 13:10:09.871 UTC 8 4173] (1001,0035.1a1c.37c3,4.1.1.10,12):MAC-IP route created with flags 0, L3 vrf 900001, seq 0, admin dist 7, soo 0
[04/24/20 13:10:09.882 UTC a 4173] (1001,0035.1a1c.37c3,4.1.1.10,12):Encoding MAC-IP best route (ADD, client id 4)
leaf1#

```

Risoluzione dei problemi

Per ulteriori informazioni sulla risoluzione dei problemi, consultare il documento sulla [risoluzione dei problemi di EVPN/VxLAN in ambienti multisito](#)

Informazioni correlate

- [White paper sulla progettazione e l'installazione di VXLAN EVPN in più siti](#)
- [Configurazione di VXLAN VPN Multi-Site](#)

Informazioni su questa traduzione

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