



BGP EVPN VXLAN ファブリック内でのスパインスイッチの設定

- [BGP EVPN VXLAN ファブリック内のスパインスイッチについて \(1 ページ\)](#)
- [BGP EVPN VXLAN ネットワークでのスパインスイッチの設定例 \(2 ページ\)](#)

BGP EVPN VXLAN ファブリック内のスパインスイッチについて

BGP EVPN VXLAN ファブリック内のスパインスイッチは、すべてのリーフスイッチ間または VTEP 間の接続ノードとして機能します。これらは EVPN VXLAN ネットワークのバックボーンを形成し、リーフスイッチ間でトラフィックを転送します。各リーフスイッチは、ネットワーク内の各スパインスイッチに接続されます。スパインスイッチはネットワーク内に冗長性を実現し、VTEP がトラフィックを相互に転送するための複数のパスを提供します。

EVPN VXLAN ネットワーク内のスパインスイッチはアンダーレイネットワークの一部であり、VXLAN カプセル化パケットを転送します。ボーダーノードとして展開すると、スパインスイッチはネットワークを外部ネットワークに接続してトラフィックの移動を可能にします。BGP EVPN VXLAN ファブリックでは、スパインスイッチをルートリフレクタとして展開することもできます。

BGP EVPN VXLAN ファブリック内でのスパインスイッチとリーフスイッチの展開のシナリオ

BGP EVPN VXLAN ファブリック内のスパインスイッチとリーフスイッチは、次の方法で展開できます。

- 同じ自律システム内のスパインスイッチとリーフスイッチ
- ある自律システム内のスパインスイッチと別の自律システム内のリーフスイッチ
- ある自律システム内のスパインスイッチと別の自律システム内の各リーフスイッチ

同じ自律システム内のスパインスイッチとリーフスイッチ

このシナリオでは、EVPN VXLAN ネットワーク内のすべてのデバイスが同じ自律システム内にあります。スパインスイッチは、BGP ルートリフレクタとエニーキャストランデブーポイント (RP) として機能します。内部ボーダーゲートウェイプロトコル (iBGP) は、スパインスイッチ間およびスパインとリーフスイッチ間のピアリングを確立するために使用されます。

トポロジと設定の例については[スパインスイッチとリーフスイッチが同じ自律システム内にある場合に iBGP を使用したスパインスイッチの設定例 \(2 ページ\)](#) を参照してください。

ある自律システム内のスパインスイッチと別の自律システム内のリーフスイッチ

このシナリオでは、すべてのリーフスイッチがスパインスイッチの自律システムとは別の1つの自律システムにあります。スパインスイッチはBGPルートサーバーとして機能します。iBGP はスパインスイッチ間のピアリングを確立するために使用されます。eBGP はスパインスイッチとリーフスイッチ間のピアリングを確立するために使用されます。

トポロジと設定の例については[スパインスイッチがある自律システムにあり、リーフスイッチが別の自律システムにある場合の eBGP を使用したスパインスイッチの設定例 \(20 ページ\)](#) を参照してください。

ある自律システム内のスパインスイッチと別の自律システム内の各リーフスイッチ

このシナリオでは、各リーフスイッチがスパインスイッチの自律システムとは異なる独自の個別自律システム内にあります。スパインスイッチは BGP ルートサーバーとして機能します。iBGP はスパインスイッチ間のピアリングを確立するために使用されます。eBGP はスパインスイッチとリーフスイッチ間のピアリングを確立するために使用されます。

トポロジと設定の例については[スパインスイッチが自律システム内にあり、各リーフスイッチが別の自律システム内にある場合の eBGP を使用したスパインスイッチの設定例 \(41 ページ\)](#) を参照してください。

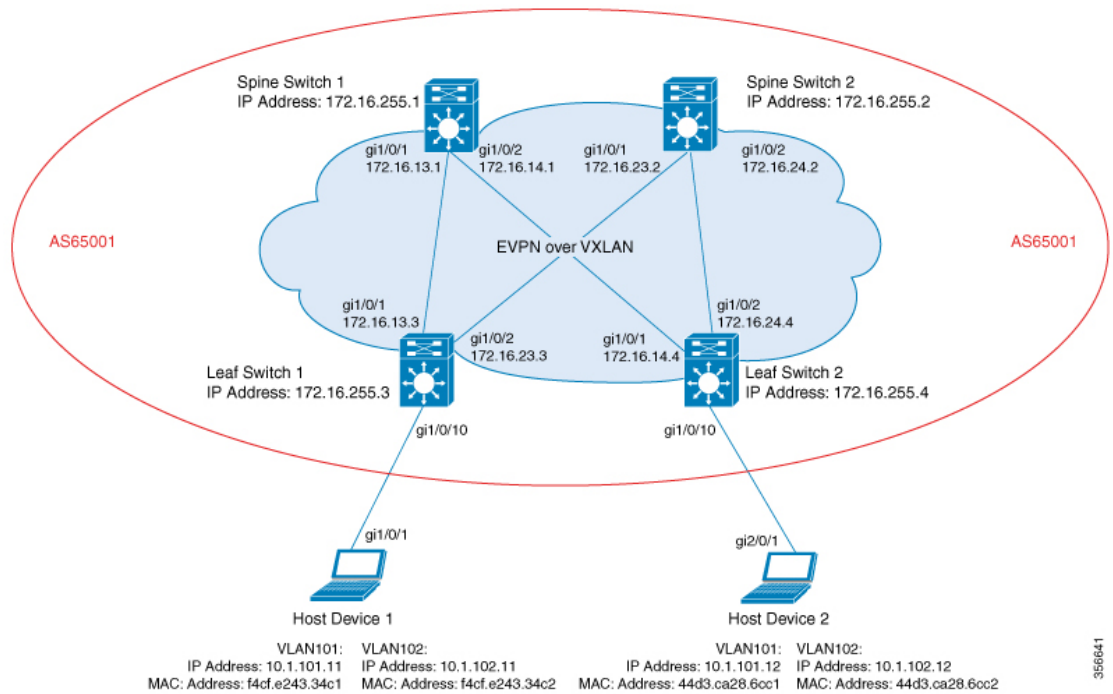
BGP EVPN VXLAN ネットワークでのスパインスイッチの設定例

この項では、BGP EVPN VXLAN ファブリック内でのスパインスイッチとリーフスイッチのさまざまな展開に対するスパインスイッチの設定例を示します。

スパインスイッチとリーフスイッチが同じ自律システム内にある場合に iBGP を使用したスパインスイッチの設定例

この項では、スパインスイッチとリーフスイッチが同じ自律システム内にある場合に、iBGP を使用して BGP EVPN VXLAN ファブリック内にスパインスイッチを設定する例を示します。次に、スパインスイッチを設定し、下に示すトポロジの設定を確認する例を示します。

図 1: スパインスイッチとリーフスイッチが同じ自律システム内にある BGP EVPN VXLAN ファブリック



このトポロジは、2台のリーフスイッチ（VTEP 1 および VTEP 2）と2台のスパインスイッチ（スパインスイッチ 1 およびスパインスイッチ 2）を備えた EVPN VXLAN ネットワークを示しています。BGP EVPN VXLAN ファブリック全体（スパインスイッチ 1、スパインスイッチ 2、リーフスイッチ 1、およびリーフスイッチ 2 を含む）は、自律システム AS65001 にあります。エニーキャスト RP は両方のスパインスイッチで設定されています。スパインスイッチ 1 とスパインスイッチ 2 は相互にルートリフレクタクライアントではありません。Multicast Source Discovery Protocol（MSDP）は、送信元を同期するためにスパインスイッチ 1 とスパインスイッチ 2 の間に設定されます。Protocol Independent Multicast（PIM）がリーフスイッチとスパインスイッチを接続するインターフェイスで有効になっています。静的 RP はネットワークで設定され、アンダーレイネットワークはマルチキャスト転送メカニズムを使用して BUM トラフィックを転送します。

次の表に、上記のトポロジのデバイスの設定例を示します。

スパインスイッチとリーフスイッチが同じ自律システム内にある場合に iBGP を使用したスパインスイッチの設定例

表 1: スパインスイッチとリーフスイッチが同じ自律システム内にある場合の iBGP を使用したスパインスイッチ 1 とスパインスイッチ 2 の設定

スパインスイッチ 1	スパインスイッチ 2
<pre> Spine-01# show running-config hostname Spine-01 ! ip routing ! ip multicast-routing ! interface Loopback0 ip address 172.16.255.1 255.255.255.255 ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.1 255.255.255.255 ip ospf 1 area 0 ! interface Loopback2 ip address 172.16.255.255 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface GigabitEthernet1/0/1 no switchport ip address 172.16.13.1 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface GigabitEthernet1/0/2 no switchport ip address 172.16.14.1 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! router ospf 1 router-id 172.16.255.1 ! router bgp 65001 template peer-policy RR-PP route-reflector-client send-community both exit-peer-policy ! template peer-session RR-PS remote-as 65001 update-source Loopback0 exit-peer-session ! bgp router-id 172.16.255.1 bgp log-neighbor-changes no bgp default ipv4-unicast neighbor 172.16.255.2 remote-as 65001 neighbor 172.16.255.2 update-source Loopback0 neighbor 172.16.255.3 inherit peer-session RR-PS neighbor 172.16.255.4 inherit peer-session RR-PS ! address-family ipv4 exit-address-family ! </pre>	<pre> Spine-02# show running-config hostname Spine-02 ! ip routing ! ip multicast-routing ! interface Loopback0 ip address 172.16.255.2 255.255.255.255 ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.2 255.255.255.255 ip ospf 1 area 0 ! interface Loopback2 ip address 172.16.255.255 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface GigabitEthernet1/0/1 no switchport ip address 172.16.23.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface GigabitEthernet1/0/2 no switchport ip address 172.16.24.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! router ospf 1 router-id 172.16.255.2 ! router bgp 65001 template peer-policy RR-PP route-reflector-client send-community both exit-peer-policy ! template peer-session RR-PS remote-as 65001 update-source Loopback0 exit-peer-session ! bgp router-id 172.16.255.2 bgp log-neighbor-changes no bgp default ipv4-unicast neighbor 172.16.255.1 remote-as 65001 neighbor 172.16.255.1 update-source Loopback0 neighbor 172.16.255.3 inherit peer-session RR-PS neighbor 172.16.255.4 inherit peer-session RR-PS ! address-family ipv4 exit-address-family ! </pre>

スパインスイッチ 1	スパインスイッチ 2
<pre>address-family l2vpn evpn neighbor 172.16.255.2 activate neighbor 172.16.255.2 send-community both neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community extended neighbor 172.16.255.3 inherit peer-policy RR-PP neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community extended neighbor 172.16.255.4 inherit peer-policy RR-PP exit-address-family ! ip pim rp-address 172.16.255.255 ip msdp peer 172.16.254.2 connect-source Loopback1 remote-as 65001 ip msdp cache-sa-state ! end Spine-01#</pre>	<pre>address-family l2vpn evpn neighbor 172.16.255.1 activate neighbor 172.16.255.1 send-community both neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community extended neighbor 172.16.255.3 inherit peer-policy RR-PP neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community extended neighbor 172.16.255.4 inherit peer-policy RR-PP exit-address-family ! ip pim rp-address 172.16.255.255 ip msdp peer 172.16.254.1 connect-source Loopback1 remote-as 65001 ip msdp cache-sa-state ! end Spine-02#</pre>

表 2: スパインスイッチとリーフスイッチが同じ自律システム内にある場合の iBGP を使用したリーフスイッチ 1 とリーフスイッチ 2 の設定

リーフスイッチ 1	リーフスイッチ 2
	<pre> Leaf-02# show running-config hostname Leaf-02 ! vrf definition green rd 1:1 ! address-family ipv4 route-target export 1:1 route-target import 1:1 route-target export 1:1 stitching route-target import 1:1 stitching exit-address-family ! address-family ipv6 route-target export 1:1 route-target import 1:1 route-target export 1:1 stitching route-target import 1:1 stitching exit-address-family ! ip routing ! ip multicast-routing ! l2vpn evpn replication-type static router-id Loopback1 default-gateway advertise ! l2vpn evpn instance 101 vlan-based encapsulation vxlan ! l2vpn evpn instance 102 vlan-based encapsulation vxlan replication-type ingress ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 ! interface Loopback0 ip address 172.16.255.4 255.255.255.255 ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.4 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface GigabitEthernet1/0/1 no switchport ip address 172.16.14.4 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! </pre>

リーフスイッチ 1	リーフスイッチ 2
<pre> Leaf-01# show running-config hostname Leaf-01 ! vrf definition green rd 1:1 ! address-family ipv4 route-target export 1:1 route-target import 1:1 route-target export 1:1 stitching route-target import 1:1 stitching exit-address-family ! address-family ipv6 route-target export 1:1 route-target import 1:1 route-target export 1:1 stitching route-target import 1:1 stitching exit-address-family ! ip routing ! ip multicast-routing ! l2vpn evpn replication-type static router-id Loopback1 default-gateway advertise ! l2vpn evpn instance 101 vlan-based encapsulation vxlan replication-type static ! l2vpn evpn instance 102 vlan-based encapsulation vxlan replication-type ingress ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 ! interface Loopback0 ip address 172.16.255.3 255.255.255.255 ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.3 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface GigabitEthernet1/0/1 no switchport ip address 172.16.13.3 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! </pre>	

スパインスイッチとリーフスイッチが同じ自律システム内にある場合に iBGP を使用したスパインスイッチの設定例

リーフスイッチ 1	リーフスイッチ 2
<pre> interface GigabitEthernet1/0/2 no switchport ip address 172.16.23.3 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface GigabitEthernet1/0/10 switchport mode trunk ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ipv6 enable no autostate ! interface nve1 no ip address source-interface Loopback1 host-reachability protocol bgp member vni 10101 mcast-group 225.0.0.101 member vni 10102 ingress-replication member vni 50901 vrf green ! router ospf 1 router-id 172.16.255.3 ! router bgp 65001 bgp log-neighbor-changes no bgp default ipv4-unicast neighbor 172.16.255.1 remote-as 65001 neighbor 172.16.255.1 update-source Loopback0 neighbor 172.16.255.2 remote-as 65001 neighbor 172.16.255.2 update-source Loopback0 ! address-family ipv4 exit-address-family ! address-family l2vpn evpn neighbor 172.16.255.1 activate neighbor 172.16.255.1 send-community both neighbor 172.16.255.2 activate neighbor 172.16.255.2 send-community both exit-address-family ! address-family ipv4 vrf green advertise l2vpn evpn redistribute connected redistribute static exit-address-family ! </pre>	<pre> interface GigabitEthernet1/0/2 no switchport ip address 172.16.24.4 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface GigabitEthernet1/0/10 switchport mode trunk ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ipv6 enable no autostate ! interface nve1 no ip address source-interface Loopback1 host-reachability protocol bgp member vni 10101 mcast-group 225.0.0.101 member vni 50901 vrf green member vni 10102 ingress-replication ! router ospf 1 router-id 172.16.255.4 ! router bgp 65001 bgp log-neighbor-changes no bgp default ipv4-unicast neighbor 172.16.255.1 remote-as 65001 neighbor 172.16.255.1 update-source Loopback0 neighbor 172.16.255.2 remote-as 65001 neighbor 172.16.255.2 update-source Loopback0 ! address-family ipv4 exit-address-family ! address-family l2vpn evpn neighbor 172.16.255.1 activate neighbor 172.16.255.1 send-community both neighbor 172.16.255.2 activate neighbor 172.16.255.2 send-community both exit-address-family ! address-family ipv4 vrf green advertise l2vpn evpn redistribute connected redistribute static exit-address-family ! </pre>

リーフスイッチ 1	リーフスイッチ 2
<pre>address-family ipv6 vrf green redistribute connected redistribute static advertise l2vpn evpn exit-address-family ! ip pim rp-address 172.16.255.255 ! end Leaf-01#</pre>	<pre>address-family ipv6 vrf green redistribute connected redistribute static advertise l2vpn evpn exit-address-family ! ip pim rp-address 172.16.255.255 ! end Leaf-02#</pre>

次に、上記の表で設定されたトポロジ内のデバイスでの **show** コマンドの出力例を示します。

スパインスイッチ 1

次に、スパインスイッチ 1 での **show ip ospf neighbor** コマンドの出力例を示します。

Spine-01# **show ip ospf neighbor**

Neighbor ID	Pri	State	Dead Time	Address	Interface
172.16.255.4	0	FULL/ -	00:00:39	172.16.14.4	GigabitEthernet1/0/2
172.16.255.3	0	FULL/ -	00:00:30	172.16.13.3	GigabitEthernet1/0/1

次に、スパインスイッチ 1 での **show bgp l2vpn evpn summary** コマンドの出力例を示します。

Spine-01# **show bgp l2vpn evpn summary**

```
BGP router identifier 172.16.255.1, local AS number 65001
BGP table version is 46, main routing table version 46
18 network entries using 6192 bytes of memory
38 path entries using 7904 bytes of memory
14/13 BGP path/bestpath attribute entries using 4032 bytes of memory
2 BGP rrinfo entries using 80 bytes of memory
12 BGP extended community entries using 640 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
BGP using 18848 total bytes of memory
BGP activity 27/9 prefixes, 49/11 paths, scan interval 60 secs
18 networks peaked at 17:16:59 May 24 2020 UTC (22:49:24.588 ago)
```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
172.16.255.2	4	65001	1318	1314	46	0	0	19:39:19	18
172.16.255.3	4	65001	1517	1536	46	0	0	22:49:32	9
172.16.255.4	4	65001	1297	1310	46	0	0	19:23:05	11

次に、ルートタイプ 2 のスパインスイッチ 1 とホストデバイス 1 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力の例を示します。

```
Spine-01# show bgp l2vpn evpn route-type 2 0 f4cfe24334c1 10.1.101.11
BGP routing table entry for [2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24,
version 4
Paths: (2 available, best #2, table EVPN-BGP-Table)
  Advertised to update-groups:
    1          2
```

```

Refresh Epoch 1
Local
 172.16.254.3 (metric 2) (via default) from 172.16.255.2 (172.16.255.2)
  Origin incomplete, metric 0, localpref 100, valid, internal
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65001:101 ENCAP:8
    Router MAC:10B3.D56A.8FC8
  Originator: 172.16.255.3, Cluster list: 172.16.255.2
  rx pathid: 0, tx pathid: 0
  net: 0x7F54CCA547D0, path: 0x7F54CCA63D70, pathext: 0x0
  flags: net: 0x0, path: 0x3, pathext: 0x0
  Updated on May 24 2020 20:42:55 UTC
Refresh Epoch 2
Local, (Received from a RR-client)
 172.16.254.3 (metric 2) (via default) from 172.16.255.3 (172.16.255.3)
  Origin incomplete, metric 0, localpref 100, valid, internal, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65001:101 ENCAP:8
    Router MAC:10B3.D56A.8FC8
  rx pathid: 0, tx pathid: 0x0
  net: 0x7F54CCA547D0, path: 0x7F54CCA64AF0, pathext: 0x7F54CA789BA8
  flags: net: 0x0, path: 0x3, pathext: 0x81
  Updated on May 24 2020 17:16:50 UTC

```

次に、ルートタイプ 2 のスパインスイッチ 1 とホストデバイス 2 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```

Spine-01# show bgp l2vpn evpn route-type 2 0 44d3ca286cc1 10.1.101.12
BGP routing table entry for [2][172.16.254.4:101][0][48][44D3CA286CC1][32][10.1.101.12]/24,
version 42
Paths: (2 available, best #1, table EVPN-BGP-Table)
  Advertised to update-groups:
    1      2
Refresh Epoch 2
Local, (Received from a RR-client)
 172.16.254.4 (metric 2) (via default) from 172.16.255.4 (172.16.255.4)
  Origin incomplete, metric 0, localpref 100, valid, internal, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65001:101 ENCAP:8
    Router MAC:7C21.0DBD.9548
  rx pathid: 0, tx pathid: 0x0
  net: 0x7F54CCA53E30, path: 0x7F54CCA63428, pathext: 0x7F54CA7898A8
  flags: net: 0x0, path: 0x3, pathext: 0x81
  Updated on May 24 2020 20:43:18 UTC
Refresh Epoch 1
Local
 172.16.254.4 (metric 2) (via default) from 172.16.255.2 (172.16.255.2)
  Origin incomplete, metric 0, localpref 100, valid, internal
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65001:101 ENCAP:8
    Router MAC:7C21.0DBD.9548
  Originator: 172.16.255.4, Cluster list: 172.16.255.2
  rx pathid: 0, tx pathid: 0
  net: 0x7F54CCA53E30, path: 0x7F54CCA64280, pathext: 0x0
  flags: net: 0x0, path: 0x3, pathext: 0x0
  Updated on May 24 2020 20:28:04 UTC

```

次に、スパインスイッチ 1 での **show ip pim neighbor** コマンドの出力例を示します。

```

Spine-01# show ip pim neighbor
PIM Neighbor Table
Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority,

```

```

        P - Proxy Capable, S - State Refresh Capable, G - GenID Capable,
        L - DR Load-balancing Capable
Neighbor      Interface      Uptime/Expires   Ver   DR
Address
172.16.13.3   GigabitEthernet1/0/1  1d22h/00:01:41   v2    1 / DR S P G
172.16.14.4   GigabitEthernet1/0/2  4w5d/00:01:24   v2    1 / DR S P G

```

次に、スパインスイッチ 1 での **show ip pim rp map** コマンドの出力例を示します。

```

Spine-01# show ip pim rp map
PIM Group-to-RP Mappings

Group(s): 224.0.0.0/4, Static
          RP: 172.16.255.255 (?)

```

次に、スパインスイッチ 1 での **show ip rpf** コマンドの出力例を示します。

```

Spine-01# show ip rpf 172.16.255.255
RPF information for ? (172.16.255.255)
  RPF interface: Loopback2
  RPF neighbor: ? (172.16.255.255) - directly connected
  RPF route/mask: 172.16.255.255/32
  RPF type: multicast (connected)
  Doing distance-preferred lookups across tables
  RPF topology: ipv4 multicast base

```

次に、スパインスイッチ 1 での **show ip msdp summary** コマンドの出力例を示します。

```

Spine-01# show ip msdp summary
MSDP Peer Status Summary
Peer Address   AS      State   Uptime/  Reset SA   Peer Name
                Downtime Count Count
172.16.254.2   65001  Up      22:37:35  0         2         ?

```

次に、スパインスイッチ 1 での **show ip msdp sa-cache** コマンドの出力例を示します。

```

Spine-01# show ip msdp sa-cache
MSDP Source-Active Cache - 2 entries
(172.16.254.3, 225.0.0.101), RP 172.16.255.255, BGP/AS 0, 00:00:29/00:05:30, Peer
172.16.254.2
(172.16.254.4, 225.0.0.101), RP 172.16.255.255, BGP/AS 0, 00:00:17/00:05:43, Peer
172.16.254.2

```

次に、スパインスイッチ 1 での **show ip mroute** コマンドの出力例を示します。

```

Spine-01# show ip mroute 225.0.0.10
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
L - Local, P - Pruned, R - RP-bit set, F - Register flag,
T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
U - URD, I - Received Source Specific Host Report,
Z - Multicast Tunnel, z - MDT-data group sender,
Y - Joined MDT-data group, y - Sending to MDT-data group,
G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
Q - Received BGP S-A Route, q - Sent BGP S-A Route,
V - RD & Vector, v - Vector, p - PIM Joins on route,

```

スパインスイッチとリーフスイッチが同じ自律システム内にある場合に iBGP を使用したスパインスイッチの設定例

```

    x - VxLAN group, c - PFP-SA cache created entry,
    * - determined by Assert, # - iif-starg configured on rpf intf
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 225.0.0.101), 00:01:04/stopped, RP 172.16.255.255, flags: SP
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list: Null

(172.16.254.4, 225.0.0.101), 00:00:51/00:02:08, flags: PA
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.14.4
  Outgoing interface list: Null

(172.16.254.3, 225.0.0.101), 00:01:04/00:01:55, flags: PA
  Incoming interface: GigabitEthernet1/0/1, RPF nbr 172.16.13.3
  Outgoing interface list: Null

```

スパインスイッチ 2

次に、スパインスイッチ 2 での **show ip ospf neighbor** コマンドの出力例を示します。

```
Spine-02# show ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
172.16.255.4	0	FULL/ -	00:00:39	172.16.24.4	GigabitEthernet1/0/2
172.16.255.3	0	FULL/ -	00:00:35	172.16.23.3	GigabitEthernet1/0/1

次に、スパインスイッチ 2 での **show bgp l2vpn evpn summary** コマンドの出力例を示します。

```
Spine-02# show bgp l2vpn evpn summary
```

```

BGP router identifier 172.16.255.2, local AS number 65001
BGP table version is 28, main routing table version 28
18 network entries using 6192 bytes of memory
38 path entries using 7904 bytes of memory
14/13 BGP path/bestpath attribute entries using 4032 bytes of memory
2 BGP rrinfo entries using 80 bytes of memory
12 BGP extended community entries using 640 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
BGP using 18848 total bytes of memory
BGP activity 36/18 prefixes, 58/20 paths, scan interval 60 secs
18 networks peaked at 16:03:20 May 24 2020 UTC (1d00h ago)

```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
172.16.255.1	4	65001	1327	1331	28	0	0	19:51:26	18
172.16.255.3	4	65001	1307	1322	28	0	0	19:35:35	9
172.16.255.4	4	65001	1316	1334	28	0	0	19:51:36	11

次に、ルートタイプ 2 のスパインスイッチ 2 とホストデバイス 1 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```
Spine-02# show bgp l2vpn evpn route-type 2 0 f4cfe24334c1 10.1.101.11
```

```

BGP routing table entry for [2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24,
version 24

```

```

Paths: (2 available, best #1, table EVPN-BGP-Table)
  Advertised to update-groups:

```

```

2          3
Refresh Epoch 2
Local, (Received from a RR-client)
 172.16.254.3 (metric 2) (via default) from 172.16.255.3 (172.16.255.3)
  Origin incomplete, metric 0, localpref 100, valid, internal, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65001:101 ENCAP:8
    Router MAC:10B3.D56A.8FC8
  rx pathid: 0, tx pathid: 0x0
  net: 0x7FEFE69D6638, path: 0x7FEFE45FED18, pathext: 0x7FEFE6645CC0
  flags: net: 0x0, path: 0x3, pathext: 0x81
  Updated on May 24 2020 20:43:24 UTC
Refresh Epoch 1
Local
 172.16.254.3 (metric 2) (via default) from 172.16.255.1 (172.16.255.1)
  Origin incomplete, metric 0, localpref 100, valid, internal
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65001:101 ENCAP:8
    Router MAC:10B3.D56A.8FC8
  Originator: 172.16.255.3, Cluster list: 172.16.255.1
  rx pathid: 0, tx pathid: 0
  net: 0x7FEFE69D6638, path: 0x7FEFE45FF738, pathext: 0x0
  flags: net: 0x0, path: 0x3, pathext: 0x0
  Updated on May 24 2020 20:27:33 UTC

```

次に、ルートタイプ 2 のスパインスイッチ 2 とホストデバイス 2 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```

Spine-02# show bgp l2vpn evpn route-type 2 0 44d3ca286cc1 10.1.101.12
BGP routing table entry for [2][172.16.254.4:101][0][48][44D3CA286CC1][32][10.1.101.12]/24,
version 10
Paths: (2 available, best #2, table EVPN-BGP-Table)
  Advertised to update-groups:
    2          3
Refresh Epoch 1
Local
 172.16.254.4 (metric 2) (via default) from 172.16.255.1 (172.16.255.1)
  Origin incomplete, metric 0, localpref 100, valid, internal
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65001:101 ENCAP:8
    Router MAC:7C21.0DBD.9548
  Originator: 172.16.255.4, Cluster list: 172.16.255.1
  rx pathid: 0, tx pathid: 0
  net: 0x7FEFE69D64D8, path: 0x7FEFE45FE730, pathext: 0x0
  flags: net: 0x0, path: 0x3, pathext: 0x0
  Updated on May 24 2020 20:43:46 UTC
Refresh Epoch 1
Local, (Received from a RR-client)
 172.16.254.4 (metric 2) (via default) from 172.16.255.4 (172.16.255.4)
  Origin incomplete, metric 0, localpref 100, valid, internal, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65001:101 ENCAP:8
    Router MAC:7C21.0DBD.9548
  rx pathid: 0, tx pathid: 0x0
  net: 0x7FEFE69D64D8, path: 0x7FEFE45FF660, pathext: 0x7FEFE6645B40
  flags: net: 0x0, path: 0x3, pathext: 0x81
  Updated on May 24 2020 20:27:22 UTC

```

次に、スパインスイッチ 2 での **show ip pim neighbor** コマンドの出力例を示します。

```

Spine-02# show ip pim neighbor
PIM Neighbor Table

```

スパインスイッチとリーフスイッチが同じ自律システム内にある場合に iBGP を使用したスパインスイッチの設定例

```
Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority,
      P - Proxy Capable, S - State Refresh Capable, G - GenID Capable,
      L - DR Load-balancing Capable
Neighbor      Interface      Uptime/Expires      Ver      DR
Address
172.16.23.3   GigabitEthernet1/0/1 6w3d/00:01:21      v2       1 / DR S P G
172.16.24.4   GigabitEthernet1/0/2 1d22h/00:01:18      v2       1 / DR S P G
```

次に、スパインスイッチ 2 での **show ip pim rp map** コマンドの出力例を示します。

```
Spine-02# show ip pim rp map
PIM Group-to-RP Mappings

Group(s): 224.0.0.0/4, Static
          RP: 172.16.255.255 (?)
```

次に、スパインスイッチ 2 での **show ip rpf** コマンドの出力例を示します。

```
Spine-02# show ip rpf 172.16.255.255
RPF information for ? (172.16.255.255)
  RPF interface: Loopback2
  RPF neighbor: ? (172.16.255.255) - directly connected
  RPF route/mask: 172.16.255.255/32
  RPF type: multicast (connected)
  Doing distance-preferred lookups across tables
  RPF topology: ipv4 multicast base
```

次に、スパインスイッチ 2 での **show ip msdp summary** コマンドの出力例を示します。

```
Spine-02# show ip msdp summary
MSDP Peer Status Summary
Peer Address      AS      State      Uptime/  Reset SA      Peer Name
                  Downtime Count Count
172.16.254.1     65001  Up         22:41:13 3         2         ?
```

次に、スパインスイッチ 2 での **show ip msdp sa-cache** コマンドの出力例を示します。

```
Spine-02# show ip msdp sa-cache
MSDP Source-Active Cache - 2 entries
(172.16.254.3, 225.0.0.101), RP 172.16.255.255, BGP/AS 0, 00:04:09/00:05:57, Peer
172.16.254.1
(172.16.254.4, 225.0.0.101), RP 172.16.255.255, BGP/AS 0, 00:03:56/00:05:57, Peer
172.16.254.1
```

次に、スパインスイッチ 2 での **show ip mroute** コマンドの出力例を示します。

```
Spine-02# show ip mroute 225.0.0.101
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
       L - Local, P - Pruned, R - RP-bit set, F - Register flag,
       T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
       X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
       U - URD, I - Received Source Specific Host Report,
       Z - Multicast Tunnel, z - MDT-data group sender,
       Y - Joined MDT-data group, y - Sending to MDT-data group,
       G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
       N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
       Q - Received BGP S-A Route, q - Sent BGP S-A Route,
```

```

V - RD & Vector, v - Vector, p - PIM Joins on route,
x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 225.0.0.101), 5w6d/00:03:16, RP 172.16.255.255, flags: S
Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list:
  GigabitEthernet1/0/2, Forward/Sparse, 1d22h/00:03:10
  GigabitEthernet1/0/1, Forward/Sparse, 5w6d/00:02:55

(172.16.254.4, 225.0.0.101), 00:00:13/00:02:46, flags: TA
Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.4
Outgoing interface list:
  GigabitEthernet1/0/1, Forward/Sparse, 00:00:13/00:03:16

(172.16.254.3, 225.0.0.101), 00:00:23/00:02:36, flags: A
Incoming interface: GigabitEthernet1/0/1, RPF nbr 172.16.23.3
Outgoing interface list:
  GigabitEthernet1/0/2, Forward/Sparse, 00:00:23/00:03:10

```

リーフスイッチ 1

次に、リーフスイッチ 1 での **show ip ospf neighbor** コマンドの出力例を示します。

```
Leaf-01# show ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
172.16.255.2	0	FULL/ -	00:00:34	172.16.23.2	GigabitEthernet1/0/2
172.16.255.1	0	FULL/ -	00:00:30	172.16.13.1	GigabitEthernet1/0/1

次に、リーフスイッチ 1 での **show bgp l2vpn evpn summary** コマンドの出力例を示します。

```
Leaf-01# show bgp l2vpn evpn summary
```

```

BGP router identifier 172.16.255.3, local AS number 65001
BGP table version is 11429, main routing table version 11429
27 network entries using 9288 bytes of memory
36 path entries using 7488 bytes of memory
15/15 BGP path/bestpath attribute entries using 4320 bytes of memory
2 BGP rrinfo entries using 80 bytes of memory
12 BGP extended community entries using 624 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
BGP using 21800 total bytes of memory
BGP activity 398/365 prefixes, 4243/4201 paths, scan interval 60 secs
89 networks peaked at 20:32:14 Apr 21 2020 UTC (4w5d ago)

```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
172.16.255.1	4	65001	261	242	11429	0	0	03:28:13	9
172.16.255.2	4	65001	31	16	11429	0	0	00:02:08	9

次に、ルートタイプ 2 のリーフスイッチ 1 とホストデバイス 2 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

スパインスイッチとリーフスイッチが同じ自律システム内にある場合に iBGP を使用したスパインスイッチの設定例

```
Leaf-01# show bgp l2vpn evpn route-type 2 0 44d3ca286cc1 10.1.101.12
BGP routing table entry for [2][172.16.254.3:101][0][48][44D3CA286CC1][32][10.1.101.12]/24,
version 11423
Paths: (1 available, best #1, table evi_101)
  Not advertised to any peer
  Refresh Epoch 1
  Local, imported path from [2][172.16.254.4:101][0][48][44D3CA286CC1][32][10.1.101.12]/24
  (global)
    172.16.254.4 (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, Label1 10101, Label2 50901
      Extended Community: RT:1:1 RT:65001:101 ENCAP:8
      Router MAC:7C21.0DBD.9548
      Originator: 172.16.255.4, Cluster list: 172.16.255.1
      rx pathid: 0, tx pathid: 0x0
      net: 0x7F575DB9FAB0, path: 0x7F575FD77698, pathext: 0x7F575DBD5B48, exp_net:
0x7F575DBA3B50
      flags: net: 0x0, path: 0x40000000000003, pathext: 0x81
      Updated on May 24 2020 20:40:59 UTC
BGP routing table entry for [2][172.16.254.4:101][0][48][44D3CA286CC1][32][10.1.101.12]/24,
version 11414
Paths: (2 available, best #2, table EVPN-BGP-Table)
  Not advertised to any peer
  Refresh Epoch 2
  Local
    172.16.254.4 (metric 3) (via default) from 172.16.255.2 (172.16.255.2)
      Origin incomplete, metric 0, localpref 100, valid, internal
      EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
      Extended Community: RT:1:1 RT:65001:101 ENCAP:8
      Router MAC:7C21.0DBD.9548
      Originator: 172.16.255.4, Cluster list: 172.16.255.2
      rx pathid: 0, tx pathid: 0
      net: 0x7F575DBA3B50, path: 0x7F575FD77E30, pathext: 0x0
      flags: net: 0x0, path: 0x3, pathext: 0x0
      Updated on May 24 2020 20:40:37 UTC
  Refresh Epoch 1
  Local
    172.16.254.4 (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, Label1 10101, Label2 50901
      Extended Community: RT:1:1 RT:65001:101 ENCAP:8
      Router MAC:7C21.0DBD.9548
      Originator: 172.16.255.4, Cluster list: 172.16.255.1
      rx pathid: 0, tx pathid: 0x0
      net: 0x7F575DBA3B50, path: 0x7F575FD769F0, pathext: 0x7F575DBD5D88
      flags: net: 0x0, path: 0x3, pathext: 0x81
      Updated on May 24 2020 20:40:59 UTC
```

次に、リーフスイッチ 1 での **show ip pim neighbor** コマンドの出力例を示します。

```
Leaf-01# show ip pim neighbor
PIM Neighbor Table
Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority,
      P - Proxy Capable, S - State Refresh Capable, G - GenID Capable,
      L - DR Load-balancing Capable
Neighbor      Interface      Uptime/Expires   Ver   DR
Address
172.16.13.1   GigabitEthernet1/0/1   1d03h/00:01:21   v2    1 / S P G
172.16.23.2   GigabitEthernet1/0/2   6w2d/00:01:25   v2    1 / S P G
```


次に、リーフスイッチ 1 での **show ip pim rp mapping** コマンドの出力例を示します。

```
Leaf-01# show ip pim rp mapping
PIM Group-to-RP Mappings

Group(s): 224.0.0.0/4, Static
RP: 172.16.255.255 (?)
```

次に、リーフスイッチ 1 での **show ip ro** コマンドの出力例を示します。

```
Leaf-01# show ip ro 172.16.255.255
Routing entry for 172.16.255.255/32
  Known via "ospf 1", distance 110, metric 2, type intra area
  Last update from 172.16.13.1 on GigabitEthernet1/0/1, 1d03h ago
  Routing Descriptor Blocks:
    * 172.16.23.2, from 172.16.255.2, 4w5d ago, via GigabitEthernet1/0/2
      Route metric is 2, traffic share count is 1
    172.16.13.1, from 172.16.255.1, 1d03h ago, via GigabitEthernet1/0/1
      Route metric is 2, traffic share count is 1
```

次に、リーフスイッチ 1 での **show ip rpf** コマンドの出力例を示します。

```
Leaf-01# show ip rpf 172.16.255.255
RPF information for ? (172.16.255.255)
  RPF interface: GigabitEthernet1/0/2
  RPF neighbor: ? (172.16.23.2)
  RPF route/mask: 172.16.255.255/32
  RPF type: unicast (ospf 1)
  Doing distance-preferred lookups across tables
  RPF topology: ipv4 multicast base, originated from ipv4 unicast base
```

次に、リーフスイッチ 1 での **show ip mroute** コマンドの出力例を示します。

```
Leaf-01# show ip mroute 225.0.0.101
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
L - Local, P - Pruned, R - RP-bit set, F - Register flag,
T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
U - URD, I - Received Source Specific Host Report,
Z - Multicast Tunnel, z - MDT-data group sender,
Y - Joined MDT-data group, y - Sending to MDT-data group,
G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
Q - Received BGP S-A Route, q - Sent BGP S-A Route,
V - RD & Vector, v - Vector, p - PIM Joins on route,
x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 225.0.0.101), 6w2d/stopped, RP 172.16.255.255, flags: SJCFx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse-Dense, 6w2d/00:01:57

(172.16.254.4, 225.0.0.101), 00:00:49/00:02:10, flags: JTx
```

スパインスイッチとリーフスイッチが同じ自律システム内にある場合に iBGP を使用したスパインスイッチの設定例

```
Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
Outgoing interface list:
  Tunnel0, Forward/Sparse-Dense, 00:00:49/00:02:10

(172.16.254.3, 225.0.0.101), 00:01:01/00:01:58, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 00:01:01/00:03:27
```

リーフスイッチ 2

次に、リーフスイッチ 2 での **show ip ospf neighbor** コマンドの出力例を示します。

```
Leaf-02# show ip ospf neighbor
```

Neighbor ID	Pri	State		Dead Time	Address	Interface
172.16.255.2	0	FULL/	-	00:00:34	172.16.24.2	GigabitEthernet1/0/2
172.16.255.1	0	FULL/	-	00:00:35	172.16.14.1	GigabitEthernet1/0/1

次に、リーフスイッチ 2 での **show bgp l2vpn evpn summary** コマンドの出力例を示します。

```
Leaf-02# show bgp l2vpn evpn summary
```

```
BGP router identifier 172.16.255.4, local AS number 65001
BGP table version is 168, main routing table version 168
25 network entries using 8600 bytes of memory
36 path entries using 7488 bytes of memory
16/15 BGP path/bestpath attribute entries using 4608 bytes of memory
2 BGP rrinfo entries using 80 bytes of memory
13 BGP extended community entries using 664 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
BGP using 21440 total bytes of memory
BGP activity 70/39 prefixes, 168/124 paths, scan interval 60 secs
31 networks peaked at 15:56:08 May 24 2020 UTC (05:05:36.264 ago)
```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
172.16.255.1	4	65001	45	31	168	0	0	00:16:18	9
172.16.255.2	4	65001	54	48	168	0	0	00:32:42	9

次に、ルートタイプ 2 のリーフスイッチ 2 とホストデバイス 1 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```
Leaf-02# show bgp l2vpn evpn route-type 2 0 f4cfe24334c1 10.1.101.11
```

```
BGP routing table entry for [2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24,
version 163
Paths: (2 available, best #1, table EVPN-BGP-Table)
  Not advertised to any peer
  Refresh Epoch 2
  Local
    172.16.254.3 (metric 3) (via default) from 172.16.255.1 (172.16.255.1)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      EVPN ESI: 000000000000000000000000, Label1 10101, Label2 50901
      Extended Community: RT:1:1 RT:65001:101 ENCAP:8
      Router MAC:10B3.D56A.8FC8
      Originator: 172.16.255.3, Cluster list: 172.16.255.1
      rx pathid: 0, tx pathid: 0x0
```

```

net: 0x7F84B9145020, path: 0x7F84BB3355F8, pathext: 0x7F84BB5B4318
flags: net: 0x0, path: 0x3, pathext: 0x81
Updated on May 24 2020 20:45:25 UTC
Refresh Epoch 1
Local
 172.16.254.3 (metric 3) (via default) from 172.16.255.2 (172.16.255.2)
Origin incomplete, metric 0, localpref 100, valid, internal
EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
Extended Community: RT:1:1 RT:65001:101 ENCAP:8
  Router MAC:10B3.D56A.8FC8
Originator: 172.16.255.3, Cluster list: 172.16.255.2
rx pathid: 0, tx pathid: 0
net: 0x7F84B9145020, path: 0x7F84BB333948, pathext: 0x0
flags: net: 0x0, path: 0x3, pathext: 0x0
Updated on May 24 2020 20:45:03 UTC
BGP routing table entry for [2][172.16.254.4:101][0][48][F4CFE24334C1][32][10.1.101.11]/24,
version 166
Paths: (1 available, best #1, table evi_101)
Not advertised to any peer
Refresh Epoch 2
Local, imported path from [2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24
(global)
 172.16.254.3 (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, Label1 10101, Label2 50901
Extended Community: RT:1:1 RT:65001:101 ENCAP:8
  Router MAC:10B3.D56A.8FC8
Originator: 172.16.255.3, Cluster list: 172.16.255.1
rx pathid: 0, tx pathid: 0x0
net: 0x7F84B9145700, path: 0x7F84BB334008, pathext: 0x7F84BB5B3A18, exp_net:
0x7F84B9145020
flags: net: 0x0, path: 0x40000000000003, pathext: 0x81
Updated on May 24 2020 20:45:25 UTC

```

次に、リーフスイッチ 2 での **show ip pim neighbor** コマンドの出力例を示します。

```

Leaf-02# show ip pim neighbor
PIM Neighbor Table
Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority,
      P - Proxy Capable, S - State Refresh Capable, G - GenID Capable,
      L - DR Load-balancing Capable
Neighbor          Interface                Uptime/Expires    Ver  DR
Address
172.16.14.1       GigabitEthernet1/0/1     4w5d/00:01:26    v2   1 / S P G
172.16.24.2       GigabitEthernet1/0/2     1d03h/00:01:20    v2   1 / S P G

```

次に、リーフスイッチ 2 での **show ip pim rp map** コマンドの出力例を示します。

```

Leaf-02# show ip pim rp map
PIM Group-to-RP Mappings

Group(s): 224.0.0.0/4, Static
          RP: 172.16.255.255 (?)

```

次に、リーフスイッチ 2 での **show ip ro** コマンドの出力例を示します。

```

Leaf-02# show ip ro 172.16.255.255
Routing entry for 172.16.255.255/32

```

```

Known via "ospf 1", distance 110, metric 2, type intra area
Last update from 172.16.14.1 on GigabitEthernet1/0/1, 05:12:11 ago
Routing Descriptor Blocks:
* 172.16.24.2, from 172.16.255.2, 05:12:11 ago, via GigabitEthernet1/0/2
  Route metric is 2, traffic share count is 1
  172.16.14.1, from 172.16.255.1, 05:12:11 ago, via GigabitEthernet1/0/1
    Route metric is 2, traffic share count is 1

```

次に、リーフスイッチ 2 での **show ip mroute** コマンドの出力例を示します。

```

Leaf-02# show ip mroute 225.0.0.101
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
       L - Local, P - Pruned, R - RP-bit set, F - Register flag,
       T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
       X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
       U - URD, I - Received Source Specific Host Report,
       Z - Multicast Tunnel, z - MDT-data group sender,
       Y - Joined MDT-data group, y - Sending to MDT-data group,
       G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
       N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
       Q - Received BGP S-A Route, q - Sent BGP S-A Route,
       V - RD & Vector, v - Vector, p - PIM Joins on route,
       x - VxLAN group, c - PFP-SA cache created entry,
       * - determined by Assert, # - iif-starg configured on rpf intf
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 225.0.0.101), 3d07h/stopped, RP 172.16.255.255, flags: SJCFx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse-Dense, 3d07h/00:00:38

(172.16.254.4, 225.0.0.101), 00:00:09/00:02:50, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 00:00:09/00:03:20

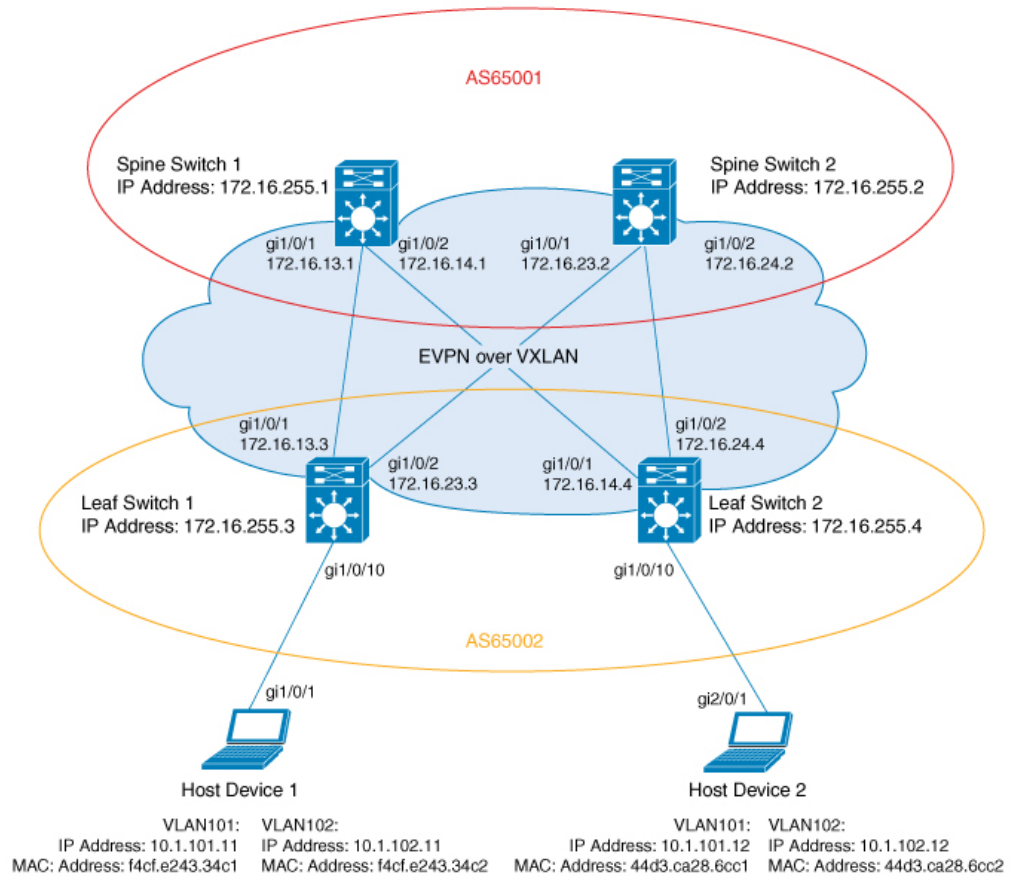
(172.16.254.3, 225.0.0.101), 00:00:28/00:02:31, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse-Dense, 00:00:28/00:02:31

```

スパインスイッチがある自律システムにあり、リーフスイッチが別の自律システムにある場合の eBGP を使用したスパインスイッチの設定例

この項では、スパインスイッチがある自律システムにあり、リーフスイッチが別の自律システムにある場合に、eBGP を使用して BGP EVPN VXLAN ファブリックでスパインスイッチを設定する例を示します。次に、スパインスイッチを設定し、下に示すトポロジの設定を確認する例を示します。

図 2: ある自律システムにスパインスイッチがあり、別の自律システムにリーフスイッチがある BGP EVPN VXLAN ファブリック



356642

このトポロジでは、2 台のリーフスイッチ（リーフスイッチ 1 とリーフスイッチ 2）と 2 台のスパインスイッチ（スパインスイッチ 1 とスパインスイッチ 2）を備えた EVPN VXLAN ネットワークを示しています。スパインスイッチ 1 とスパインスイッチ 2 は自律システム AS65001 にあります。リーフスイッチ 1 とリーフスイッチ 2 は自律システム AS65002 にあります。スパインスイッチ 1 とスパインスイッチ 2 は BGP ルートサーバーであり、互いのルートリフレククライアントではありません。Multicast Source Discovery Protocol (MSDP) は、送信元を同期するためにスパインスイッチ 1 とスパインスイッチ 2 の間に設定されます。Protocol Independent Multicast (PIM) がリーフスイッチとスパインスイッチを接続するインターフェイスで有効になっています。静的 RP はネットワークで設定され、アンダーレイネットワークはマルチキャスト転送メカニズムを使用して BUM トラフィックを転送します。



(注) 異なる自律システム番号を持つ BGP の更新を処理できるように、リーフスイッチで L2VPN EVPN アドレスファミリー コンフィギュレーション モードで `neighbor ip-address allowas-in` コマンドを実行する必要があります。



(注) スパインスイッチで **no bgp default route-target filter** コマンドをルータ コンフィギュレーション モードで手動で実行する必要があります。



(注) ファブリックを機能させるには、リーフスイッチとスパインスイッチで eBGP マルチホップを設定する必要があります。

次の表に、上記のトポロジのデバイスの設定例を示します。

表 3: スパインスイッチがある自律システムにあり、リーフスイッチが別の自律システムにある場合の eBGP を使用したスパインスイッチ 1 およびスパインスイッチ 2 の設定

スパインスイッチ 1	スパインスイッチ 2
<pre>Spine-01# show running-config hostname Spine-01 ! ip routing ! ip multicast-routing ! interface Loopback0 ip address 172.16.255.1 255.255.255.255 ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.1 255.255.255.255 ip ospf 1 area 0 ! interface Loopback2 ip address 172.16.255.255 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface GigabitEthernet1/0/1 no switchport ip address 172.16.13.1 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface GigabitEthernet1/0/2 no switchport ip address 172.16.14.1 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! router ospf 1 router-id 172.16.255.1 ! router bgp 65001 bgp router-id 172.16.255.1 bgp log-neighbor-changes no bgp default ipv4-unicast no bgp default route-target filter neighbor 172.16.255.2 remote-as 65001 neighbor 172.16.255.2 update-source Loopback0 neighbor 172.16.255.3 remote-as 65002 neighbor 172.16.255.3 ebgp-multihop 255 neighbor 172.16.255.3 update-source Loopback0 neighbor 172.16.255.4 remote-as 65002 neighbor 172.16.255.4 ebgp-multihop 255 neighbor 172.16.255.4 update-source Loopback0 ! address-family ipv4 exit-address-family !</pre>	<pre>Spine-02# show running-config hostname Spine-02 ! ip routing ! ip multicast-routing ! interface Loopback0 ip address 172.16.255.2 255.255.255.255 ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.2 255.255.255.255 ip ospf 1 area 0 ! interface Loopback2 ip address 172.16.255.255 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface GigabitEthernet1/0/1 no switchport ip address 172.16.23.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface GigabitEthernet1/0/2 no switchport ip address 172.16.24.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! router ospf 1 router-id 172.16.255.2 ! router bgp 65001 bgp router-id 172.16.255.2 bgp log-neighbor-changes no bgp default ipv4-unicast no bgp default route-target filter neighbor 172.16.255.1 remote-as 65001 neighbor 172.16.255.1 update-source Loopback0 neighbor 172.16.255.3 remote-as 65002 neighbor 172.16.255.3 ebgp-multihop 255 neighbor 172.16.255.3 update-source Loopback0 neighbor 172.16.255.4 remote-as 65002 neighbor 172.16.255.4 ebgp-multihop 255 neighbor 172.16.255.4 update-source Loopback0 ! address-family ipv4 exit-address-family !</pre>

■ スパインスイッチがある自律システムにあり、リーフスイッチが別の自律システムにある場合の eBGP を使用したスパインスイッチの設定例

スパインスイッチ 1	スパインスイッチ 2
<pre> address-family l2vpn evpn neighbor 172.16.255.2 activate neighbor 172.16.255.2 send-community both neighbor 172.16.255.2 route-map BGP-NHU out neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community extended neighbor 172.16.255.3 route-map BGP-NHU out neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-map BGP-NHU out exit-address-family ! ip pim rp-address 172.16.255.255 ip msdp peer 172.16.254.2 connect-source Loopback1 remote-as 65001 ip msdp cache-sa-state ! route-map BGP-NHU permit 10 set ip next-hop unchanged ! end Spine-01# </pre>	<pre> address-family l2vpn evpn neighbor 172.16.255.1 activate neighbor 172.16.255.1 send-community both neighbor 172.16.255.1 route-map BGP-NHU out neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-map BGP-NHU out neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-map BGP-NHU out exit-address-family ! ip pim rp-address 172.16.255.255 ip msdp peer 172.16.254.1 connect-source Loopback1 remote-as 65001 ip msdp cache-sa-state ! route-map BGP-NHU permit 10 set ip next-hop unchanged ! end Spine-02# </pre>

表 4:スパインスイッチがある自律システムにあり、リーフスイッチが別の自律システムにある場合の **eBGP** を使用したリーフスイッチ 1 およびリーフスイッチ 2 の設定

リーフスイッチ 1	リーフスイッチ 2

スパインスイッチがある自律システムにあり、リーフスイッチが別の自律システムにある場合の eBGP を使用したスパインスイッチの設定例

リーフスイッチ 1	リーフスイッチ 2
<pre>Leaf-01# show running-config hostname Leaf-01 ! vrf definition green rd 1:1 ! address-family ipv4 route-target export 1:1 route-target import 1:1 route-target export 1:1 stitching route-target import 1:1 stitching exit-address-family ! address-family ipv6 route-target export 1:1 route-target import 1:1 route-target export 1:1 stitching route-target import 1:1 stitching exit-address-family ! ip routing ! ip multicast-routing ! l2vpn evpn replication-type static router-id Loopback1 default-gateway advertise ! l2vpn evpn instance 101 vlan-based encapsulation vxlan replication-type static ! l2vpn evpn instance 102 vlan-based encapsulation vxlan replication-type ingress ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 ! interface Loopback0 ip address 172.16.255.3 255.255.255.255 ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.3 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface GigabitEthernet1/0/1 no switchport ip address 172.16.13.3 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0</pre>	<pre>Leaf-02# show running-config hostname Leaf-02 ! vrf definition green rd 1:1 ! address-family ipv4 route-target export 1:1 route-target import 1:1 route-target export 1:1 stitching route-target import 1:1 stitching exit-address-family ! address-family ipv6 route-target export 1:1 route-target import 1:1 route-target export 1:1 stitching route-target import 1:1 stitching exit-address-family ! ip routing ! ip multicast-routing ! l2vpn evpn replication-type static router-id Loopback1 default-gateway advertise ! l2vpn evpn instance 101 vlan-based encapsulation vxlan ! l2vpn evpn instance 102 vlan-based encapsulation vxlan replication-type ingress ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 ! interface Loopback0 ip address 172.16.255.4 255.255.255.255 ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.4 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface GigabitEthernet1/0/1 no switchport ip address 172.16.14.4 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 !</pre>

リーフスイッチ 1	リーフスイッチ 2
-----------	-----------

スパインスイッチがある自律システムにあり、リーフスイッチが別の自律システムにある場合の eBGP を使用したスパインスイッチの設定例

リーフスイッチ 1	リーフスイッチ 2
<pre> interface GigabitEthernet1/0/2 no switchport ip address 172.16.23.3 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface GigabitEthernet1/0/10 switchport mode trunk ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ipv6 enable no autostate ! interface nve1 no ip address source-interface Loopback1 host-reachability protocol bgp member vni 10101 mcast-group 225.0.0.101 member vni 10102 ingress-replication member vni 50901 vrf green ! router ospf 1 router-id 172.16.255.3 ! router bgp 65002 bgp log-neighbor-changes no bgp default ipv4-unicast neighbor 172.16.255.1 remote-as 65001 neighbor 172.16.255.1 ebgp-multihop 255 neighbor 172.16.255.1 update-source Loopback0 neighbor 172.16.255.2 remote-as 65001 neighbor 172.16.255.2 ebgp-multihop 255 neighbor 172.16.255.2 update-source Loopback0 ! address-family ipv4 exit-address-family ! address-family l2vpn evpn neighbor 172.16.255.1 activate neighbor 172.16.255.1 send-community both neighbor 172.16.255.1 allowas-in neighbor 172.16.255.2 activate neighbor 172.16.255.2 send-community both neighbor 172.16.255.2 allowas-in exit-address-family ! address-family ipv4 vrf green advertise l2vpn evpn redistribute connected redistribute static exit-address-family </pre>	<pre> interface GigabitEthernet1/0/2 no switchport ip address 172.16.24.4 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface GigabitEthernet1/0/10 switchport mode trunk ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ipv6 enable no autostate ! interface nve1 no ip address source-interface Loopback1 host-reachability protocol bgp member vni 10101 mcast-group 225.0.0.101 member vni 50901 vrf green member vni 10102 ingress-replication ! router ospf 1 router-id 172.16.255.4 ! router bgp 65002 bgp log-neighbor-changes no bgp default ipv4-unicast neighbor 172.16.255.1 remote-as 65001 neighbor 172.16.255.1 ebgp-multihop 255 neighbor 172.16.255.1 update-source Loopback0 neighbor 172.16.255.2 remote-as 65001 neighbor 172.16.255.2 ebgp-multihop 255 neighbor 172.16.255.2 update-source Loopback0 ! address-family ipv4 exit-address-family ! address-family l2vpn evpn neighbor 172.16.255.1 activate neighbor 172.16.255.1 send-community both neighbor 172.16.255.1 allowas-in neighbor 172.16.255.2 activate neighbor 172.16.255.2 send-community both neighbor 172.16.255.2 allowas-in exit-address-family ! address-family ipv4 vrf green advertise l2vpn evpn redistribute connected redistribute static exit-address-family </pre>

リーフスイッチ 1	リーフスイッチ 2
<pre>! address-family ipv6 vrf green redistribute connected redistribute static advertise l2vpn evpn exit-address-family ! ip pim rp-address 172.16.255.255 ! end Leaf-01#</pre>	<pre>! address-family ipv6 vrf green redistribute connected redistribute static advertise l2vpn evpn exit-address-family ! ip pim rp-address 172.16.255.255 ! end Leaf-02#</pre>

次に、上記の表で設定されたトポロジ内のデバイスでの **show** コマンドの出力例を示します。

スパインスイッチ 1

次に、スパインスイッチ 1 での **show ip ospf neighbor** コマンドの出力例を示します。

Spine-01# **show ip ospf neighbor**

Neighbor ID	Pri	State	Dead Time	Address	Interface
172.16.255.4	0	FULL/ -	00:00:33	172.16.14.4	GigabitEthernet1/0/2
172.16.255.3	0	FULL/ -	00:00:34	172.16.13.3	GigabitEthernet1/0/1

次に、スパインスイッチ 1 での **show bgp l2vpn evpn summary** コマンドの出力例を示します。

Spine-01# **show bgp l2vpn evpn summary**

```
BGP router identifier 172.16.255.1, local AS number 65001
BGP table version is 75, main routing table version 75
18 network entries using 6192 bytes of memory
38 path entries using 7904 bytes of memory
27/13 BGP path/bestpath attribute entries using 7776 bytes of memory
1 BGP AS-PATH entries using 24 bytes of memory
12 BGP extended community entries using 640 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
BGP using 22536 total bytes of memory
BGP activity 18/0 prefixes, 76/38 paths, scan interval 60 secs
18 networks peaked at 20:34:25 May 27 2020 UTC (5d18h ago)
```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
172.16.255.2	4	65001	9196	9183	75	0	0	5d18h	18
172.16.255.3	4	65002	8446	8456	75	0	0	5d07h	9
172.16.255.4	4	65002	8446	8447	75	0	0	5d07h	11

次に、ルートタイプ 2 のスパインスイッチ 1 とホストデバイス 2 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

Spine-01# **show bgp l2vpn evpn route-type 2 0 44d3ca286cc1 10.1.101.12**

```
BGP routing table entry for [2][172.16.254.4:101][0][48][44D3CA286CC1][32][10.1.101.12]/24,
version 72
```

Paths: (2 available, best #1, table EVPN-BGP-Table)

Advertised to update-groups:

4 5

```

Refresh Epoch 2
65002
 172.16.254.4 (metric 2) (via default) from 172.16.255.4 (172.16.255.4)
  Origin incomplete, metric 0, localpref 100, valid, external, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
    Router MAC:7C21.0DBD.9548
    rx pathid: 0, tx pathid: 0x0
    net: 0x7F789AD67240, path: 0x7F789AD76820, pathext: 0x7F789AD88298
    flags: net: 0x0, path: 0x3, pathext: 0x81
    Updated on May 28 2020 07:29:30 UTC
Refresh Epoch 1
65002
 172.16.254.4 (metric 2) (via default) from 172.16.255.2 (172.16.255.2)
  Origin incomplete, metric 0, localpref 100, valid, internal
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
    Router MAC:7C21.0DBD.9548
    rx pathid: 0, tx pathid: 0
    net: 0x7F789AD67240, path: 0x7F789AD76EE0, pathext: 0x0
    flags: net: 0x0, path: 0x3, pathext: 0x0
    Updated on May 28 2020 07:27:54 UTC

```

次に、ルートタイプ 2 のスパインスイッチ 1 とホストデバイス 2 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```

Spine-01# show bgp l2vpn evpn route-type 2 0 f4cfe24334c1 10.1.101.11
BGP routing table entry for [2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24,
version 40
Paths: (2 available, best #2, table EVPN-BGP-Table)
  Advertised to update-groups:
    4          5
Refresh Epoch 1
65002
 172.16.254.3 (metric 2) (via default) from 172.16.255.2 (172.16.255.2)
  Origin incomplete, metric 0, localpref 100, valid, internal
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
    Router MAC:10B3.D56A.8FC8
    rx pathid: 0, tx pathid: 0
    net: 0x7F789AD67EA0, path: 0x7F789AD77678, pathext: 0x0
    flags: net: 0x0, path: 0x3, pathext: 0x0
    Updated on May 28 2020 07:29:03 UTC
Refresh Epoch 1
65002
 172.16.254.3 (metric 2) (via default) from 172.16.255.3 (172.16.255.3)
  Origin incomplete, metric 0, localpref 100, valid, external, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
    Router MAC:10B3.D56A.8FC8
    rx pathid: 0, tx pathid: 0x0
    net: 0x7F789AD67EA0, path: 0x7F789AD77FC0, pathext: 0x7F789AD88598
    flags: net: 0x0, path: 0x3, pathext: 0x81
    Updated on May 28 2020 07:27:47 UTC

```

次に、スパインスイッチ 1 での **show ip pim neighbor** コマンドの出力例を示します。

```

Spine-01# show ip pim neighbor
PIM Neighbor Table
Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority,
      P - Proxy Capable, S - State Refresh Capable, G - GenID Capable,
      L - DR Load-balancing Capable

```

Neighbor Address	Interface	Uptime/Expires	Ver	DR Prio/Mode
172.16.13.3	GigabitEthernet1/0/1	5d19h/00:01:44	v2	1 / DR S P G
172.16.14.4	GigabitEthernet1/0/2	5d19h/00:01:36	v2	1 / DR S P G

次に、スパインスイッチ 1 での **show ip pim rp mapping** コマンドの出力例を示します。

```
Spine-01# show ip pim rp mapping
PIM Group-to-RP Mappings

Group(s): 224.0.0.0/4, Static
          RP: 172.16.255.255 (?)
```

次に、スパインスイッチ 1 での **show ip ro** コマンドの出力例を示します。

```
Spine-01# show ip ro 172.16.255.255
Routing entry for 172.16.255.255/32
  Known via "connected", distance 0, metric 0 (connected, via interface)
  Routing Descriptor Blocks:
    * directly connected, via Loopback2
      Route metric is 0, traffic share count is 1
```

次に、スパインスイッチ 1 での **show ip msdp summary** コマンドの出力例を示します。

```
Spine-01# show ip msdp summary
MSDP Peer Status Summary
Peer Address   AS      State   Uptime/  Reset SA   Peer Name
                Down    Count  Downtime Count Count
172.16.254.2   65001  Up      5d19h   0         2        ?
```

次に、スパインスイッチ 1 での **show ip msdp sa-cache** コマンドの出力例を示します。

```
Spine-01# show ip msdp sa-cache
MSDP Source-Active Cache - 2 entries
(172.16.254.3, 225.0.0.101), RP 172.16.255.255, BGP/AS 0, 00:04:01/00:05:23, Peer 172.16.254.2
(172.16.254.4, 225.0.0.101), RP 172.16.255.255, BGP/AS 0, 00:03:39/00:05:26, Peer 172.16.254.2
```

次に、スパインスイッチ 1 での **show ip mroute** コマンドの出力例を示します。

```
Spine-01# show ip mroute 225.0.0.101
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
L - Local, P - Pruned, R - RP-bit set, F - Register flag,
T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
U - URD, I - Received Source Specific Host Report,
Z - Multicast Tunnel, z - MDT-data group sender,
Y - Joined MDT-data group, y - Sending to MDT-data group,
G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
Q - Received BGP S-A Route, q - Sent BGP S-A Route,
V - RD & Vector, v - Vector, p - PIM Joins on route,
```

スパインスイッチがある自律システムにあり、リーフスイッチが別の自律システムにある場合の eBGP を使用したスパインスイッチの設定例

```

    x - VxLAN group, c - PFP-SA cache created entry,
    * - determined by Assert, # - iif-starg configured on rpf intf
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 225.0.0.101), 00:04:02/stopped, RP 172.16.255.255, flags: SP
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list: Null

(172.16.254.4, 225.0.0.101), 00:00:34/00:02:25, flags: PA
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.14.4
  Outgoing interface list: Null

(172.16.254.3, 225.0.0.101), 00:00:46/00:02:13, flags: PA
  Incoming interface: GigabitEthernet1/0/1, RPF nbr 172.16.13.3
  Outgoing interface list: Null

```

スパインスイッチ 2

次に、スパインスイッチ 2 での **show ip ospf neighbor** コマンドの出力例を示します。

```
Spine-02# show ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
172.16.255.4	0	FULL/ -	00:00:37	172.16.24.4	GigabitEthernet1/0/2
172.16.255.3	0	FULL/ -	00:00:32	172.16.23.3	GigabitEthernet1/0/1

次に、スパインスイッチ 2 での **show bgp l2vpn evpn summary** コマンドの出力例を示します。

```
Spine-02# show bgp l2vpn evpn summary
```

```

BGP router identifier 172.16.255.2, local AS number 65001
BGP table version is 91, main routing table version 91
18 network entries using 6192 bytes of memory
38 path entries using 7904 bytes of memory
27/13 BGP path/bestpath attribute entries using 7776 bytes of memory
1 BGP AS-PATH entries using 24 bytes of memory
12 BGP extended community entries using 640 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
BGP using 22536 total bytes of memory
BGP activity 20/2 prefixes, 76/38 paths, scan interval 60 secs
18 networks peaked at 20:36:02 May 27 2020 UTC (5d18h ago)

```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
172.16.255.1	4	65001	9183	9196	91	0	0	5d18h	18
172.16.255.3	4	65002	8443	8442	91	0	0	5d07h	9
172.16.255.4	4	65002	8442	8446	91	0	0	5d07h	11

次に、ホストデバイス 1 のスパインスイッチ 2 での **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```
Spine-02# bgp l2vpn evpn route-type 2 0 44d3ca286cc1 10.1.101.12
```

```

BGP routing table entry for [2][172.16.254.4:101][0][48][44D3CA286CC1][32][10.1.101.12]/24,
version 74

```

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

```
  Advertised to update-groups:
```

```
    3          4
```



```

Refresh Epoch 1
65002
 172.16.254.4 (metric 2) (via default) from 172.16.255.1 (172.16.255.1)
  Origin incomplete, metric 0, localpref 100, valid, internal
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
    Router MAC:7C21.0DBD.9548
  rx pathid: 0, tx pathid: 0
  net: 0x7FB64B5D07C0, path: 0x7FB64B5DFA08, pathext: 0x0
  flags: net: 0x0, path: 0x3, pathext: 0x0
  Updated on May 28 2020 07:30:01 UTC
Refresh Epoch 1
65002
 172.16.254.4 (metric 2) (via default) from 172.16.255.4 (172.16.255.4)
  Origin incomplete, metric 0, localpref 100, valid, external, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
    Router MAC:7C21.0DBD.9548
  rx pathid: 0, tx pathid: 0x0
  net: 0x7FB64B5D07C0, path: 0x7FB64B5E01A0, pathext: 0x7FB64B5F1498
  flags: net: 0x0, path: 0x3, pathext: 0x81
  Updated on May 28 2020 07:28:25 UTC

```

次に、ホストデバイス2のスパインスイッチ2に対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```

Spine-02# show bgp l2vpn evpn route-type 2 0 f4cfe24334c1 10.1.101.11
BGP routing table entry for [2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24,
version 88
Paths: (2 available, best #1, table EVPN-BGP-Table)
  Advertised to update-groups:
    3      4
Refresh Epoch 2
65002
 172.16.254.3 (metric 2) (via default) from 172.16.255.3 (172.16.255.3)
  Origin incomplete, metric 0, localpref 100, valid, external, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
    Router MAC:10B3.D56A.8FC8
  rx pathid: 0, tx pathid: 0x0
  net: 0x7FB64B5D1580, path: 0x7FB64B5E0D70, pathext: 0x7FB64B5F19D8
  flags: net: 0x0, path: 0x3, pathext: 0x81
  Updated on May 28 2020 07:29:33 UTC
Refresh Epoch 1
65002
 172.16.254.3 (metric 2) (via default) from 172.16.255.1 (172.16.255.1)
  Origin incomplete, metric 0, localpref 100, valid, internal
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
    Router MAC:10B3.D56A.8FC8
  rx pathid: 0, tx pathid: 0
  net: 0x7FB64B5D1580, path: 0x7FB64B5E0AE8, pathext: 0x0
  flags: net: 0x0, path: 0x3, pathext: 0x0
  Updated on May 28 2020 07:28:18 UTC

```

次に、スパインスイッチ2での **show ip pim neighbor** コマンドの出力例を示します。

```

Spine-02# show ip pim neighbor
PIM Neighbor Table
Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority,
      P - Proxy Capable, S - State Refresh Capable, G - GenID Capable,
      L - DR Load-balancing Capable

```

```
Neighbor      Interface      Uptime/Expires  Ver  DR
Address
172.16.23.3   GigabitEthernet1/0/1  5d19h/00:01:33  v2   1 / DR S P G
172.16.24.4   GigabitEthernet1/0/2  5d19h/00:01:18  v2   1 / DR S P G
```

次に、スパインスイッチ2での **show ip pim rp mapping** コマンドの出力例を示します。

```
Spine-02# show ip pim rp mapping
PIM Group-to-RP Mappings
```

```
Group(s): 224.0.0.0/4, Static
RP: 172.16.255.255 (?)
```

次に、スパインスイッチ2での **show ip ro** コマンドの出力例を示します。

```
Spine-02# show ip ro 172.16.255.255
Routing entry for 172.16.255.255/32
  Known via "connected", distance 0, metric 0 (connected, via interface)
  Routing Descriptor Blocks:
  * directly connected, via Loopback2
    Route metric is 0, traffic share count is 1
```

次に、スパインスイッチ2での **show ip msdp summary** コマンドの出力例を示します。

```
Spine-02# show ip msdp summary
MSDP Peer Status Summary
Peer Address      AS      State      Uptime/  Reset SA      Peer Name
                  Downtime Count Count
172.16.254.1      65001  Up         5d19h    0      2      ?
```

次に、スパインスイッチ2での **show ip msdp sa-cache** コマンドの出力例を示します。

```
Spine-02# show ip msdp sa-cache
MSDP Source-Active Cache - 2 entries
(172.16.254.3, 225.0.0.101), RP 172.16.255.255, BGP/AS 0, 00:04:07/00:05:17, Peer
172.16.254.1
(172.16.254.4, 225.0.0.101), RP 172.16.255.255, BGP/AS 0, 00:03:45/00:05:20, Peer
172.16.254.1
```

次に、スパインスイッチ2での **show ip mroute** コマンドの出力例を示します。

```
Spine-02# show ip mroute 225.0.0.101
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
L - Local, P - Pruned, R - RP-bit set, F - Register flag,
T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
U - URD, I - Received Source Specific Host Report,
Z - Multicast Tunnel, z - MDT-data group sender,
Y - Joined MDT-data group, y - Sending to MDT-data group,
G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
Q - Received BGP S-A Route, q - Sent BGP S-A Route,
V - RD & Vector, v - Vector, p - PIM Joins on route,
x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
```

```

Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 225.0.0.101), 5d19h/00:03:21, RP 172.16.255.255, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 5d19h/00:03:15
    GigabitEthernet1/0/1, Forward/Sparse, 5d19h/00:03:21

(172.16.254.4, 225.0.0.101), 00:00:40/00:02:19, flags: A
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.4
  Outgoing interface list:
    GigabitEthernet1/0/1, Forward/Sparse, 00:00:40/00:03:21

(172.16.254.3, 225.0.0.101), 00:00:52/00:02:07, flags: A
  Incoming interface: GigabitEthernet1/0/1, RPF nbr 172.16.23.3
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 00:00:52/00:03:15

```

リーフスイッチ 1

次に、リーフスイッチ 1 での **show ip ospf neighbor** コマンドの出力例を示します。

```
Leaf-01# show ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
172.16.255.2	0	FULL/ -	00:00:38	172.16.23.2	GigabitEthernet1/0/2
172.16.255.1	0	FULL/ -	00:00:32	172.16.13.1	GigabitEthernet1/0/1

次に、リーフスイッチ 1 での **show bgp l2vpn evpn summary** コマンドの出力例を示します。

```
Leaf-01# show bgp l2vpn evpn summary
```

```

BGP router identifier 172.16.255.3, local AS number 65002
BGP table version is 32, main routing table version 32
27 network entries using 9288 bytes of memory
38 path entries using 7904 bytes of memory
16/15 BGP path/bestpath attribute entries using 4608 bytes of memory
1 BGP AS-PATH entries using 40 bytes of memory
13 BGP extended community entries using 664 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
BGP using 22504 total bytes of memory
BGP activity 395/362 prefixes, 918/872 paths, scan interval 60 secs
27 networks peaked at 13:15:47 May 26 2020 UTC (1w0d ago)

```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
172.16.255.1	4	65001	8457	8446	32	0	0	5d07h	9
172.16.255.2	4	65001	8443	8444	32	0	0	5d07h	11

次に、ルートタイプ 2 のリーフスイッチ 1 とホストデバイス 2 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```
Leaf-01# show bgp l2vpn evpn route-type 2 0 44d3ca286cc1 10.1.101.12
```

```

BGP routing table entry for [2][172.16.254.3:101][0][48][44D3CA286CC1][32][10.1.101.12]/24,
version 22
Paths: (1 available, best #1, table evi_101)
  Not advertised to any peer
  Refresh Epoch 1
  65001 65002, imported path from

```

```
[2][172.16.254.4:101][0][48][44D3CA286CC1][32][10.1.101.12]/24 (global)
 172.16.254.4 (metric 3) (via default) from 172.16.255.1 (172.16.255.1)
  Origin incomplete, localpref 100, valid, external, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
  Router MAC:7C21.0DBD.9548
  rx pathid: 0, tx pathid: 0x0
  net: 0x7F575E47B150, path: 0x7F575E1EF800, pathext: 0x7F575E201C08, exp_net:
  0x7F575E479470
  flags: net: 0x0, path: 0x40000000000003, pathext: 0x81
  Updated on May 28 2020 07:25:32 UTC
BGP routing table entry for [2][172.16.254.4:101][0][48][44D3CA286CC1][32][10.1.101.12]/24,
version 10
Paths: (2 available, best #2, table EVPN-BGP-Table)
  Advertised to update-groups:
    19
  Refresh Epoch 2
  65001 65002
  172.16.254.4 (metric 3) (via default) from 172.16.255.2 (172.16.255.2)
  Origin incomplete, localpref 100, valid, external
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
  Router MAC:7C21.0DBD.9548
  rx pathid: 0, tx pathid: 0
  net: 0x7F575E479470, path: 0x7F575E1EFD10, pathext: 0x0
  flags: net: 0x0, path: 0x3, pathext: 0x0
  Updated on May 28 2020 07:26:48 UTC
  Refresh Epoch 1
  65001 65002
  172.16.254.4 (metric 3) (via default) from 172.16.255.1 (172.16.255.1)
  Origin incomplete, localpref 100, valid, external, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
  Router MAC:7C21.0DBD.9548
```

次に、ルートタイプ2のリーフスイッチ1とホストデバイス1のIPアドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```
Leaf-01# show bgp l2vpn evpn route-type 2 0 f4cfe24334c1 10.1.101.11
BGP routing table entry for [2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24,
version 4
Paths: (1 available, best #1, table evi_101)
  Advertised to update-groups:
    19
  Refresh Epoch 1
  Local
  :: (via default) from 0.0.0.0 (172.16.255.3)
  Origin incomplete, localpref 100, weight 32768, valid, sourced, local, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
  Router MAC:10B3.D56A.8FC8
  Local irb vxlan vtep:
  vrf:green, l3-vni:50901
  local router mac:10B3.D56A.8FC8
  core-irb interface:Vlan901
  vtep-ip:172.16.254.3
  rx pathid: 0, tx pathid: 0x0
  net: 0x7F575E479B50, path: 0x7F575E1F0580, pathext: 0x7F575E201CC8
  flags: net: 0x0, path: 0x40000280000003, pathext: 0x81
  Updated on May 28 2020 07:25:30 UTC
```

次に、リーフスイッチ 1 での **show ip pim neighbor** コマンドの出力例を示します。

```
Leaf-01# show ip pim neighbor
PIM Neighbor Table
Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority,
      P - Proxy Capable, S - State Refresh Capable, G - GenID Capable,
      L - DR Load-balancing Capable
Neighbor          Interface                Uptime/Expires    Ver   DR
Address           Address                  Address            Ver   Prio/Mode
172.16.13.1       GigabitEthernet1/0/1     5d19h/00:01:38    v2    1 / S P G
172.16.23.2       GigabitEthernet1/0/2     5d19h/00:01:17    v2    1 / S P G
```

次に、リーフスイッチ 1 での **show ip pim rp mapping** コマンドの出力例を示します。

```
Leaf-01# show ip pim rp mapping
PIM Group-to-RP Mappings

Group(s): 224.0.0.0/4, Static
          RP: 172.16.255.255 (?)
```

次に、リーフスイッチ 1 での **show ip ro** コマンドの出力例を示します。

```
Leaf-01# show ip ro 172.16.255.255
Routing entry for 172.16.255.255/32
  Known via "ospf 1", distance 110, metric 2, type intra area
  Last update from 172.16.23.2 on GigabitEthernet1/0/2, 5d19h ago
  Routing Descriptor Blocks:
    172.16.23.2, from 172.16.255.2, 5d19h ago, via GigabitEthernet1/0/2
      Route metric is 2, traffic share count is 1
    * 172.16.13.1, from 172.16.255.1, 5d19h ago, via GigabitEthernet1/0/1
      Route metric is 2, traffic share count is 1
```

次に、リーフスイッチ 1 での **show ip rpf** コマンドの出力例を示します。

```
Leaf-01# show ip rpf 172.16.255.255
RPF information for ? (172.16.255.255)
  RPF interface: GigabitEthernet1/0/2
  RPF neighbor: ? (172.16.23.2)
  RPF route/mask: 172.16.255.255/32
  RPF type: unicast (ospf 1)
  Doing distance-preferred lookups across tables
  RPF topology: ipv4 multicast base, originated from ipv4 unicast base
```

次に、リーフスイッチ 1 での **show ip mroute** コマンドの出力例を示します。

```
Leaf-01# show ip mroute 225.0.0.101
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
       L - Local, P - Pruned, R - RP-bit set, F - Register flag,
       T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
       X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
       U - URD, I - Received Source Specific Host Report,
       Z - Multicast Tunnel, z - MDT-data group sender,
       Y - Joined MDT-data group, y - Sending to MDT-data group,
       G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
       N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
       Q - Received BGP S-A Route, q - Sent BGP S-A Route,
       V - RD & Vector, v - Vector, p - PIM Joins on route,
       x - VxLAN group, c - PFF-SA cache created entry,
       * - determined by Assert, # - iif-starg configured on rpf intf
```

```

Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 225.0.0.101), 7w4d/stopped, RP 172.16.255.255, flags: SJCFx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse-Dense, 1w0d/00:00:40

(172.16.254.4, 225.0.0.101), 00:01:22/00:01:37, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse-Dense, 00:01:22/00:01:37

(172.16.254.3, 225.0.0.101), 00:01:35/00:01:24, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 00:01:35/00:02:53

```

リーフスイッチ 2

次に、リーフスイッチ 2 での **show ip ospf neighbor** コマンドの出力例を示します。

```
Leaf-02# show ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
172.16.255.2	0	FULL/ -	00:00:34	172.16.24.2	GigabitEthernet1/0/2
172.16.255.1	0	FULL/ -	00:00:31	172.16.14.1	GigabitEthernet1/0/1

次に、リーフスイッチ 2 での **show bgp l2vpn evpn summary** コマンドの出力例を示します。

```
Leaf-02# show bgp l2vpn evpn summary
```

```

BGP router identifier 172.16.255.4, local AS number 65002
BGP table version is 28, main routing table version 28
25 network entries using 8600 bytes of memory
34 path entries using 7072 bytes of memory
16/15 BGP path/bestpath attribute entries using 4608 bytes of memory
1 BGP AS-PATH entries using 40 bytes of memory
13 BGP extended community entries using 664 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
BGP using 20984 total bytes of memory
BGP activity 199/168 prefixes, 638/596 paths, scan interval 60 secs
25 networks peaked at 13:20:44 May 26 2020 UTC (1w0d ago)

```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
172.16.255.1	4	65001	8449	8447	28	0	0	5d07h	9
172.16.255.2	4	65001	8448	8443	28	0	0	5d07h	7

次に、ルートタイプ 2 のリーフスイッチ 2 とホストデバイス 1 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```
Leaf-02# show bgp l2vpn evpn route-type 2 0 f4cfe24334c1 10.1.101.11
```

```

BGP routing table entry for [2] [172.16.254.3:101] [0] [48] [F4CFE24334C1] [32] [10.1.101.11]/24,
version 4

```

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

```
  Advertised to update-groups:
```

```
  7
```

```

Refresh Epoch 2
65001 65002
  172.16.254.3 (metric 3) (via default) from 172.16.255.1 (172.16.255.1)
  Origin incomplete, localpref 100, valid, external
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
    Router MAC:10B3.D56A.8FC8
  rx pathid: 0, tx pathid: 0
  net: 0x7F84BB3C4290, path: 0x7F84BB49BF98, pathext: 0x0
  flags: net: 0x0, path: 0x3, pathext: 0x0
  Updated on May 28 2020 07:31:42 UTC
Refresh Epoch 1
65001 65002
  172.16.254.3 (metric 3) (via default) from 172.16.255.2 (172.16.255.2)
  Origin incomplete, localpref 100, valid, external, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
    Router MAC:10B3.D56A.8FC8
  rx pathid: 0, tx pathid: 0x0
  net: 0x7F84BB3C4290, path: 0x7F84BB49D9C0, pathext: 0x7F84BB594138
  flags: net: 0x0, path: 0x3, pathext: 0x81
  Updated on May 28 2020 07:31:37 UTC
BGP routing table entry for [2][172.16.254.4:101][0][48][F4CFE24334C1][32][10.1.101.11]/24,
version 20
Paths: (1 available, best #1, table evi_101)
  Not advertised to any peer
Refresh Epoch 1
65001 65002, imported path from
[2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24 (global)
  172.16.254.3 (metric 3) (via default) from 172.16.255.2 (172.16.255.2)
  Origin incomplete, localpref 100, valid, external, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
    Router MAC:10B3.D56A.8FC8

```

次に、ルートタイプ 2 のリーフスイッチ 2 とホストデバイス 2 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```

Leaf-02# show bgp l2vpn evpn route-type 2 0 44d3ca286cc1 10.1.101.12
BGP routing table entry for [2][172.16.254.4:101][0][48][44D3CA286CC1][32][10.1.101.12]/24,
version 10
Paths: (1 available, best #1, table evi_101)
  Advertised to update-groups:
    7
Refresh Epoch 1
Local
  :: (via default) from 0.0.0.0 (172.16.255.4)
  Origin incomplete, localpref 100, weight 32768, valid, sourced, local, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65002:101 ENCAP:8
    Router MAC:7C21.0DBD.9548
Local irb vxlan vtep:
  vrf:green, l3-vni:50901
  local router mac:7C21.0DBD.9548
  core-irb interface:Vlan901
  vtep-ip:172.16.254.4
  rx pathid: 0, tx pathid: 0x0
  net: 0x7F84BB3C4970, path: 0x7F84BB49CDF0, pathext: 0x7F84BB593CB8
  flags: net: 0x0, path: 0x4000028000003, pathext: 0x81
  Updated on May 28 2020 07:30:04 UTC

```

次に、リーフスイッチ 2 での **show ip pim neighbor** コマンドの出力例を示します。

```
Leaf-02# show ip pim neighbor
PIM Neighbor Table
Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority,
      P - Proxy Capable, S - State Refresh Capable, G - GenID Capable,
      L - DR Load-balancing Capable
Neighbor          Interface          Uptime/Expires    Ver   DR
Address           Address           Address           Address Address
172.16.14.1       GigabitEthernet1/0/1 5d19h/00:01:22    v2    1 / S P G
172.16.24.2       GigabitEthernet1/0/2 5d19h/00:01:27    v2    1 / S P G
```

次に、リーフスイッチ 2 での コマンドの出力例を示します。

```
Leaf-02# show ip pim rp mapping
PIM Group-to-RP Mappings

Group(s): 224.0.0.0/4, Static
          RP: 172.16.255.255 (?)
```

次に、リーフスイッチ 2 での **show ip ro** コマンドの出力例を示します。

```
Leaf-02# show ip ro 172.16.255.255
Routing entry for 172.16.255.255/32
  Known via "ospf 1", distance 110, metric 2, type intra area
  Last update from 172.16.24.2 on GigabitEthernet1/0/2, 5d19h ago
  Routing Descriptor Blocks:
    172.16.24.2, from 172.16.255.2, 5d19h ago, via GigabitEthernet1/0/2
      Route metric is 2, traffic share count is 1
    * 172.16.14.1, from 172.16.255.1, 5d19h ago, via GigabitEthernet1/0/1
      Route metric is 2, traffic share count is 1
```

次に、リーフスイッチ 2 での **show ip rpf** コマンドの出力例を示します。

```
Leaf-02# show ip rpf 172.16.255.255
RPF information for ? (172.16.255.255)
  RPF interface: GigabitEthernet1/0/2
  RPF neighbor: ? (172.16.24.2)
  RPF route/mask: 172.16.255.255/32
  RPF type: unicast (ospf 1)
  Doing distance-preferred lookups across tables
  RPF topology: ipv4 multicast base, originated from ipv4 unicast base
```

次に、リーフスイッチ 2 での **show ip mroute** コマンドの出力例を示します。

```
Leaf-02# show ip mroute 225.0.0.101
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
       L - Local, P - Pruned, R - RP-bit set, F - Register flag,
       T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
       X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
       U - URD, I - Received Source Specific Host Report,
       Z - Multicast Tunnel, z - MDT-data group sender,
       Y - Joined MDT-data group, y - Sending to MDT-data group,
       G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
       N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
       Q - Received BGP S-A Route, q - Sent BGP S-A Route,
       V - RD & Vector, v - Vector, p - PIM Joins on route,
       x - VxLAN group, c - PFP-SA cache created entry,
```



```

* - determined by Assert, # - iif-starg configured on rpf intf
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 225.0.0.101), 1w5d/stopped, RP 172.16.255.255, flags: SJCfX
Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
Outgoing interface list:
Tunnel0, Forward/Sparse-Dense, 1w5d/00:00:06

(172.16.254.4, 225.0.0.101), 00:01:56/00:01:03, flags: FTx
Incoming interface: Loopback1, RPF nbr 0.0.0.0
Outgoing interface list:
GigabitEthernet1/0/2, Forward/Sparse, 00:01:56/00:02:32

(172.16.254.3, 225.0.0.101), 00:02:09/00:00:50, flags: JTx
Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
Outgoing interface list:
Tunnel0, Forward/Sparse-Dense, 00:02:09/00:00:50

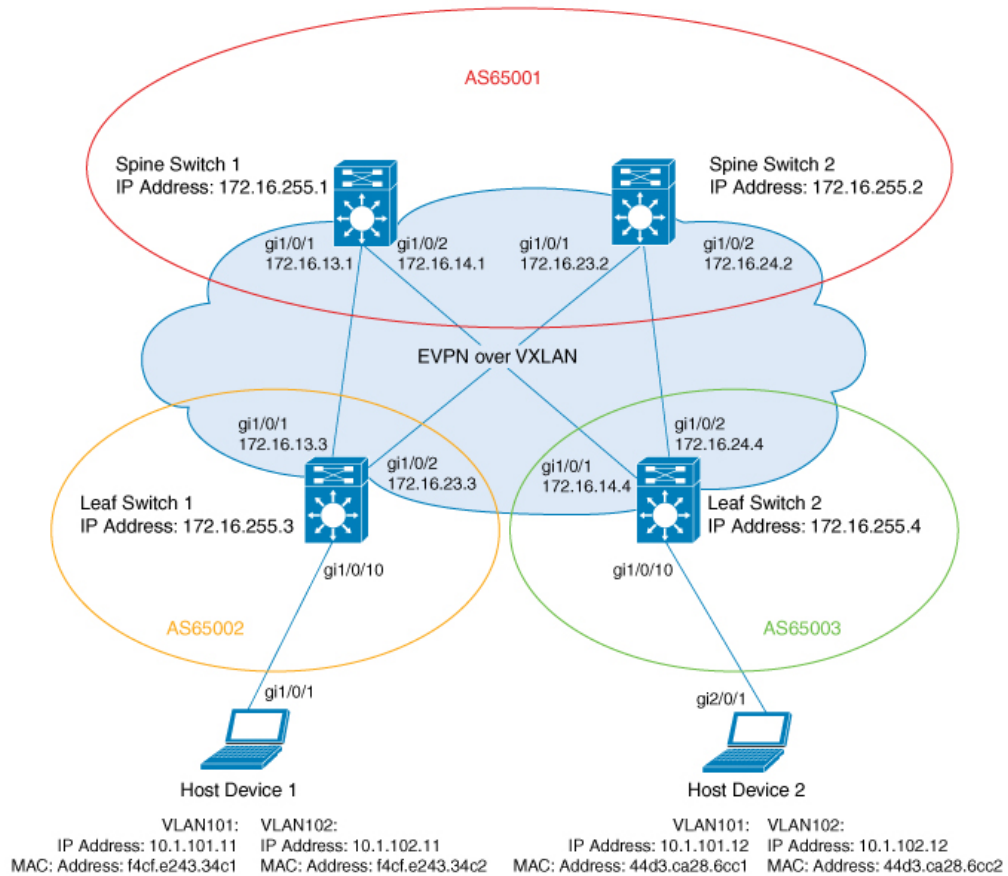
```

スパインスイッチが自律システム内にあり、各リーフスイッチが別の自律システム内にある場合の eBGP を使用したスパインスイッチの設定例

この項では、スパインスイッチがある自律システム内にあり、リーフスイッチが別の自律システム内にある場合に、eBGP を使用して BGP EVPN VXLAN ファブリックでスパインスイッチを設定する例を示します。次に、スパインスイッチを設定し、下に示すトポロジの設定を確認する例を示します。

スパインスイッチが自律システム内にあり、各リーフスイッチが別の自律システム内にある場合の eBGP を使用したスパインスイッチの設定例

図3:ある自律システムにスパインスイッチがあり、別の自律システムに各リーフスイッチがある BGPEVPNVXLANファブリック



このトポロジでは、2 台のリーフスイッチ（リーフスイッチ 1 とリーフスイッチ 2）と 2 台のスパインスイッチ（スパインスイッチ 1 とスパインスイッチ 2）を備えた EVPN VXLAN ネットワークを示しています。スパインスイッチ 1 とスパインスイッチ 2 は自律システム AS65001 にあります。リーフスイッチ 1 は自律システム AS65002 にあります。リーフスイッチ 2 は自律システム AS65003 にあります。スパインスイッチ 1 とスパインスイッチ 2 は BGP ルートサーバーであり、互いのルートリフレクタイアントではありません。Multicast Source Discovery Protocol (MSDP) は、送信元を同期するためにスパインスイッチ 1 とスパインスイッチ 2 の間に設定されます。Protocol Independent Multicast (PIM) がリーフスイッチとスパインスイッチを接続するインターフェイスで有効になっています。静的 RP はネットワークで設定され、アンダーレイネットワークはマルチキャスト転送メカニズムを使用して BUM トラフィックを転送します。



(注) 別の自律システム番号を持つ BGP の更新を処理できるようにするには、リーフスイッチで L2VPN EVPN アドレスファミリー コンフィギュレーション モードで `rewrite-evpn-rt-asn` コマンドを実行する必要があります。



(注) スパインスイッチで **no bgp default route-target filter** コマンドをルータ コンフィギュレーション モードで手動で実行する必要があります。



(注) ファブリックを機能させるには、リーフスイッチとスパインスイッチで eBGP マルチホップを設定する必要があります。

次の表に、上記のトポロジのデバイスの設定例を示します。

スパインスイッチが自律システム内にあり、各リーフスイッチが別の自律システム内にある場合の eBGP を使用したスパインスイッチの設定例

表 5: スパインスイッチがある自律システムにあり、各リーフスイッチが別の自律システムにある場合の eBGP を使用したスパインスイッチ 1 および スパインスイッチ 2 の設定

スパインスイッチ 1	スパインスイッチ 2
<pre>Spine-01# show running-config hostname Spine-01 ! ip routing ! ip multicast-routing ! interface Loopback0 ip address 172.16.255.1 255.255.255.255 ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.1 255.255.255.255 ip ospf 1 area 0 ! interface Loopback2 ip address 172.16.255.255 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface GigabitEthernet1/0/1 no switchport ip address 172.16.13.1 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface GigabitEthernet1/0/2 no switchport ip address 172.16.14.1 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! router ospf 1 router-id 172.16.255.1 ! router bgp 65001 bgp router-id 172.16.255.1 bgp log-neighbor-changes no bgp default ipv4-unicast no bgp default route-target filter neighbor 172.16.255.2 remote-as 65001 neighbor 172.16.255.2 update-source Loopback0 neighbor 172.16.255.3 remote-as 65002 neighbor 172.16.255.3 ebgp-multihop 255 neighbor 172.16.255.3 update-source Loopback0 neighbor 172.16.255.4 remote-as 65003 neighbor 172.16.255.4 ebgp-multihop 255 neighbor 172.16.255.4 update-source Loopback0 ! address-family ipv4 exit-address-family !</pre>	<pre>Spine-02# show running-config hostname Spine-02 ! ip routing ! ip multicast-routing ! interface Loopback0 ip address 172.16.255.2 255.255.255.255 ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.2 255.255.255.255 ip ospf 1 area 0 ! interface Loopback2 ip address 172.16.255.255 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface GigabitEthernet1/0/1 no switchport ip address 172.16.23.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface GigabitEthernet1/0/2 no switchport ip address 172.16.24.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! router ospf 1 router-id 172.16.255.2 ! router bgp 65001 bgp router-id 172.16.255.2 bgp log-neighbor-changes no bgp default ipv4-unicast no bgp default route-target filter neighbor 172.16.255.1 remote-as 65001 neighbor 172.16.255.1 update-source Loopback0 neighbor 172.16.255.3 remote-as 65002 neighbor 172.16.255.3 ebgp-multihop 255 neighbor 172.16.255.3 update-source Loopback0 neighbor 172.16.255.4 remote-as 65003 neighbor 172.16.255.4 ebgp-multihop 255 neighbor 172.16.255.4 update-source Loopback0 ! address-family ipv4 exit-address-family !</pre>

スパインスイッチ 1	スパインスイッチ 2
<pre> address-family l2vpn evpn rewrite-evpn-rt-asn neighbor 172.16.255.2 activate neighbor 172.16.255.2 send-community both neighbor 172.16.255.2 route-map BGP-NHU out neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-map BGP-NHU out neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-map BGP-NHU out exit-address-family ! ip pim rp-address 172.16.255.255 ip pim ssm default ip msdp peer 172.16.254.2 connect-source Loopback1 remote-as 65001 ip msdp cache-sa-state ! route-map BGP-NHU permit 10 set ip next-hop unchanged ! end Spine-01# </pre>	<pre> address-family l2vpn evpn rewrite-evpn-rt-asn neighbor 172.16.255.1 activate neighbor 172.16.255.1 send-community both neighbor 172.16.255.1 route-map BGP-NHU out neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-map BGP-NHU out neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-map BGP-NHU out exit-address-family ! ip pim rp-address 172.16.255.255 ip pim ssm default ip msdp peer 172.16.254.1 connect-source Loopback1 remote-as 65001 ip msdp cache-sa-state ! route-map BGP-NHU permit 10 set ip next-hop unchanged ! end Spine-02# </pre>

スパインスイッチが自律システム内にあり、各リーフスイッチが別の自律システム内にある場合の **eBGP** を使用したスパインスイッチの設定例

表 6: スパインスイッチがある自律システムにあり、各リーフスイッチが別の自律システムにある場合の **eBGP** を使用したリーフスイッチ 1 およびリーフスイッチ 2 の設定

リーフスイッチ 1	リーフスイッチ 2
-----------	-----------

リーフスイッチ 1	リーフスイッチ 2
<pre>Leaf-01# show running-config hostname Leaf-01 ! vrf definition green rd 1:1 ! address-family ipv4 route-target export 1:1 route-target import 1:1 route-target export 1:1 stitching route-target import 1:1 stitching exit-address-family ! address-family ipv6 route-target export 1:1 route-target import 1:1 route-target export 1:1 stitching route-target import 1:1 stitching exit-address-family ! ip routing ! ip multicast-routing ! l2vpn evpn replication-type static router-id Loopback1 default-gateway advertise ! l2vpn evpn instance 101 vlan-based encapsulation vxlan replication-type static ! l2vpn evpn instance 102 vlan-based encapsulation vxlan replication-type ingress ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 ! interface Loopback0 ip address 172.16.255.3 255.255.255.255 ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.3 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface GigabitEthernet1/0/1 no switchport ip address 172.16.13.3 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0</pre>	<pre>Leaf-02# show running-config hostname Leaf-02 ! vrf definition green rd 1:1 ! address-family ipv4 route-target export 1:1 route-target import 1:1 route-target export 1:1 stitching route-target import 1:1 stitching exit-address-family ! address-family ipv6 route-target export 1:1 route-target import 1:1 route-target export 1:1 stitching route-target import 1:1 stitching exit-address-family ! ip routing ! ip multicast-routing ! l2vpn evpn replication-type static router-id Loopback1 default-gateway advertise ! l2vpn evpn instance 101 vlan-based encapsulation vxlan ! l2vpn evpn instance 102 vlan-based encapsulation vxlan replication-type ingress ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 ! interface Loopback0 ip address 172.16.255.4 255.255.255.255 ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.4 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface GigabitEthernet1/0/1 no switchport ip address 172.16.14.4 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 !</pre>

スパインスイッチが自律システム内にあり、各リーフスイッチが別の自律システム内にある場合の eBGP を使用したスパインスイッチの設定例

リーフスイッチ 1	リーフスイッチ 2
<pre> interface GigabitEthernet1/0/2 no switchport ip address 172.16.23.3 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ipv6 enable no autostate ! interface nve1 no ip address source-interface Loopback1 host-reachability protocol bgp member vni 10101 mcast-group 225.0.0.101 member vni 10102 ingress-replication member vni 50901 vrf green ! router ospf 1 router-id 172.16.255.3 ! router bgp 65002 bgp log-neighbor-changes no bgp default ipv4-unicast neighbor 172.16.255.1 remote-as 65001 neighbor 172.16.255.1 ebgp-multihop 255 neighbor 172.16.255.1 update-source Loopback0 neighbor 172.16.255.2 remote-as 65001 neighbor 172.16.255.2 ebgp-multihop 255 neighbor 172.16.255.2 update-source Loopback0 ! address-family ipv4 exit-address-family ! address-family l2vpn evpn rewrite-evpn-rt-asn neighbor 172.16.255.1 activate neighbor 172.16.255.1 send-community both neighbor 172.16.255.2 activate neighbor 172.16.255.2 send-community both exit-address-family ! address-family ipv4 vrf green advertise l2vpn evpn redistribute connected redistribute static exit-address-family ! </pre>	<pre> interface GigabitEthernet1/0/2 no switchport ip address 172.16.24.4 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ipv6 enable no autostate ! interface nve1 no ip address source-interface Loopback1 host-reachability protocol bgp member vni 10101 mcast-group 225.0.0.101 member vni 50901 vrf green member vni 10102 ingress-replication ! router ospf 1 router-id 172.16.255.4 ! router bgp 65003 bgp log-neighbor-changes no bgp default ipv4-unicast neighbor 172.16.255.1 remote-as 65001 neighbor 172.16.255.1 ebgp-multihop 255 neighbor 172.16.255.1 update-source Loopback0 neighbor 172.16.255.2 remote-as 65001 neighbor 172.16.255.2 ebgp-multihop 255 neighbor 172.16.255.2 update-source Loopback0 ! address-family ipv4 exit-address-family ! address-family l2vpn evpn rewrite-evpn-rt-asn neighbor 172.16.255.1 activate neighbor 172.16.255.1 send-community both neighbor 172.16.255.2 activate neighbor 172.16.255.2 send-community both exit-address-family ! address-family ipv4 vrf green advertise l2vpn evpn redistribute connected redistribute static exit-address-family ! </pre>

リーフスイッチ 1	リーフスイッチ 2
<pre>address-family ipv6 vrf green redistribute connected redistribute static advertise l2vpn evpn exit-address-family ! ip pim rp-address 172.16.255.255 ip pim ssm default ! end Leaf-01#</pre>	<pre>address-family ipv6 vrf green redistribute connected redistribute static advertise l2vpn evpn exit-address-family ! ip pim rp-address 172.16.255.255 ! end Leaf-02#</pre>

次に、上記の表で設定されたトポロジ内のデバイスでの **show** コマンドの出力例を示します。

スパインスイッチ 1

次に、スパインスイッチ 1 での **show ip ospf neighbor** コマンドの出力例を示します。

```
Spine-01# show ip ospf neighbor
Neighbor ID      Pri   State           Dead Time   Address        Interface
172.16.255.4     0    FULL/ -         00:00:34   172.16.14.4   GigabitEthernet1/0/2
172.16.255.3     0    FULL/ -         00:00:38   172.16.13.3   GigabitEthernet1/0/1
```

次に、スパインスイッチ 1 での **show bgp l2vpn evpn summary** コマンドの出力例を示します。

```
Spine-01# show bgp l2vpn evpn summary
BGP router identifier 172.16.255.1, local AS number 65001
BGP table version is 19, main routing table version 19
18 network entries using 6192 bytes of memory
38 path entries using 7904 bytes of memory
45/15 BGP path/bestpath attribute entries using 12960 bytes of memory
2 BGP AS-PATH entries using 48 bytes of memory
24 BGP extended community entries using 1280 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
BGP using 28384 total bytes of memory
BGP activity 94/76 prefixes, 293/255 paths, scan interval 60 secs
18 networks peaked at 21:10:53 Jun 4 2020 UTC (2d23h ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.2  4      65001   28     27     19     0    0 00:08:49    18
172.16.255.3  4      65002   35     27     19     0    0 00:08:54     9
172.16.255.4  4      65003   34     27     19     0    0 00:08:54    11
```

次に、ルートタイプ 2 のスパインスイッチ 1 とホストデバイス 2 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```
Spine-01# show bgp l2vpn evpn route-type 2 0 44d3ca286cc1 10.1.101.12
BGP routing table entry for [2][172.16.254.4:101][0][48][44D3CA286CC1][32][10.1.101.12]/24,
version 10
Paths: (2 available, best #2, table EVPN-BGP-Table)
  Advertised to update-groups:
```

スパインスイッチが自律システム内にあり、各リーフスイッチが別の自律システム内にある場合の eBGP を使用したスパインスイッチの設定例

```

    11          13
Refresh Epoch 1
65003
  172.16.254.4 (metric 2) (via default) from 172.16.255.2 (172.16.255.2)
    Origin incomplete, metric 0, localpref 100, valid, internal
    EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
    Extended Community: RT:1:1 RT:65001:101 ENCAP:8
      Router MAC:7C21.0DBD.9548
      rx pathid: 0, tx pathid: 0
      net: 0x7F7898C7FEF0, path: 0x7F7898C8E578, pathext: 0x0
      flags: net: 0x0, path: 0x3, pathext: 0x0
      Updated on Jun 7 2020 20:42:32 UTC
Refresh Epoch 2
65003
  172.16.254.4 (metric 2) (via default) from 172.16.255.4 (172.16.255.4)
    Origin incomplete, metric 0, localpref 100, valid, external, best
    EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
    Extended Community: RT:1:1 RT:65001:101 ENCAP:8
      Router MAC:7C21.0DBD.9548
      rx pathid: 0, tx pathid: 0x0
      net: 0x7F7898C7FEF0, path: 0x7F7898C8E728, pathext: 0x7F7898CAE8E0
      flags: net: 0x0, path: 0x3, pathext: 0x81
      Updated on Jun 7 2020 20:41:30 UTC

```

次に、ルートタイプ 2 のスパインスイッチ 1 とホストデバイス 1 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力の例を示します。

```

Spine-01# show bgp l2vpn evpn route-type 2 0 f4cfe24334c1 10.1.101.11
BGP routing table entry for [2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24,
version 4
Paths: (2 available, best #2, table EVPN-BGP-Table)
  Advertised to update-groups:
    11          13
Refresh Epoch 1
65002
  172.16.254.3 (metric 2) (via default) from 172.16.255.2 (172.16.255.2)
    Origin incomplete, metric 0, localpref 100, valid, internal
    EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
    Extended Community: RT:1:1 RT:65001:101 ENCAP:8
      Router MAC:10B3.D56A.8FC8
      rx pathid: 0, tx pathid: 0
      net: 0x7F7898C7F290, path: 0x7F7898C8FEC8, pathext: 0x0
      flags: net: 0x0, path: 0x3, pathext: 0x0
      Updated on Jun 7 2020 20:42:32 UTC
Refresh Epoch 2
65002
  172.16.254.3 (metric 2) (via default) from 172.16.255.3 (172.16.255.3)
    Origin incomplete, metric 0, localpref 100, valid, external, best
    EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
    Extended Community: RT:1:1 RT:65001:101 ENCAP:8
      Router MAC:10B3.D56A.8FC8
      rx pathid: 0, tx pathid: 0x0
      net: 0x7F7898C7F290, path: 0x7F7898C8E218, pathext: 0x7F7898CAEE20
      flags: net: 0x0, path: 0x3, pathext: 0x81
      Updated on Jun 7 2020 20:41:30 UTC

```

次に、スパインスイッチ 1 での **show ip pim neighbor** コマンドの出力例を示します。

```

Spine-01# show ip pim neighbor
PIM Neighbor Table
Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority,
      P - Proxy Capable, S - State Refresh Capable, G - GenID Capable,

```

```

      L - DR Load-balancing Capable
Neighbor      Interface                Uptime/Expires   Ver   DR
Address
172.16.13.3   GigabitEthernet1/0/1   1w4d/00:01:37   v2    1 / DR S P G
172.16.14.4   GigabitEthernet1/0/2   1w4d/00:01:39   v2    1 / DR S P G

```

次に、スパインスイッチ 1 での **show ip pim rp mapping** コマンドの出力例を示します。

```

Spine-01# show ip pim rp mapping
PIM Group-to-RP Mappings

Group(s): 224.0.0.0/4, Static
RP: 172.16.255.255 (?)

```

次に、スパインスイッチ 1 での **show ip ro** コマンドの出力例を示します。

```

Spine-01# show ip ro 172.16.255.255
Routing entry for 172.16.255.255/32
  Known via "connected", distance 0, metric 0 (connected, via interface)
  Routing Descriptor Blocks:
    * directly connected, via Loopback2
      Route metric is 0, traffic share count is 1

```

次に、スパインスイッチ 1 での **show ip msdp summary** コマンドの出力例を示します。

```

Spine-01# show ip msdp summary
MSDP Peer Status Summary
Peer Address      AS      State      Uptime/  Reset SA      Peer Name
                  Downtime Count Count
172.16.254.2      65001  Up         1w4d    0      2      ?

```

次に、スパインスイッチ 1 での **show ip msdp sa-cache** コマンドの出力例を示します。

```

Spine-01# show ip msdp sa-cache
MSDP Source-Active Cache - 2 entries
(172.16.254.3, 225.0.0.101), RP 172.16.255.255, BGP/AS 0, 00:01:07/00:05:06, Peer
172.16.254.2
(172.16.254.4, 225.0.0.101), RP 172.16.255.255, BGP/AS 0, 00:00:45/00:05:14, Peer
172.16.254.2

```

次に、スパインスイッチ 1 での **show ip rpf** コマンドの出力例を示します。

```

Spine-01# show ip rpf 172.16.255.255
RPF information for ? (172.16.255.255)
  RPF interface: Loopback2
  RPF neighbor: ? (172.16.255.255) - directly connected
  RPF route/mask: 172.16.255.255/32
  RPF type: multicast (connected)
  Doing distance-preferred lookups across tables
  RPF topology: ipv4 multicast base

```

次に、スパインスイッチ 1 での **show ip mroute** コマンドの出力例を示します。

```

Spine-01# show ip mroute 225.0.0.101
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,

```

スパインスイッチが自律システム内にあり、各リーフスイッチが別の自律システム内にある場合の eBGP を使用したスパインスイッチの設定例

```

L - Local, P - Pruned, R - RP-bit set, F - Register flag,
T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
U - URD, I - Received Source Specific Host Report,
Z - Multicast Tunnel, z - MDT-data group sender,
Y - Joined MDT-data group, y - Sending to MDT-data group,
G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
Q - Received BGP S-A Route, q - Sent BGP S-A Route,
V - RD & Vector, v - Vector, p - PIM Joins on route,
x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 225.0.0.101), 00:01:07/stopped, RP 172.16.255.255, flags: SP
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list: Null

(172.16.254.4, 225.0.0.101), 00:00:45/00:02:14, flags: PA
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.14.4
  Outgoing interface list: Null

(172.16.254.3, 225.0.0.101), 00:01:07/00:01:52, flags: PA
  Incoming interface: GigabitEthernet1/0/1, RPF nbr 172.16.13.3
  Outgoing interface list: Null

```

スパインスイッチ 2

次に、スパインスイッチ 2 での **show ip ospf neighbor** コマンドの出力例を示します。

```

Spine-02# show ip ospf neighbor
Neighbor ID      Pri   State           Dead Time   Address        Interface
172.16.255.4    0    FULL/ -         00:00:32   172.16.24.4   GigabitEthernet1/0/2
172.16.255.3    0    FULL/ -         00:00:34   172.16.23.3   GigabitEthernet1/0/1

```

次に、スパインスイッチ 2 での **show bgp l2vpn evpn summary** コマンドの出力例を示します。

```

Spine-02# show bgp l2vpn evpn summary
BGP router identifier 172.16.255.2, local AS number 65001
BGP table version is 19, main routing table version 19
18 network entries using 6192 bytes of memory
38 path entries using 7904 bytes of memory
45/15 BGP path/bestpath attribute entries using 12960 bytes of memory
2 BGP AS-PATH entries using 48 bytes of memory
24 BGP extended community entries using 1280 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
BGP using 28384 total bytes of memory
BGP activity 56/38 prefixes, 244/206 paths, scan interval 60 secs
18 networks peaked at 21:11:25 Jun 4 2020 UTC (2d23h ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001   27     28     19    0    0 00:08:54    18
172.16.255.3  4      65002   30     27     19    0    0 00:08:54     9
172.16.255.4  4      65003   30     27     19    0    0 00:08:54    11

```

次に、ルートタイプ 2 のスパインスイッチ 2 とホストデバイス 2 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```
Spine-02# show bgp l2vpn evpn route-type 2 0 44d3ca286cc1 10.1.101.12
BGP routing table entry for [2][172.16.254.4:101][0][48][44D3CA286CC1][32][10.1.101.12]/24,
version 10
Paths: (2 available, best #2, table EVPN-BGP-Table)
  Advertised to update-groups:
    9          10
Refresh Epoch 1
65003
  172.16.254.4 (metric 2) (via default) from 172.16.255.1 (172.16.255.1)
  Origin incomplete, metric 0, localpref 100, valid, internal
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65001:101 ENCAP:8
  Router MAC:7C21.0DBD.9548
  rx pathid: 0, tx pathid: 0
  net: 0x7FB6494C8550, path: 0x7FB64B6D21A8, pathext: 0x0
  flags: net: 0x0, path: 0x3, pathext: 0x0
  Updated on Jun 7 2020 20:43:06 UTC
Refresh Epoch 2
65003
  172.16.254.4 (metric 2) (via default) from 172.16.255.4 (172.16.255.4)
  Origin incomplete, metric 0, localpref 100, valid, external, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65001:101 ENCAP:8
  Router MAC:7C21.0DBD.9548
  rx pathid: 0, tx pathid: 0x0
  net: 0x7FB6494C8550, path: 0x7FB64B6D3870, pathext: 0x7FB6494D8788
  flags: net: 0x0, path: 0x3, pathext: 0x81
  Updated on Jun 7 2020 20:42:08 UTC
```

次に、ルートタイプ 2 のスパインスイッチ 2 とホストデバイス 1 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```
Spine-02# show bgp l2vpn evpn route-type 2 0 f4cfe24334c1 10.1.101.11
BGP routing table entry for [2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24,
version 4
Paths: (2 available, best #2, table EVPN-BGP-Table)
  Advertised to update-groups:
    9          10
Refresh Epoch 1
65002
  172.16.254.3 (metric 2) (via default) from 172.16.255.1 (172.16.255.1)
  Origin incomplete, metric 0, localpref 100, valid, internal
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65001:101 ENCAP:8
  Router MAC:10B3.D56A.8FC8
  rx pathid: 0, tx pathid: 0
  net: 0x7FB6494C86B0, path: 0x7FB64B6D25E0, pathext: 0x0
  flags: net: 0x0, path: 0x3, pathext: 0x0
  Updated on Jun 7 2020 20:43:06 UTC
Refresh Epoch 2
65002
  172.16.254.3 (metric 2) (via default) from 172.16.255.3 (172.16.255.3)
  Origin incomplete, metric 0, localpref 100, valid, external, best
  EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65001:101 ENCAP:8
  Router MAC:10B3.D56A.8FC8
  rx pathid: 0, tx pathid: 0x0
  net: 0x7FB6494C86B0, path: 0x7FB64B6D31B0, pathext: 0x7FB6494D8CC8
  flags: net: 0x0, path: 0x3, pathext: 0x81
```

スパインスイッチが自律システム内にあり、各リーフスイッチが別の自律システム内にある場合の eBGP を使用したスパインスイッチの設定例

Updated on Jun 7 2020 20:42:08 UTC

次に、スパインスイッチ 2 での **show ip pim neighbor** コマンドの出力例を示します。

```
Spine-02# show ip pim neighbor
PIM Neighbor Table
Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority,
      P - Proxy Capable, S - State Refresh Capable, G - GenID Capable,
      L - DR Load-balancing Capable
Neighbor      Interface                Uptime/Expires    Ver   DR
Address
172.16.23.3   GigabitEthernet1/0/1    00:34:48/00:01:27 v2    1 / DR S P G
172.16.24.4   GigabitEthernet1/0/2    1w4d/00:01:36    v2    1 / DR S P G
```

次に、スパインスイッチ 2 での **show ip pim rp mapping** コマンドの出力例を示します。

```
Spine-02# show ip pim rp mapping
PIM Group-to-RP Mappings

Group(s): 224.0.0.0/4, Static
          RP: 172.16.255.255 (?)
```

次に、スパインスイッチ 2 での **show ip ro** コマンドの出力例を示します。

```
Spine-02# show ip ro 172.16.255.255
Routing entry for 172.16.255.255/32
  Known via "connected", distance 0, metric 0 (connected, via interface)
  Routing Descriptor Blocks:
  * directly connected, via Loopback2
    Route metric is 0, traffic share count is 1
```

次に、スパインスイッチ 2 での **show ip msdp summary** コマンドの出力例を示します。

```
Spine-02# show ip msdp summary
MSDP Peer Status Summary
Peer Address      AS      State      Uptime/  Reset SA      Peer Name
                  Downtime Count Count
172.16.254.1     65001  Up         1w4d     0      2      ?
```

次に、スパインスイッチ 2 での **show ip msdp sa-cache** コマンドの出力例を示します。

```
Spine-02# show ip msdp sa-cache
RPF information for ? (172.16.255.255)
  RPF interface: Loopback2
  RPF neighbor: ? (172.16.255.255) - directly connected
  RPF route/mask: 172.16.255.255/32
  RPF type: multicast (connected)
  Doing distance-preferred lookups across tables
  RPF topology: ipv4 multicast base
```

次に、スパインスイッチ 2 での **show ip mroute** コマンドの出力例を示します。

```
Spine-02# show ip mroute 225.0.0.101
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
       L - Local, P - Pruned, R - RP-bit set, F - Register flag,
       T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
```

```

X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
U - URD, I - Received Source Specific Host Report,
Z - Multicast Tunnel, z - MDT-data group sender,
Y - Joined MDT-data group, y - Sending to MDT-data group,
G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
Q - Received BGP S-A Route, q - Sent BGP S-A Route,
V - RD & Vector, v - Vector, p - PIM Joins on route,
x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 225.0.0.101), 1w4d/00:03:27, RP 172.16.255.255, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/1, Forward/Sparse, 00:34:36/00:03:22
    GigabitEthernet1/0/2, Forward/Sparse, 2d23h/00:03:27

(172.16.254.4, 225.0.0.101), 00:00:50/00:02:09, flags: A
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.4
  Outgoing interface list:
    GigabitEthernet1/0/1, Forward/Sparse, 00:00:50/00:03:22

(172.16.254.3, 225.0.0.101), 00:01:11/00:01:47, flags: A
  Incoming interface: GigabitEthernet1/0/1, RPF nbr 172.16.23.3
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 00:01:11/00:03:27

```

リーフスイッチ 1

次に、リーフスイッチ 1 での **show ip ospf neighbor** コマンドの出力例を示します。

```

Leaf-01# show ip ospf neighbor
Neighbor ID   Pri  State   Dead Time   Address           Interface
172.16.255.2   0    FULL/  -          00:00:31      172.16.23.2      GigabitEthernet1/0/2
172.16.255.1   0    FULL/  -          00:00:34      172.16.13.1     GigabitEthernet1/0/1

```

次に、リーフスイッチ 1 での **show bgp l2vpn evpn summary** コマンドの出力例を示します。

```

Leaf-01# show bgp l2vpn evpn summary
BGP router identifier 172.16.255.3, local AS number 65002
BGP table version is 99, main routing table version 99
27 network entries using 9288 bytes of memory
36 path entries using 7488 bytes of memory
22/15 BGP path/bestpath attribute entries using 6336 bytes of memory
1 BGP AS-PATH entries using 40 bytes of memory
18 BGP extended community entries using 944 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
BGP using 24096 total bytes of memory
BGP activity 483/450 prefixes, 1123/1081 paths, scan interval 60 secs
27 networks peaked at 13:15:47 May 26 2020 UTC (1w5d ago)

Neighbor      V      AS  MsgRcvd  MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001    27       34       99    0    0 00:08:30    9
172.16.255.2  4      65001    27       29       99    0    0 00:08:25    9

```

スパインスイッチが自律システム内にあり、各リーフスイッチが別の自律システム内にある場合の eBGP を使用したスパインスイッチの設定例

次に、ルートタイプ 2 のリーフスイッチ 1 とホストデバイス 2 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```
Leaf-01# show bgp l2vpn evpn route-type 2 0 44d3ca286cc1 10.1.101.12
BGP routing table entry for [2][172.16.254.3:101][0][48][44D3CA286CC1][32][10.1.101.12]/24,
version 93
Paths: (1 available, best #1, table evi_101)
  Not advertised to any peer
  Refresh Epoch 1
    65001 65003, imported path from
  [2][172.16.254.4:101][0][48][44D3CA286CC1][32][10.1.101.12]/24 (global)
    172.16.254.4 (metric 3) (via default) from 172.16.255.2 (172.16.255.2)
      Origin incomplete, localpref 100, valid, external, best
      EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
      Extended Community: RT:1:1 RT:65002:101 ENCAP:8
        Router MAC:7C21.0DBD.9548
        rx pathid: 0, tx pathid: 0x0
        net: 0x7F575E4795D0, path: 0x7F575E1EFC38, pathext: 0x7F575E201308, exp_net:
0x7F575E47AA70
          flags: net: 0x0, path: 0x40000000000003, pathext: 0x81
          Updated on Jun 7 2020 20:40:17 UTC
BGP routing table entry for [2][172.16.254.4:101][0][48][44D3CA286CC1][32][10.1.101.12]/24,
version 84
Paths: (2 available, best #2, table EVPN-BGP-Table)
  Advertised to update-groups:
    21
  Refresh Epoch 1
    65001 65003
    172.16.254.4 (metric 3) (via default) from 172.16.255.1 (172.16.255.1)
      Origin incomplete, localpref 100, valid, external
      EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
      Extended Community: RT:1:1 RT:65002:101 ENCAP:8
```

次に、ルートタイプ 2 のリーフスイッチ 1 とホストデバイス 1 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```
Leaf-01# show bgp l2vpn evpn route-type 2 0 f4cfe24334c1 10.1.101.11
BGP routing table entry for [2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24,
version 4
Paths: (1 available, best #1, table evi_101)
  Advertised to update-groups:
    21
  Refresh Epoch 1
  Local
    :: (via default) from 0.0.0.0 (172.16.255.3)
      Origin incomplete, localpref 100, weight 32768, valid, sourced, local, best
      EVPN ESI: 00000000000000000000, Label1 10101, Label2 50901
      Extended Community: RT:1:1 RT:65002:101 ENCAP:8
        Router MAC:10B3.D56A.8FC8
      Local irb vxlan vtep:
        vrf:green, l3-vni:50901
        local router mac:10B3.D56A.8FC8
        core-irb interface:Vlan901
        vtep-ip:172.16.254.3
      rx pathid: 0, tx pathid: 0x0
      net: 0x7F575E47ABD0, path: 0x7F575E1F13D8, pathext: 0x7F575E201968
      flags: net: 0x0, path: 0x4000028000003, pathext: 0x81
      Updated on Jun 4 2020 21:26:02 UTC
```

次に、リーフスイッチ 1 での **show l2vpn evpn mac ip** コマンドの出力例を示します。


```
Leaf-01# show l2vpn evpn mac ip
IP Address          EVI   VLAN  MAC Address      Next Hop(s)
-----
10.1.101.11         101   101   f4cf.e243.34c1  Gi1/0/10:101
10.1.101.12         101   101   44d3.ca28.6cc1  172.16.254.4
10.1.102.11         102   102   f4cf.e243.34c2  Gi1/0/10:102
10.1.102.12         102   102   44d3.ca28.6cc2  172.16.254.4
```

次に、リーフスイッチ 1 での **show ip pim neighbor** コマンドの出力例を示します。

```
Leaf-01# show ip pim neighbor
PIM Neighbor Table
Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority,
      P - Proxy Capable, S - State Refresh Capable, G - GenID Capable,
      L - DR Load-balancing Capable
Neighbor      Interface          Uptime/Expires   Ver   DR
Address
172.16.13.1   GigabitEthernet1/0/1  1w4d/00:01:17   v2    1 / S P G
172.16.23.2   GigabitEthernet1/0/2  00:34:19/00:01:24 v2    1 / S P G
```

次に、リーフスイッチ 1 での **show ip pim rp mapping** コマンドの出力例を示します。

```
Leaf-01# show ip pim rp mapping
PIM Group-to-RP Mappings
```

```
Group(s): 224.0.0.0/4, Static
          RP: 172.16.255.255 (?)
```

次に、リーフスイッチ 1 での **show ip ro** コマンドの出力例を示します。

```
Leaf-01# show ip ro 172.16.255.255
Routing entry for 172.16.255.255/32
Known via "ospf 1", distance 110, metric 2, type intra area
Last update from 172.16.23.2 on GigabitEthernet1/0/2, 00:34:08 ago
Routing Descriptor Blocks:
  172.16.23.2, from 172.16.255.2, 00:34:08 ago, via GigabitEthernet1/0/2
    Route metric is 2, traffic share count is 1
  * 172.16.13.1, from 172.16.255.1, 1w4d ago, via GigabitEthernet1/0/1
    Route metric is 2, traffic share count is 1
```

次に、リーフスイッチ 1 での **show ip rpf** コマンドの出力例を示します。

```
Leaf-01# show ip rpf 172.16.255.255
RPF information for ? (172.16.255.255)
  RPF interface: GigabitEthernet1/0/2
  RPF neighbor: ? (172.16.23.2)
  RPF route/mask: 172.16.255.255/32
  RPF type: unicast (ospf 1)
  Doing distance-preferred lookups across tables
  RPF topology: ipv4 multicast base, originated from ipv4 unicast base
```

次に、リーフスイッチ 1 での **show ip mroute** コマンドの出力例を示します。

```
Leaf-01# show ip mroute 225.0.0.101
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
       L - Local, P - Pruned, R - RP-bit set, F - Register flag,
       T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
       X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
```

スパインスイッチが自律システム内にあり、各リーフスイッチが別の自律システム内にある場合の eBGP を使用したスパインスイッチの設定例

```

U - URD, I - Received Source Specific Host Report,
Z - Multicast Tunnel, z - MDT-data group sender,
Y - Joined MDT-data group, y - Sending to MDT-data group,
G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
Q - Received BGP S-A Route, q - Sent BGP S-A Route,
V - RD & Vector, v - Vector, p - PIM Joins on route,
x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 225.0.0.101), 8w2d/stopped, RP 172.16.255.255, flags: SJCfX
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse-Dense, 1w5d/00:01:01

(172.16.254.4, 225.0.0.101), 00:00:21/00:02:38, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse-Dense, 00:00:21/00:02:38

(172.16.254.3, 225.0.0.101), 00:00:43/00:02:46, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 00:00:43/00:02:46

```

リーフスイッチ 2

次に、リーフスイッチ 2 での **show ip ospf neighbor** コマンドの出力例を示します。

```

Leaf-02# show ip ospf neighbor
Neighbor ID      Pri   State           Dead Time   Address        Interface
172.16.255.2     0    FULL/ -         00:00:36   172.16.24.2   GigabitEthernet1/0/2
172.16.255.1     0    FULL/ -         00:00:31   172.16.14.1   GigabitEthernet1/0/1

```

次に、リーフスイッチ 2 での **show bgp l2vpn evpn summary** コマンドの出力例を示します。

```

Leaf-02# show bgp l2vpn evpn summary
BGP router identifier 172.16.255.4, local AS number 65003
BGP table version is 83, main routing table version 83
25 network entries using 8600 bytes of memory
36 path entries using 7488 bytes of memory
23/15 BGP path/bestpath attribute entries using 6624 bytes of memory
1 BGP AS-PATH entries using 40 bytes of memory
19 BGP extended community entries using 984 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
BGP using 23736 total bytes of memory
BGP activity 95/64 prefixes, 207/163 paths, scan interval 60 secs
25 networks peaked at 21:31:21 Jun 4 2020 UTC (2d23h ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001    27     34      83    0    0 00:08:40      9
172.16.255.2  4      65001    27     29      83    0    0 00:08:35      9

```

次に、ルートタイプ 2 のリーフスイッチ 2 とホストデバイス 2 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```
Leaf-02# show bgp l2vpn evpn route-type 2 0 44d3ca286cc1 10.1.101.12
BGP routing table entry for [2][172.16.254.4:101][0][48][44D3CA286CC1][32][10.1.101.12]/24,
version 4
Paths: (1 available, best #1, table evi_101)
  Advertised to update-groups:
    2
  Refresh Epoch 1
  Local
  :: (via default) from 0.0.0.0 (172.16.255.4)
  Origin incomplete, localpref 100, weight 32768, valid, sourced, local, best
  EVPN ESI: 000000000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65003:101 ENCAP:8
  Router MAC:7C21.0DBD.9548
  Local irb vxlan vtep:
    vrf:green, l3-vni:50901
    local router mac:7C21.0DBD.9548
    core-irb interface:Vlan901
    vtep-ip:172.16.254.4
  rx pathid: 0, tx pathid: 0x0
  net: 0x7F84B8F2D778, path: 0x7F84BB3149F0, pathext: 0x7F84BB526788
  flags: net: 0x0, path: 0x4000028000003, pathext: 0x81
  Updated on Jun 4 2020 21:30:20 UTC
```

次に、ルートタイプ 2 のリーフスイッチ 2 とホストデバイス 1 の IP アドレスに対する **show bgp l2vpn evpn route-type** コマンドの出力例を示します。

```
Leaf-02# show bgp l2vpn evpn route-type 2 0 f4cfe24334c1 10.1.101.11
BGP routing table entry for [2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24,
version 72
Paths: (2 available, best #2, table EVPN-BGP-Table)
  Advertised to update-groups:
    2
  Refresh Epoch 1
  65001 65002
  172.16.254.3 (metric 3) (via default) from 172.16.255.1 (172.16.255.1)
  Origin incomplete, localpref 100, valid, external
  EVPN ESI: 000000000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65003:101 ENCAP:8
  Router MAC:10B3.D56A.8FC8
  rx pathid: 0, tx pathid: 0
  net: 0x7F84B8F2E958, path: 0x7F84BB313FD0, pathext: 0x0
  flags: net: 0x0, path: 0x3, pathext: 0x0
  Updated on Jun 7 2020 20:44:45 UTC
  Refresh Epoch 1
  65001 65002
  172.16.254.3 (metric 3) (via default) from 172.16.255.2 (172.16.255.2)
  Origin incomplete, localpref 100, valid, external, best
  EVPN ESI: 000000000000000000000000, Label1 10101, Label2 50901
  Extended Community: RT:1:1 RT:65003:101 ENCAP:8
  Router MAC:10B3.D56A.8FC8
  rx pathid: 0, tx pathid: 0x0
  net: 0x7F84B8F2E958, path: 0x7F84BB313178, pathext: 0x7F84BB526548
  flags: net: 0x0, path: 0x3, pathext: 0x81
  Updated on Jun 7 2020 20:44:44 UTC
BGP routing table entry for [2][172.16.254.4:101][0][48][F4CFE24334C1][32][10.1.101.11]/24,
version 78
Paths: (1 available, best #1, table evi_101)
  Not advertised to any peer
  Refresh Epoch 1
```

スパインスイッチが自律システム内にあり、各リーフスイッチが別の自律システム内にある場合の eBGP を使用したスパインスイッチの設定例

```

65001 65002, imported path from
[2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24 (global)
172.16.254.3 (metric 3) (via default) from 172.16.255.2 (172.16.255.2)
Origin incomplete, localpref 100, valid, external, best
EVPN ESI: 000000000000000000000000, Label1 10101, Label2 50901
Extended Community: RT:1:1 RT:65003:101 ENCAP:8
Router MAC:10B3.D56A.8FC8
rx pathid: 0, tx pathid: 0x0
net: 0x7F84B8F2D358, path: 0x7F84BB314258, pathext: 0x7F84BB5265A8, exp_net:
0x7F84B8F2E958
flags: net: 0x0, path: 0x40000000000003, pathext: 0x81
Updated on Jun 7 2020 20:44:44 UTC

```

次に、リーフスイッチ 2 での **show l2vpn evpn mac ip** コマンドの出力例を示します。

```

Leaf-02# show l2vpn evpn mac ip
IP Address          EVI   VLAN  MAC Address      Next Hop(s)
-----
10.1.101.11         101   101   f4cf.e243.34c1  172.16.254.3
10.1.101.12         101   101   44d3.ca28.6cc1  Gi1/0/10:101
10.1.102.11         102   102   f4cf.e243.34c2  172.16.254.3
10.1.102.12         102   102   44d3.ca28.6cc2  Gi1/0/10:102

```

次に、リーフスイッチ 2 での **show ip pim neighbor** コマンドの出力例を示します。

```

Leaf-02# show ip pim neighbor
PIM Neighbor Table
Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority,
      P - Proxy Capable, S - State Refresh Capable, G - GenID Capable,
      L - DR Load-balancing Capable
Neighbor          Interface                Uptime/Expires    Ver   DR
Address
172.16.14.1       GigabitEthernet1/0/1     1w4d/00:01:42    v2    1 / S P G
172.16.24.2       GigabitEthernet1/0/2     1w4d/00:01:19    v2    1 / S P G

```

次に、リーフスイッチ 2 での **show ip pim rp mapping** コマンドの出力例を示します。

```

Leaf-02# show ip pim rp mapping
PIM Group-to-RP Mappings

Group(s): 224.0.0.0/4, Static
RP: 172.16.255.255 (?)

```

次に、リーフスイッチ 2 での **show ip ro** コマンドの出力例を示します。

```

Leaf-02# show ip ro 172.16.255.255
Routing entry for 172.16.255.255/32
  Known via "ospf 1", distance 110, metric 2, type intra area
  Last update from 172.16.14.1 on GigabitEthernet1/0/1, 3d00h ago
  Routing Descriptor Blocks:
  * 172.16.24.2, from 172.16.255.2, 3d00h ago, via GigabitEthernet1/0/2
    Route metric is 2, traffic share count is 1
  172.16.14.1, from 172.16.255.1, 3d00h ago, via GigabitEthernet1/0/1
    Route metric is 2, traffic share count is 1

```

次に、リーフスイッチ 2 での **show ip rpf** コマンドの出力例を示します。

```

Leaf-02# show ip rpf 172.16.255.255
RPF information for ? (172.16.255.255)

```

```

RPF interface: GigabitEthernet1/0/2
RPF neighbor: ? (172.16.24.2)
RPF route/mask: 172.16.255.255/32
RPF type: unicast (ospf 1)
Doing distance-preferred lookups across tables
RPF topology: ipv4 multicast base, originated from ipv4 unicast base

```

次に、リーフスイッチ 2 での **show ip mroute** コマンドの出力例を示します。

```

Leaf-02# show ip mroute 225.0.0.101
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
L - Local, P - Pruned, R - RP-bit set, F - Register flag,
T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
U - URD, I - Received Source Specific Host Report,
Z - Multicast Tunnel, z - MDT-data group sender,
Y - Joined MDT-data group, y - Sending to MDT-data group,
G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
Q - Received BGP S-A Route, q - Sent BGP S-A Route,
V - RD & Vector, v - Vector, p - PIM Joins on route,
x - VxLAN group, c - PFF-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 225.0.0.101), 2w3d/stopped, RP 172.16.255.255, flags: SJCFx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse-Dense, 2d23h/00:01:40

(172.16.254.4, 225.0.0.101), 00:00:31/00:02:58, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 00:00:31/00:02:58

(172.16.254.3, 225.0.0.101), 00:00:52/00:02:07, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse-Dense, 00:00:52/00:02:07

```

スパインスイッチが自律システム内にあり、各リーフスイッチが別の自律システム内にある場合の eBGP を使用したスパインスイッチの設定例