



## Configuring Tenant Routed Multicast

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## Restrictions for Tenant Routed Multicast

- Data MDT between BGP EVPN VXLAN TRM and external MVPN multicast network is not supported.
- In the underlay network, the default MDT supports only PIM sparse mode, and Data MDT supports PIM sparse mode and PIM source specific multicast (SSM) mode.



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**Note** The spine switch can be configured as the rendezvous point (RP). The RP for the underlay network can also be elected using PIM Bootstrap Router (BSR) or Auto-RP.

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- TRM data MDT is supported for TRM in PIM sparse mode and TRM in PIM source specific mode for IPv4 connections only.
- TRM data MDT supports IPv4 C-multicast flows only.
- TRM data MDT supports rate-based switchover only for IPv4 multicast flows.
- TRM data MDT supports Layer 2, IP, and VRF-Lite handoffs only.

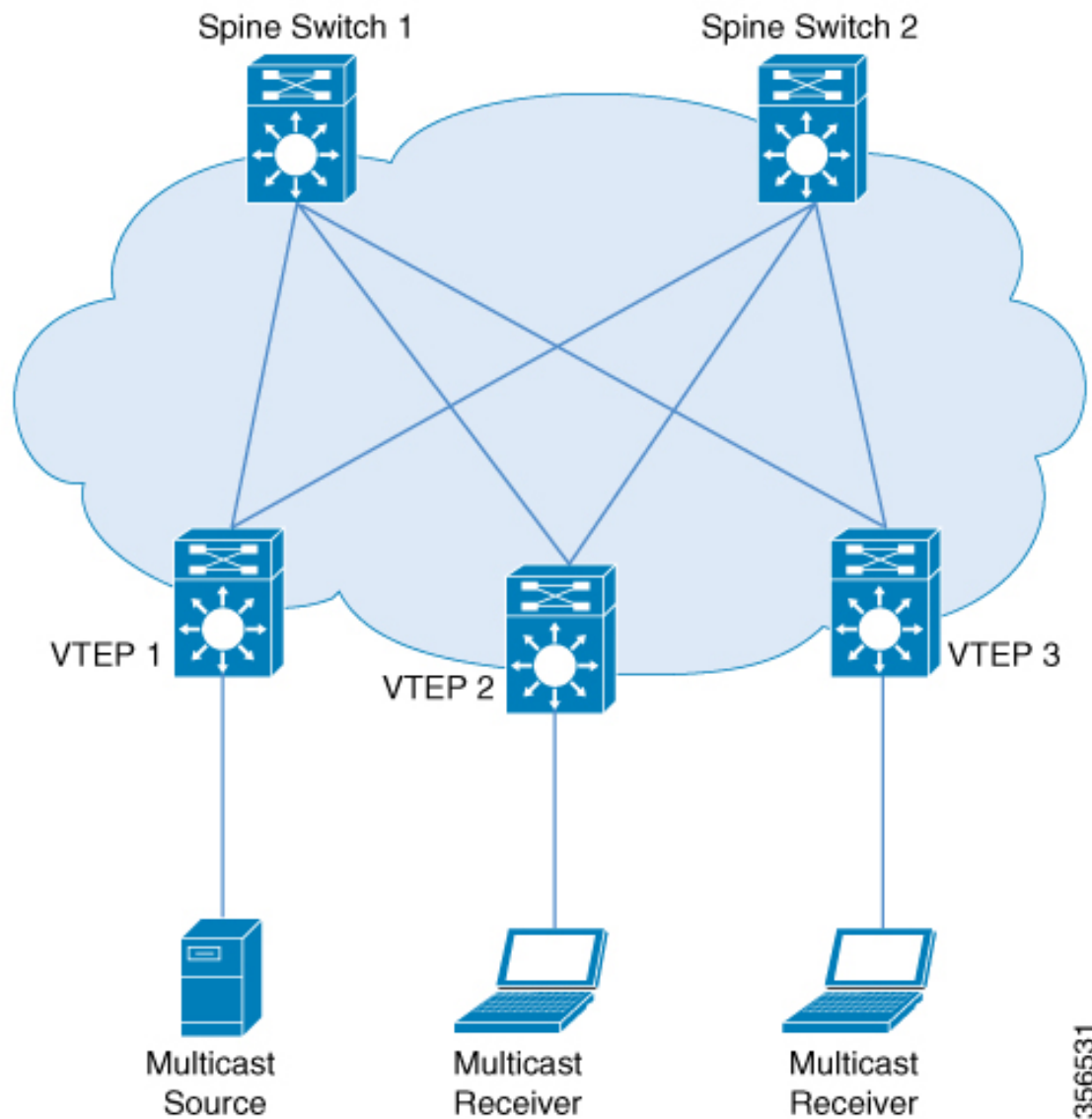
## Information about Tenant Routed Multicast

TRM enables multicast forwarding in a VXLAN fabric that uses a BGP-based EVPN control plane. TRM provides multi-tenancy aware multicast forwarding between senders and receivers within the same or different subnets local or across VTEPs.

TRM enables the delivery of a customer's IP multicast traffic in a multi-tenant fabric in an efficient and resilient manner. The delivery of TRM improves Layer 3 overlay multicast functionality in the networks. With TRM enabled, multicast forwarding in the underlay is leveraged to replicate VXLAN-encapsulated routed multicast traffic. A default MDT is built per-VRF. This is in addition to the existing multicast groups for broadcast and unknown unicast traffic in a Layer 2 virtual network instance (VNI), and for Layer 2 multicast replication group. The individual multicast group addresses in the overlay are mapped to the respective underlay multicast address for replication and transport. The advantage of using a BGP-based approach is that it allows the BGP EVPN VXLAN fabric with TRM to operate as fully distributed overlay rendezvous point (RP), with the RP presence on every edge device or VTEP.

A multicast-enabled data center fabric is typically part of an overall multicast network. Multicast sources, receivers, and multicast rendezvous points, might reside inside the data center but might also be inside the campus or externally reachable via the WAN. Thus, TRM allows a seamless integration with existing multicast networks with newer enterprise fabric.

Figure 1: Tenant Routed Multicast Topology



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For IPv4 and IPv6 multicast traffic, TRM uses BGP EVPN and multicast virtual private network (MVPN) routes to perform multicast routing. All the VTEPs in the network do not need to be BGP peers. There can be BGP peering between the VTEPs and the spine switches with the spine switches acting as route reflectors. Source reachability is distributed via EVPN route type 2 and EVPN route type 5 in the fabric. RPF is installed based on these routes. Source-active and receiver-join information is carried in the MVPN address family using route types 5, 6, and 7.

In an EVPN VXLAN network, TRM is supported in the overlay network in PIM sparse mode and PIM source specific multicast (SSM) mode. VTEPs have BGP peering in MVPN as well as EVPN address families to exchange routes for TRM.

## TRM in PIM Sparse Mode

PIM-SM distributes information about active sources by forwarding data packets on the shared tree. Because PIM-SM uses shared trees, it requires the use of a rendezvous point (RP). An RP is used for the initial convergence of multicast traffic between sources and receivers.

The following section describes the different ways the RP can be configured for TRM in PIM sparse mode.

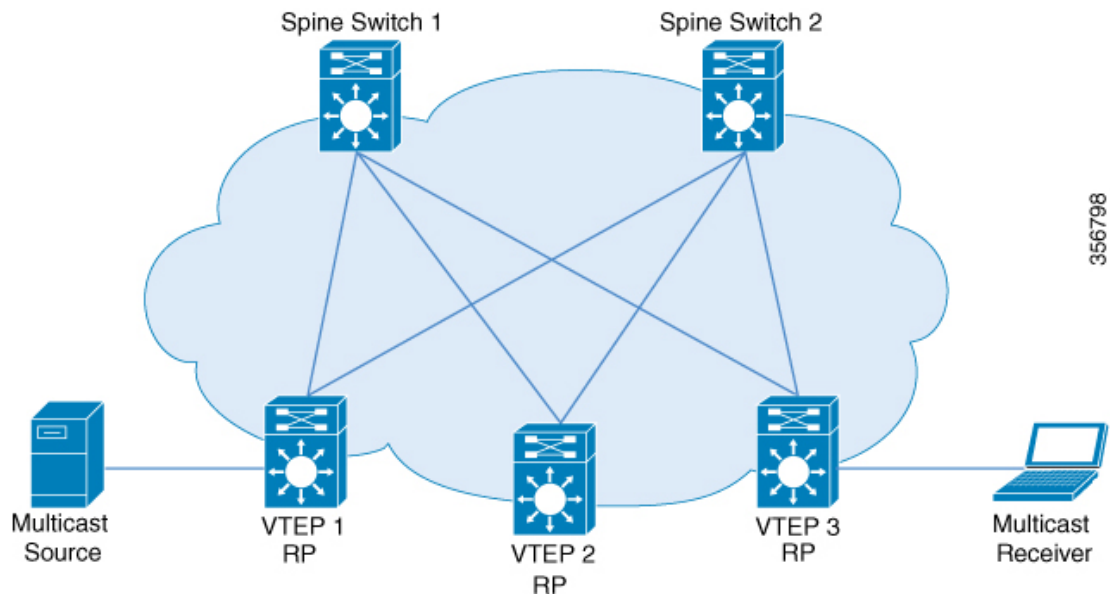
### RP Placement

For TRM in PIM sparse mode, the overlay RP can be configured either within the BGP EVPN VXLAN fabric, or outside of the fabric.

#### Anycast RP in the Overlay Network

In Anycast RP in the overlay network, every VTEP acts as an RP.

**Figure 2: Anycast RP in the Overlay Network**

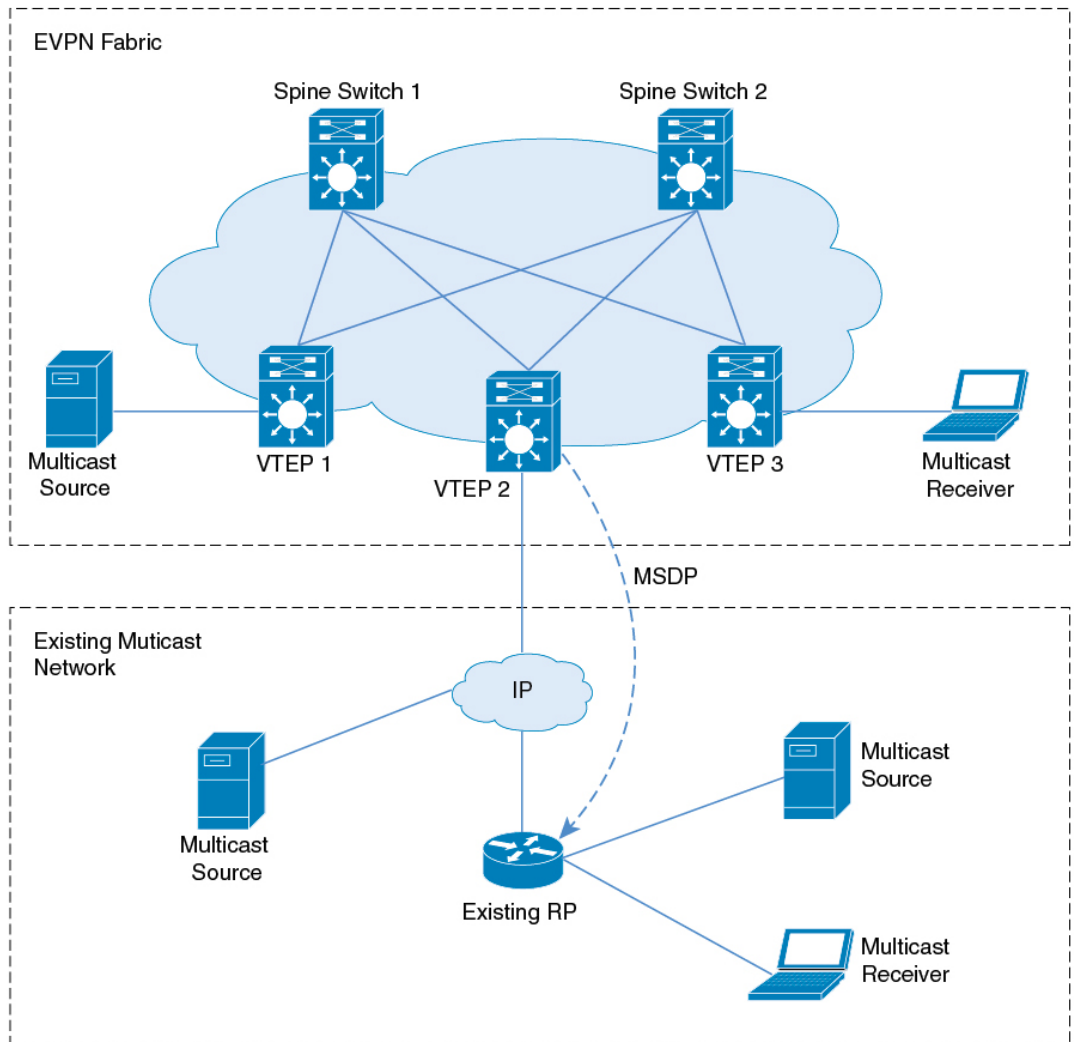


Anycast RP can also inter-operate with existing multicast networks and RP as shown below. Refer the *Configuring MSDP* chapter of the *IP Multicast Routing Configuration Guide* for information on how to configure MSDP.



**Note** MSDP is an IPv4 protocol and the MSDP originator IP loopback configuration is mandatory.

Figure 3: Anycast RP with IPv4 Overlay in an Existing Multicast Network



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**RP Inside the BGP EVPN VXLAN Fabric**

In a TRM scenario where all sources and receivers are within the EVPN VXLAN network, the overlay RP can be placed on a border spine or on a VTEP.

Figure 4: Border Spine Switch as an RP

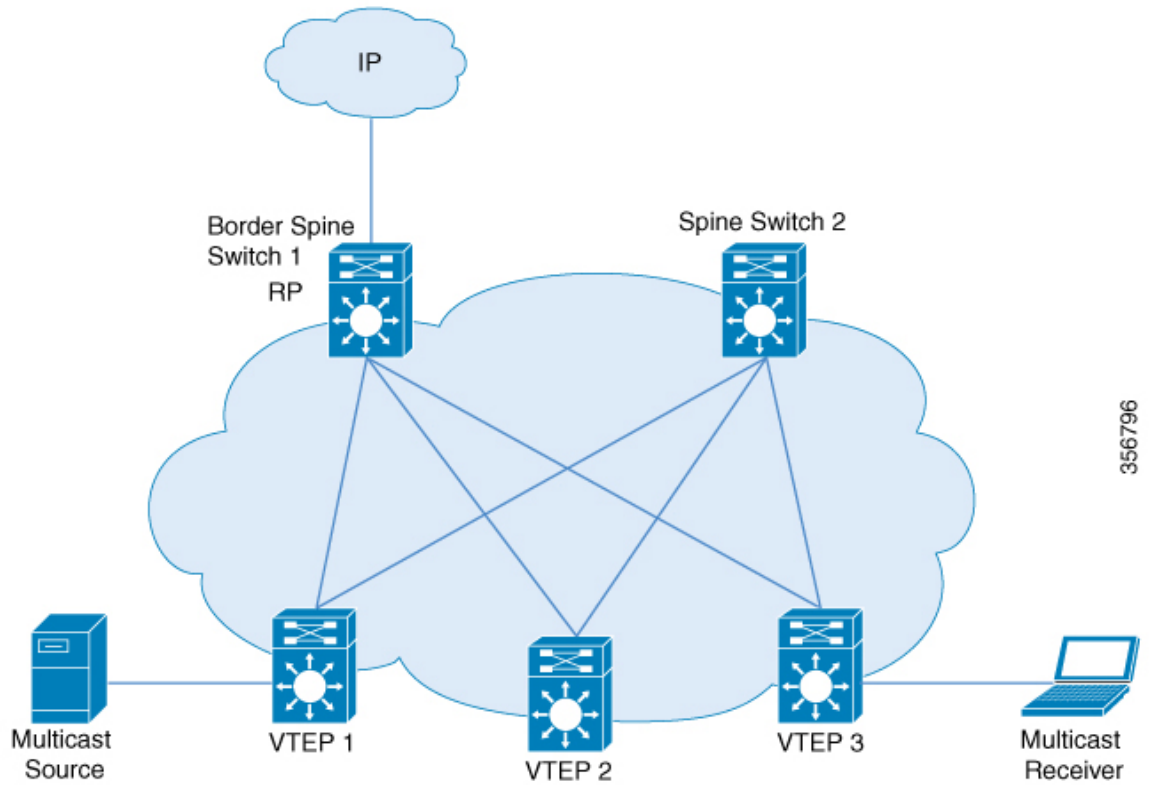
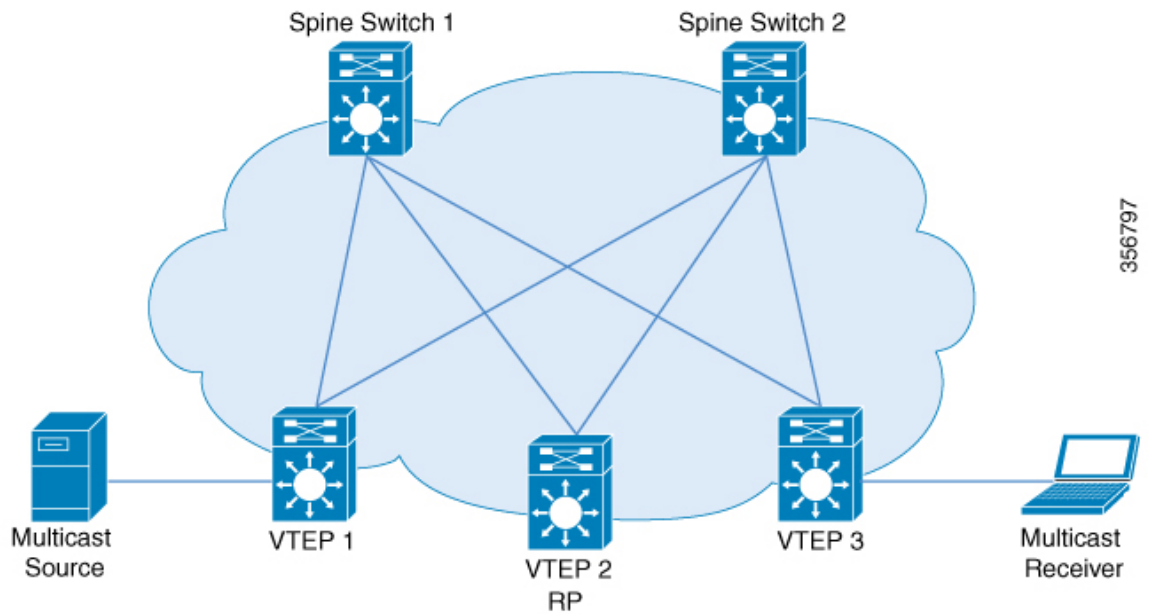


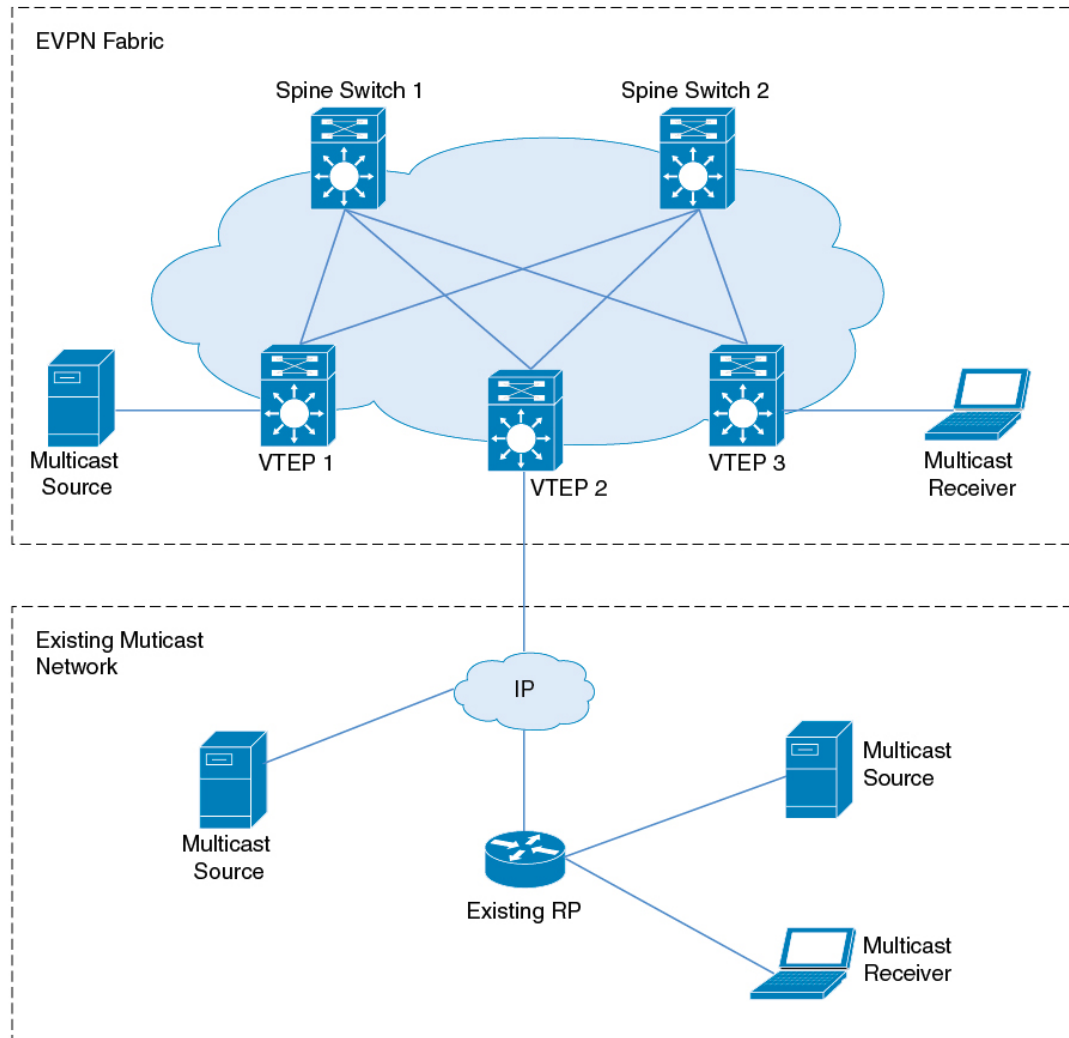
Figure 5: VTEP as an RP



### RP Outside the BGP EVPN VXLAN Fabric

In a TRM scenario where sources and receivers need to interwork with the overlay network and the EVPN VXLAN network, the RP can be placed on an external router connected to a VTEP.

*Figure 6: RP Outside the BGP EVPN VXLAN Fabric with an Existing Multicast Network*



In PIM sparse mode, TRM can be configured in three different ways depending on how the RP is configured:

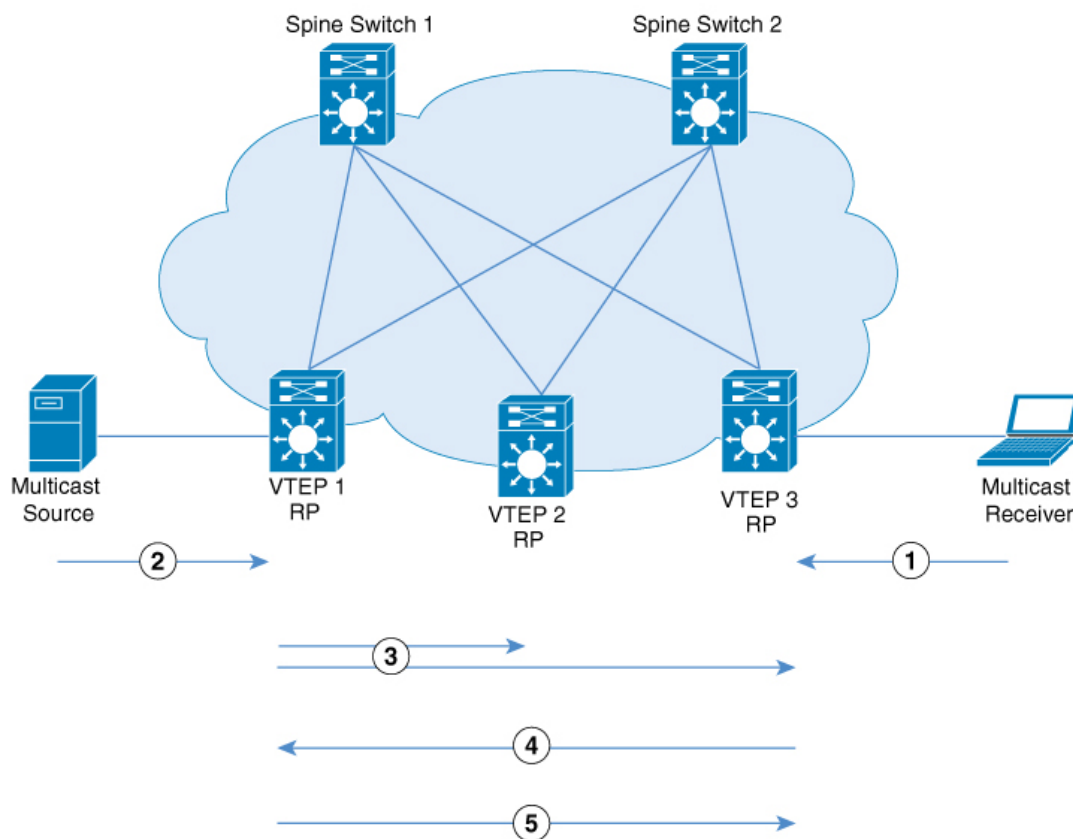
- PIM Sparse Mode with Anycast RP
- PIM Sparse Mode with RP Inside the BGP EVPN VXLAN Fabric
- PIM Sparse Mode with RP Outside the BGP EVPN VXLAN Fabric

## PIM Sparse Mode with Anycast RP

In PIM sparse mode with anycast RP, every VTEP in the EVPN VXLAN network acts as an RP in the overlay network for its respective multicast group. The RPs in the underlay network must be configured on the spine switches.

When a VTEP discovers a source device, it sends Source A-D Routes (MVPN route type 5) to all the other VTEPs. Based on these Source A-D routes, the other VTEPs send (S,G) join requests as MVPN route type 7 to the source VTEP.

Figure 7: PIM Sparse Mode with Anycast RP



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In PIM sparse mode with anycast RP, the following sequence of events occurs:

1. Receiver sends (\*,G) IGMP Join to VTEP 3. Since VTEP 3 is an RP, (\*,G) is created at VTEP 3.
2. The source device starts streaming data and (S,G) is created on VTEP 1.
3. VTEP 1 performs self-source-registration since it is also an RP.

The source VTEP (VTEP 1) advertises Source A-D Routes (also called MVPN route type 5) for the (S,G) to all the other VTEPs which are BGP peers in the MVPN address family.

4. VTEP 2 and VTEP 3 receive and install the Source A-D Route for the (S,G).

(S,G) is created at VTEP 3. VTEP 3 now has an overlay route for the (S,G) and also has a unicast route to the source device from the EVPN Control plane. It then sends an MVPN route type 7 (S,G) BGP join to VTEP 1 and starts accepting traffic.

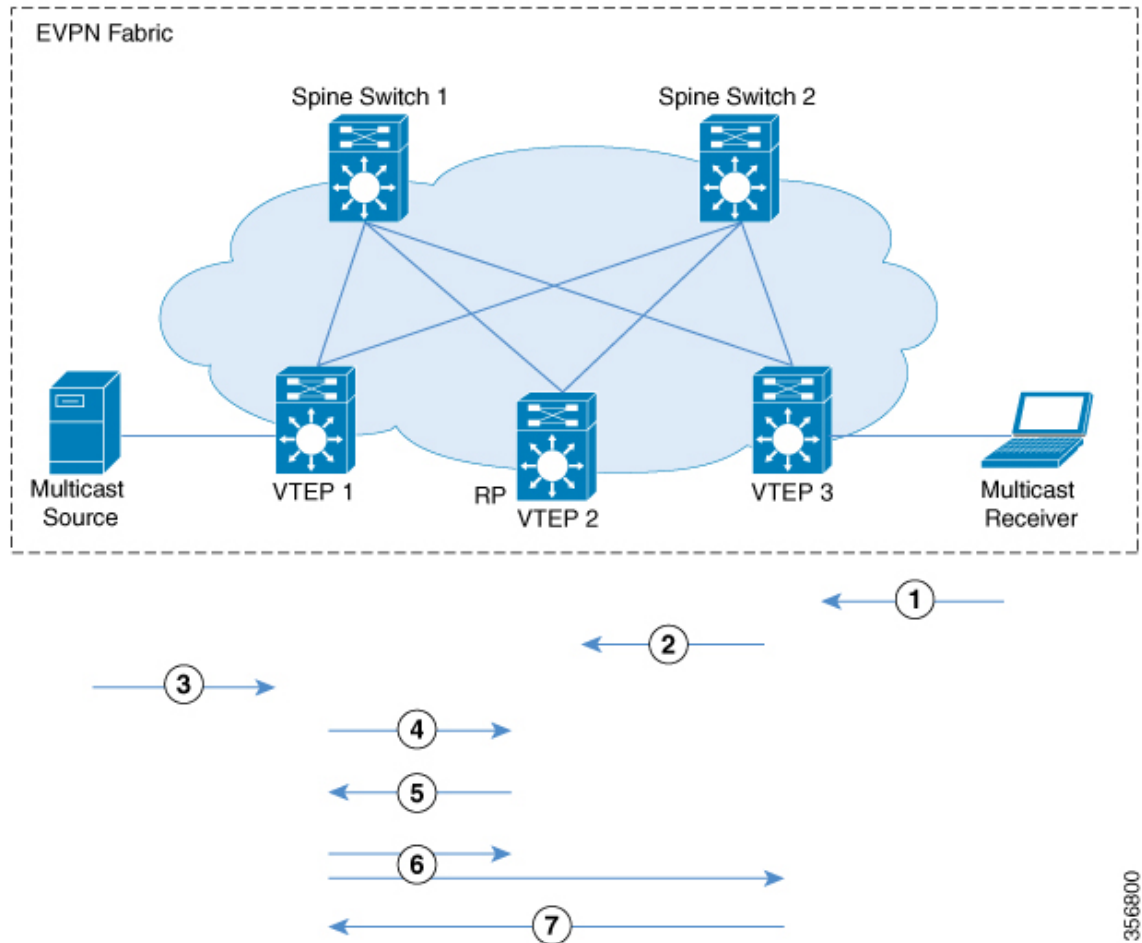


- VTEP 1 receives and installs MVPN route type 7 from VTEP 3. It uses the Layer 3 VNI's SVI as the forwarding interface for the (S,G) and starts forwarding traffic.

### PIM Sparse Mode with RP Inside the BGP EVPN VXLAN Fabric

In PIM sparse mode with RP inside the BGP EVPN VXLAN Fabric, the RP can be any VTEP in the EVPN VXLAN network.

Figure 8: PIM Sparse Mode with RP Inside the BGP EVPN VXLAN Fabric



The following sequence of events occurs when TRM is enabled in PIM sparse mode with the RP inside the fabric:

- Receiver sends (\*,G) IGMP Join to VTEP 3. (\*,G) is created at VTEP 3.
- VTEP 3 sends MVPN route type 6 to VTEP 2 which is the RP. (\*,G) is created at VTEP 2.
- The source device starts streaming data and (S,G) is created on VTEP 1.
- VTEP 1 performs source-registration at VTEP 2 since it is the RP. (S,G) is created at VTEP 2.
- Since the RP has a receiver for (S,G), it sends an MVPN route type 7 to VTEP 1 and forwards PIM-register traffic towards receivers in the (\*,G) tree.

6. VTEP 1 receives and installs MVPN route type 7 from VTEP 2. It uses the Layer 3 VNI's SVI as the forwarding interface for (S,G).

The source VTEP (VTEP 1) advertises Source A-D Routes for (S,G) to all the other VTEPs which are BGP peers in the MVPN address family.

VTEP 2 and VTEP 3 receive and install the Source A-D Routes for (S,G).

7. (S,G) is created at VTEP 3. VTEP 3 now has an overlay route for (S,G) and also has a unicast route to the source device from the EVPN Control plane. It then sends an MVPN route type 7 to VTEP 1 and starts accepting traffic.

VTEP 1 receives and installs MVPN route type 7 from VTEP 3 and starts forwarding traffic.




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**Note** For the receiver VTEP to be able to send an MVPN route type 7 to the source VTEP, there can be two triggers:

- The (\*,G) packets being forwarded to the receiver VTEP from the RP.
- The Source A-D route received from the source VTEP.

Once either of these are received, the receiver VTEP sends MVPN route type 7 to the source VTEP.

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## PIM Sparse Mode with RP Outside the BGP EVPN VXLAN Fabric

In PIM sparse mode with RP outside the BGP EVPN VXLAN Fabric, the RP can be a PIM router behind any VTEP in the EVPN VXLAN network.

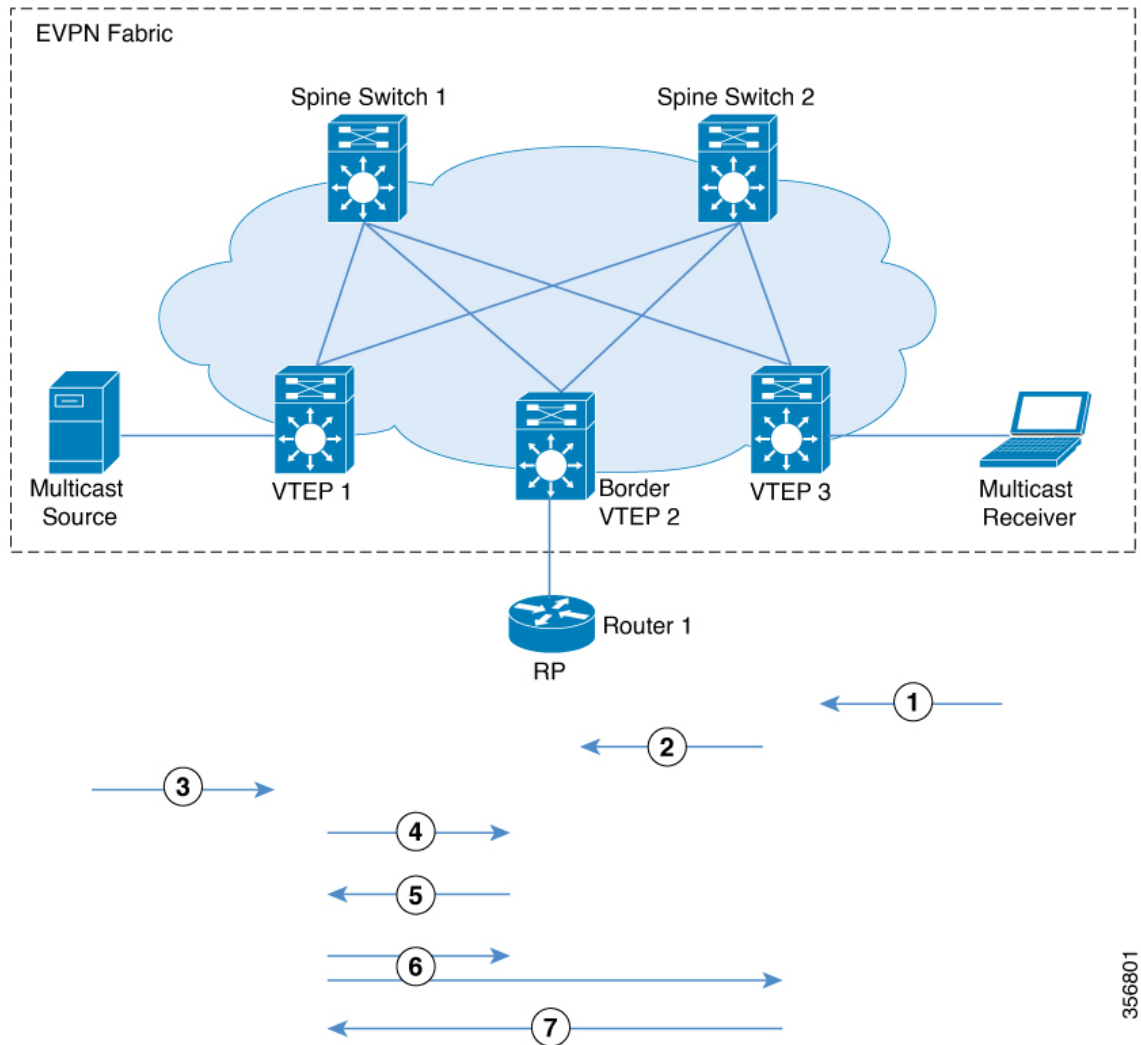



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**Note** When the RP is configured outside the BGP EVPN VXLAN fabric, TRM in PIM sparse mode functions the same way as it does when the RP is inside the fabric.

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Figure 9: PIM Sparse Mode with RP Outside the BGP EVPN VXLAN Fabric



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The chronological traffic flow from the image above is as follows:

1. Receiver sends (\*,G) IGMP Join to VTEP 3. (\*,G) is created at VTEP 3.
2. VTEP3 sends and MVPN route type 6 to VTEP 2 which has the RP in its overlay network. This route is converted to a (\*,G) join towards the RP by VTEP2.
3. The source device starts streaming data and (S,G) is created on VTEP 1.
4. VTEP1 performs source registration with RP. (S,G) join from RP creates (S,G) state at VTEP 2.
5. Since the RP has a receiver for (S,G), it sends an MVPN route type 7 to VTEP 1 and forwards PIM-register traffic towards receivers in the (\*,G) tree.
6. VTEP 1 receives and installs MVPN route type 7 from VTEP 2. It uses the Layer 3 VNI's SVI as the forwarding interface for (S,G).

The source VTEP (VTEP 1) advertises Source A-D Routes for (S,G) to all the other VTEPs which are BGP peers in the MVPN address family.

VTEP 2 and VTEP 3 receive and install the Source A-D Routes for (S,G).

7. (S,G) is created at VTEP 3. VTEP 3 now has an overlay route for (S,G) and also has a unicast route to the source device from the EVPN Control plane. It then sends an MVPN route type 7 to VTEP 1 and starts accepting traffic.

VTEP 1 receives and installs MVPN route type 7 from VTEP 3 and starts forwarding traffic.




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**Note** For the receiver VTEP to be able to send an MVPN route type 7 to the source VTEP, there can be two triggers:

- The (\*,G) packets being forwarded to the receiver VTEP from the RP.
- The Source A-D route received from the source VTEP.

Once either of these are received, the receiver VTEP sends MVPN route type 7 to the source VTEP.

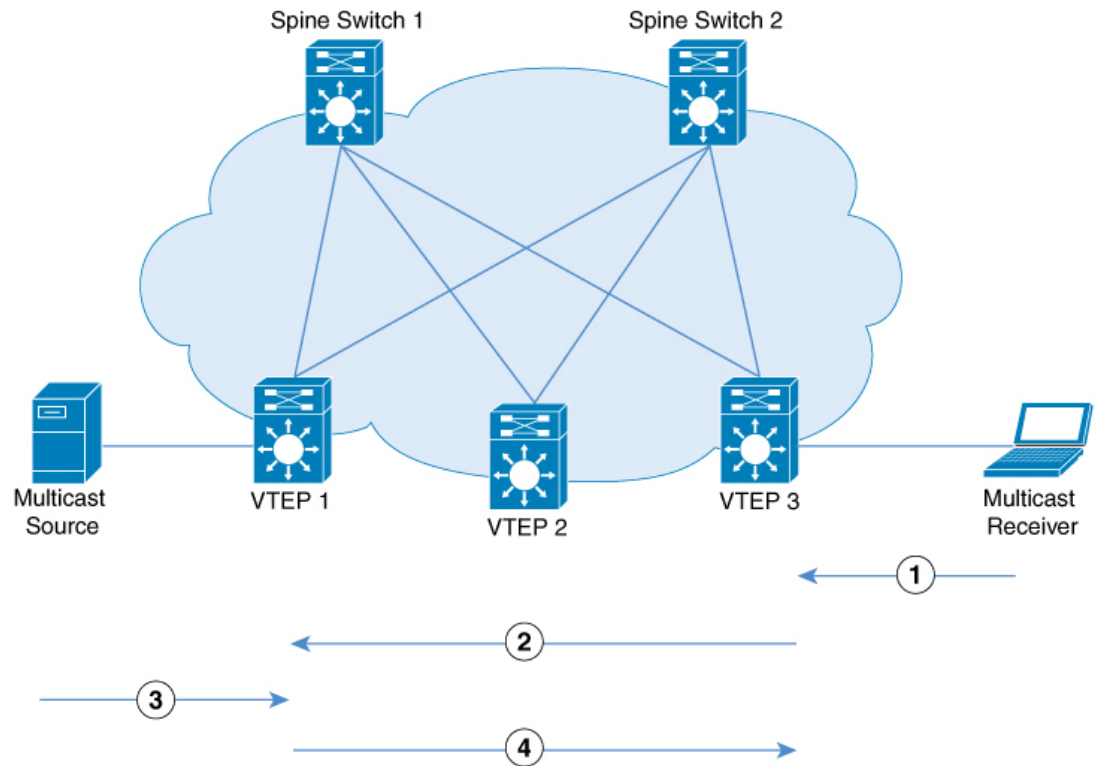
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See [PIM Sparse Mode with RP Inside the BGP EVPN VXLAN Fabric](#) for the sequence of events that happen when TRM is enabled in PIM sparse mode with the RP inside the fabric.

## TRM in PIM Source Specific Mode

In PIM source specific mode, the Source A-D route (MVPN route type 5) is not needed for the multicast convergence to happen. The receiver VTEP does not wait to receive the Source A-D route to send the MVPN route type 7.

Figure 10: PIM Source Specific Mode



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In PIM Source Specific Mode, the following sequence of events occurs:

1. When the source device sends a unicast packet, VTEP 1 sends out EVPN routes to all the other VTEPs, letting them know that the packet is from the source device.  
The receiver sends an (S,G) IGMP join towards VTEP 3 and an (S,G) entry is created.
2. VTEP 3 performs an RPF lookup for the source device. If the SVI of the Layer 3 VNI is found to be the RPF interface, VTEP 3 sends MVPN route type 7 towards VTEP 1.
3. VTEP 1 receives and installs the MVPN route type 7. VTEP 1 creates an (S,G) entry, using the Layer 3 VNI's SVI as the forwarding interface for (S,G).  
The source device sends (S,G) data to VTEP 1.
4. VTEP 1 starts forwarding the traffic to VTEP 3.

## Data MDT

Data MDTs are purpose built underlay MDTs to provide optimized forwarding in the MVPN and EVPN core. Threshold and access control configurations can be used to control the characteristics of overlay streams for which data MDTs will be built. The threshold at which the data MDT is created can be configured on a per-VRF basis only. When the multicast transmission exceeds the defined threshold, the sending VTEP device creates the data MDT and sends a MVPN route type 3 message, which contains information about the data MDT, to all devices on the default MDT. The statistics to determine whether a multicast stream has exceeded

the data MDT threshold are examined periodically. After a VTEP device sends the MVPN route type 3 message, it waits 3 more seconds before switching over.

### Benefits of Data MDT

- With Data MDT, replication load on the EVPN spine nodes are greatly reduced and there are less number of copies in the EVPN underlay overall.
- Data MDT lowers the bandwidth usage between the spine nodes and VTEPs. The traffic load at VTEPs that do not require certain overlay streams are completely avoided.
- Data MDT also offers flexibility in deployment through ACLs and threshold-based switchovers, and also enables load-balancing capabilities.

Data MDTs are created only for (S, G) multicast route entries within the VRF multicast routing table. They are not created for (\*, G) entries regardless of the value of the individual source data rate. An ACL can be configured to control the overlay streams that will be allowed onto the data MDT irrespective of the threshold.

Data MDT is supported for all TRM modes: PIM sparse mode with anycast RP, PIM sparse mode with RP inside the BGP EVPN VXLAN fabric, PIM sparse mode with RP outside the BGP EVPN VXLAN fabric, and PIM source specific multicast (SSM) mode.

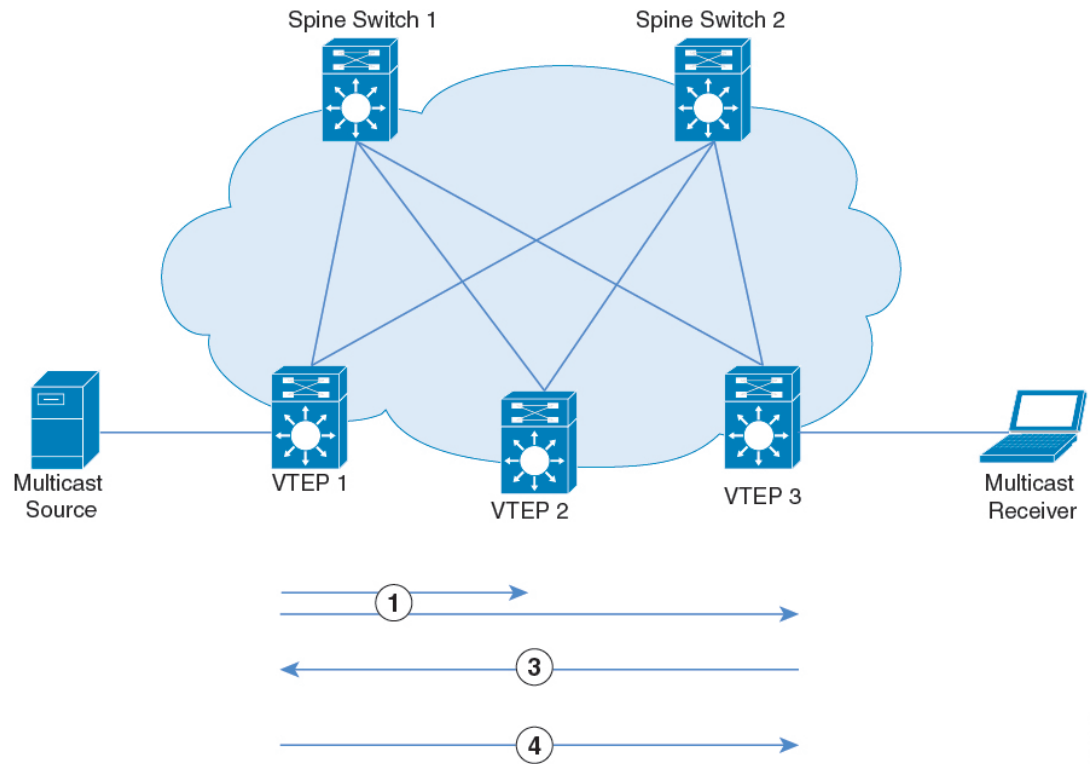


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**Note** For an optimal usage of Data MDT, we recommend that you configure PIM-SSM in the underlay. If you configure PIM sparse mode in the underlay, use distinct Data MDT ranges on each VTEP.

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Figure 11: Data MDT Mode



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After the sequence of events of PIM sparse mode with RP outside the BGP EVPN VXLAN fabric or PIM source specific mode is completed, continue with the following sequence of events for Data MDT mode:

1. VTEP1 sends MVPN route type 3 to all other nodes. The threshold is exceeded for stream and MVPN route type 3 is sent to advertise data MDT for the stream. After 3 seconds, VTEP1 switches stream from the default MDT to data MDT using MVPN route type 3. Only VTEP3 receives stream data.
2. VTEP2 has no receiver, and so it does not join the advertised data MDT underlay.
3. VTEP3 has a receiver, and joins the advertised data MDT underlay.

## How to Configure Tenant Routed Multicast

### Prerequisites to Configuring TRM

Before configuring TRM, ensure that EVPN VXLAN Layer 2 and Layer 3 Overlay networks have been configured. See [How to Configure EVPN VXLAN Integrated Routing and Bridging](#) for detailed steps to configure Layer 2 and Layer 3 overlay networks.

Perform the following set of procedures to configure TRM in an EVPN VXLAN network:

## Configuring TRM with PIM Sparse Mode

To configure TRM with PIM Sparse Mode, perform the following tasks:

### Configuring the TRM Multicast Distribution Tree in the VRF

To configure the TRM MDT, perform the following steps:

#### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> <b>enable</b>	Enables privileged EXEC mode. Enter your password, if prompted.
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>vrf definition</b> <i>vrf-name</i> <b>Example:</b> Device(config)# <b>vrf definition green</b>	Names the VRF and enters VRF configuration mode.
<b>Step 4</b>	<b>address-family</b> { <b>ipv4</b>   <b>ipv6</b> } <b>Example:</b> Device(config-vrf)# <b>address-family ipv4</b>	Specifies the VRF and enters VRF address family configuration mode. <ul style="list-style-type: none"> <li>• Use the <b>ipv4</b> keyword to configure IPv4 address family.</li> <li>• Use the <b>ipv6</b> keyword to configure IPv6 address family.</li> </ul>
<b>Step 5</b>	<b>mdt default vxlan</b> <i>group-address</i> <b>Example:</b> Device(config-vrf-af)# <b>mdt default vxlan 225.2.2.2</b>	Configures the multicast group address range for default MDT groups for a VRF in a VXLAN.
<b>Step 6</b>	<b>mdt auto-discovery vxlan</b> [ <b>inter-as</b> ] <b>Example:</b> Device(config-vrf-af)# <b>mdt auto-discovery vxlan</b>	Enables VXLAN with BGP auto-discovery. Use the <b>inter-as</b> keyword for the MVPN address family routes to cross the BGP autonomous system (AS) boundaries.
<b>Step 7</b>	<b>mdt overlay use-bgp</b> [ <b>spt-only</b> ] <b>Example:</b> Device(config-vrf-af)# <b>mdt overlay use-bgp spt-only</b>	Configures the mechanism that is used by TRM in PIM sparse mode to operate within the BGP EVPN VXLAN fabric. Specifies BGP as the overlay protocol.



	Command or Action	Purpose
		<ul style="list-style-type: none"> <li>Use the <b>mdt overlay use-bgp spt-only</b> command to configure PIM sparse mode with anycast RP.</li> <li>Use the <b>mdt overlay use-bgp</b> command to configure PIM sparse mode with a single RP either inside or outside the BGP EVPN VXLAN fabric.</li> </ul>
<b>Step 8</b>	<b>mdt data vxlan</b> <i>data-mdt-subnet</i> <i>data-mdt-mask</i> [ <b>list</b> <i>access-list-number</i> ] <b>Example:</b> Device(config-vrf-af) # <b>mdt data vxlan</b> 225.2.2.0 0.0.0.255 <b>list</b> 101	(Optional) Configures the multicast group address range for data MDT groups for a VRF in a VXLAN.
<b>Step 9</b>	<b>mdt data threshold</b> <i>kb/s</i> <b>Example:</b> Device(config-vrf-af) # <b>mdt data</b> <b>threshold</b> 111	(Optional) Defines the bandwidth threshold value in kilobits per second (kb/s). The range is from 1 to 4294967, and the default value is 0.
<b>Step 10</b>	<b>exit-address-family</b> <b>Example:</b> Device(config-vrf-af) # <b>exit-address-family</b>	Exits VRF address family configuration mode and returns to VRF configuration mode.
<b>Step 11</b>	<b>end</b> <b>Example:</b> Device(config-vrf) # <b>end</b>	Returns to privileged EXEC mode.

## Configuring Multicast Routing on the Overlay VRF

To enable multicast routing on the overlay VRF, perform the following steps:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> <b>enable</b>	Enables privileged EXEC mode. Enter your password, if prompted.
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>ip multicast-routing vrf</b> <i>vrf-name</i> <b>Example:</b>	Enables IP multicast forwarding on the overlay VRF.

	Command or Action	Purpose
	Device(config)# <b>ip multicast-routing vrf green</b>	
<b>Step 4</b>	<b>ipv6 unicast-routing</b> <b>Example:</b> Device(config)# <b>ipv6 unicast-routing</b>	Enables IPv6 unicast forwarding.
<b>Step 5</b>	<b>ipv6 multicast-routing vrf vrf-name</b> <b>Example:</b> Device(config)# <b>ipv6 multicast-routing vrf green</b>	Enables IPv6 multicast forwarding on the overlay VRF.
<b>Step 6</b>	<b>end</b> <b>Example:</b> Device(config)# <b>end</b>	Returns to privileged EXEC mode.

## Configuring Multicast on Switch Virtual Interfaces for Core-facing and Access-facing VLANs

To configure multicast on SVIs for the core-facing and access-facing VLANs on the VTEP, perform the following steps:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> <b>enable</b>	Enables privileged EXEC mode. Enter your password, if prompted.
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>interface vlan core-facing-vlan-id</b> <b>Example:</b> Device(config)# <b>interface vlan 200</b>	Enters interface configuration mode for the specified VLAN.
<b>Step 4</b>	<b>ip pim sparse-mode</b> <b>Example:</b> Device(config-if) # <b>ip pim sparse-mode</b>	Enables IPv4 multicast on the core-facing SVI.
<b>Step 5</b>	<b>exit</b> <b>Example:</b> Device(config-if) # <b>end</b>	Returns to privileged EXEC mode.

	Command or Action	Purpose
<b>Step 6</b>	<b>interface vlan</b> <i>access-facing-vlan-id</i> <b>Example:</b> Device(config)# <b>interface vlan 202</b>	Enters interface configuration mode for the specified VLAN.
<b>Step 7</b>	<b>ip pim sparse-mode</b> <b>Example:</b> Device(config-if) # <b>ip pim sparse-mode</b>	Enables IPv4 multicast on the access-facing SVI where sources or receivers are connected. Repeat this step for all the access-facing SVIs that are part of the Layer 2 VNI where sources and receivers are connected.
<b>Step 8</b>	<b>end</b> <b>Example:</b> Device(config-if)# <b>end</b>	Returns to privileged EXEC mode.

## Configuring BGP with MVPN Address Family on VTEP

To configure BGP on a VTEP with MVPN address family, perform the following steps:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> <b>enable</b>	Enables privileged EXEC mode. Enter your password, if prompted.
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>router bgp</b> <i>autonomous-system-number</i> <b>Example:</b> Device(config)# <b>router bgp 1</b>	Enables a BGP routing process, assigns it an autonomous system number, and enters router configuration mode.
<b>Step 4</b>	<b>address-family {ipv4   ipv6} mvpn</b> <b>Example:</b> Device(config-router)# <b>address-family ipv4 mvpn</b>	Specifies the MVPN address family and enters address family configuration mode. <ul style="list-style-type: none"> <li>• Use the <b>ipv4</b> keyword to configure IPv4 MVPN address family.</li> <li>• Use the <b>ipv6</b> keyword to configure IPv6 MVPN address family.</li> </ul>
<b>Step 5</b>	<b>neighbor ip-address activate</b> <b>Example:</b> Device(config-router-af)# <b>neighbor 10.2.2.20 activate</b>	Enables the exchange of information with a BGP neighbor. Use the IP address of the spine switch as the neighbor IP address.

	Command or Action	Purpose
<b>Step 6</b>	<b>neighbor <i>ip-address</i> send-community extended</b>  <b>Example:</b> Device(config-router-af)# <b>neighbor 10.2.2.20 send-community both</b>	Specifies the communities attribute sent to a BGP neighbor.  Use the IP address of the spine switch as the neighbor IP address.
<b>Step 7</b>	<b>neighbor <i>ip-address</i> advertisement-interval <i>seconds</i></b>  <b>Example:</b> Device(config-router-af)# <b>neighbor 10.2.2.20 advertisement-interval 10</b>	(Optional) Sets the minimum route advertisement interval (MRAI) between the sending of BGP routing updates.
<b>Step 8</b>	<b>exit-address-family</b>  <b>Example:</b> Device(config-router-af)# <b>exit-address-family</b>	Exits address family configuration mode and returns to router configuration mode.
<b>Step 9</b>	<b>end</b>  <b>Example:</b> Device(config-router)# <b>end</b>	Returns to privileged EXEC mode.

## Configuring RP for Underlay Network

To configure RP for the underlay network, perform the following steps:



**Note** We recommend that you configure the Spine Switch as the RP for the underlay network.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b>  <b>Example:</b> Device> <b>enable</b>	Enables privileged EXEC mode.  Enter your password, if prompted.
<b>Step 2</b>	<b>configure terminal</b>  <b>Example:</b> Device# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>ip pim rp-address <i>ip-address-of-rp</i></b>  <b>Example:</b> Device(config)# <b>ip pim rp-address &lt;rp-ip-address&gt;</b>	Configures the RP in the underlay network.  For information about RP redundancy, see <i>IP Multicast Routing Configuration Guide</i> .

	Command or Action	Purpose
<b>Step 4</b>	<b>end</b> <b>Example:</b> Device (config) # <b>end</b>	Returns to privileged EXEC mode.

## Configuring RP for Overlay Network

To configure RP for the overlay network, perform the following steps:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> <b>enable</b>	Enables privileged EXEC mode. Enter your password, if prompted.
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>interface loopback-interface</b> <b>Example:</b> Device (config) # <b>interface Loopback 13</b>	Enters interface configuration mode for the specified Loopback interface.
<b>Step 4</b>	<b>vrf forwarding vrf-name</b> <b>Example:</b> Device (config-if) # <b>vrf forwarding green</b>	Configures forwarding table for the Loopback interface.
<b>Step 5</b>	<b>ip-address ip-address subnet-mask</b> <b>Example:</b> Device (config-if) # <b>ip address 10.1.13.13 255.255.255.255</b>	Configures the IP address for the Loopback interface.
<b>Step 6</b>	<b>ip pim sparse-mode</b> <b>Example:</b> Device (config-if) # <b>ip pim sparse-mode</b>	Enables IPv4 multicast on the Loopback interface. <b>Note</b> Enable PIM sparse mode only if EVPN VXLAN Layer 2 overlay network is also configured on the VTEP with underlay multicast as the mechanism for forwarding BUM traffic.
<b>Step 7</b>	<b>exit</b> <b>Example:</b> Device (config-if) # <b>exit</b>	Returns to global configuration mode.

	Command or Action	Purpose
<b>Step 8</b>	<pre>{ip   ipv6 } pim vrf vrf-name rp-address rp-address</pre> <p><b>Example:</b></p> <pre>Device(config)# ip pim vrf green rp-address 10.1.13.13</pre>	<p>Configures the address of the local VTEP as the PIM RP for the multicast group.</p> <ul style="list-style-type: none"> <li>• In PIM-SM with Anycast RP mode, use the address of the loopback interface of the local VTEP.</li> <li>• In PIM-SM with RP either inside or outside the BGP EVPN VXLAN fabric, use the IP address of the RP.</li> </ul> <p><b>Note</b> The loopback interface specified must be part of the same VRF.</p>
<b>Step 9</b>	<pre>{ip   ipv6 } pim vrf vrf-name register-source loopback-address-of-vtep</pre> <p><b>Example:</b></p> <pre>Device(config)# ip pim vrf green register-source loopback901</pre>	<p>Configures a unique IP address for the loopback interface of the VTEP that acts as the first hop router to multicast traffic.</p>
<b>Step 10</b>	<pre>end</pre> <p><b>Example:</b></p> <pre>Device(config)# end</pre>	<p>Returns to privileged EXEC mode.</p>

## Configuring TRM with PIM Source Specific Mode

To configure TRM with PIM Source Specific Mode, perform the following tasks:

- [Configuring the TRM Multicast Distribution Tree in the VRF](#)
- [Configuring Multicast Routing on the Overlay VRF](#)
- [Configuring Multicast on Switch Virtual Interfaces for Core-facing and Access-facing VLANs](#)
- [Configuring BGP with MVPN Address Family on VTEP](#)
- [Configuring RP for Underlay Network](#)

## Configuring SSM for Overlay Network

To configure SSM for the overlay network, perform the following steps:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<pre>enable</pre> <p><b>Example:</b></p> <pre>Device&gt; enable</pre>	<p>Enables privileged EXEC mode.</p> <p>Enter your password, if prompted.</p>

	Command or Action	Purpose
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# <code>configure terminal</code>	Enters global configuration mode.
<b>Step 3</b>	<b>ip pim [vrf vrf-name ] ssm {default   range access-list }</b> <b>Example:</b> Device(config)# <code>ip pim vrf green ssm default</code>	Configures an SSM range for TRM. The <b>default</b> keyword defines the SSM range access list as 232/8. The <b>range</b> keyword specifies the standard IP access list number or name that defines the SSM range.
<b>Step 4</b>	<b>end</b> <b>Example:</b> Device(config)# <code>end</code>	Returns to privileged EXEC mode.

## Verifying Tenant Routed Multicast

The following table lists the **show** commands that are used to verify TRM:

Command	Purpose
<code>show nve peers</code>	Displays NVE interface state information for peer leaf switches.
<code>show l2vpn evpn peers vxlan</code>	Displays Layer 2 EVPN peer route counts in the VXLAN and up time.
<code>show ip igmp vrf green groups</code>	Displays the multicast groups with receivers that are directly connected to the router pertaining to the specific Multicast Virtual Routing and Forwarding (MVRF) instance and that were learned through IGMP.
<code>show bgp ipv4 mvpn all</code>	Displays the MVPN options for BGP MVPN C-route signaling.
<code>show ip mroute vrf green</code>	Displays the contents of the mroute table that pertain to a specific MVRF instance.
<code>show ip mfib vrf green</code>	Displays forwarding entries and interfaces in the IPv4 Multicast Forwarding Information Base (MFIB) associated with MVRF instances.
<code>show ip mroute</code>	Displays multicast routing table information.
<code>show ip mfib</code>	Displays the forwarding entries and interfaces in the IPv4 MFIB.



**Note** On the Cisco Catalyst 9600 Series Supervisor 2 Module, an overlay (S,G) entry is not created if there are no receivers on the Last Hop Router (LHR) VTEPs because the source natively drops the packets at hardware.

## Troubleshooting Tenant Routed Multicast

See [Troubleshoot EVPN VxLAN TRM on Catalyst 9000 Switches](#) document to learn how to troubleshoot issues with TRM in a BGP EVPN VXLAN fabric.

## Configuration Examples for Tenant Routed Multicast

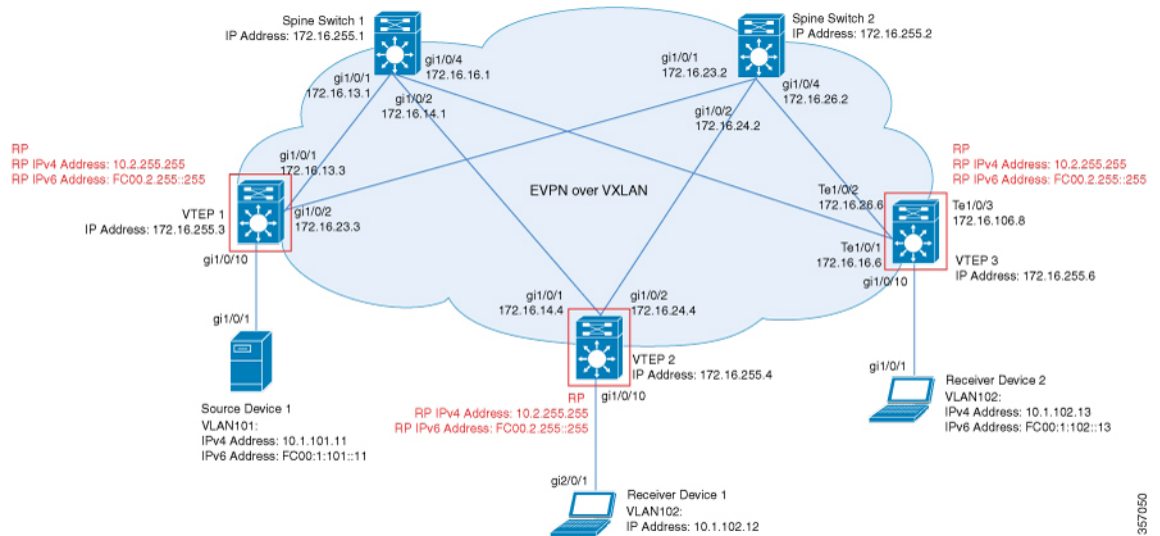
The following sections provide configuration examples for TRM in different scenarios.



**Note** These configuration examples do not have the Data MDT feature enabled.

### Example: Configuring TRM in PIM Sparse Mode with Anycast RP

This example shows how to configure and verify Layer 3 TRM with PIM-SM for IPv4 and IPv6 multicast traffic when the every VTEP is an RP is inside the BGP EVPN VXLAN fabric.



The topology shows an EVPN VXLAN network with a receiver device and a source device connected to VTEP 1 and VTEP 2 respectively. The IPv4 multicast group is 226.1.1.1 and the IPv6 multicast group is FF06:1::1 in this topology. The following tables provide sample configurations for the devices in this topology:



Table 1: Configuring VTEP 1, VTEP 2, and VTEP 3 to Configure TRM in PIM-SM with Anycast RP for IPv4 and IPv6 Multicast Traffic

VTEP 1	VTEP 2	VTEP 3
<pre>Leaf-01# show running-config hostname Leaf-01 ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp spt-only 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 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp spt-only 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 ip multicast-routing vrf green ! ipv6 unicast-routing ipv6 multicast-routing vrf green ! 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 ! system mtu 9198 ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 !</pre>	<pre>Leaf-02# show running-config hostname Leaf-02 ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp spt-only 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 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp spt-only 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 ip multicast-routing vrf green ! ipv6 unicast-routing ipv6 multicast-routing vrf green ! 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 ! system mtu 9198 ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 !</pre>	<pre>Leaf-03# show running-config hostname Leaf-03 ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp spt-only 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 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp spt-only 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 ip multicast-routing vrf green ! ipv6 unicast-routing ipv6 multicast-routing vrf green ! 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 ! system mtu 9198 ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 !</pre>

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

VTEP 1	VTEP 2	VTEP 3
<pre> interface Loopback0 ip address 172.16.255.3 255.255.255.255 ip pim sparse-mode 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 Loopback255 vrf forwarding green ip address 10.2.255.255 255.255.255.255 ip pim sparse-mode ipv6 address FC00:2:255::255/128 ipv6 enable ! interface Loopback901 vrf forwarding green ip address 10.1.255.1 255.255.255.255 ip pim sparse-mode ipv6 address FC00:1:255::1/128 ipv6 enable ! 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 ! 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 access vlan 101 switchport mode access ! </pre>	<pre> interface Loopback0 ip address 172.16.255.4 255.255.255.255 ip pim sparse-mode 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 Loopback255 vrf forwarding green ip address 10.2.255.255 255.255.255.255 ip pim sparse-mode ipv6 address FC00:2:255::2/128 ipv6 enable ! interface Loopback901 vrf forwarding green ip address 10.1.255.2 255.255.255.255 ip pim sparse-mode ipv6 address FC00:1:255::2/128 ipv6 enable ! 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 ! 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 access vlan 102 switchport mode access ! </pre>	<pre> interface Loopback0 ip address 172.16.255.6 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.6 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface Loopback255 vrf forwarding green ip address 10.2.255.255 255.255.255.255 ip pim sparse-mode ipv6 address FC00:2:255::255/128 ipv6 enable ! interface Loopback901 vrf forwarding green ip address 10.1.255.3 255.255.255.255 ip pim sparse-mode ipv6 address FC00:1:255::3/128 ipv6 enable ! interface TenGigabitEthernet1/0/1 no switchport ip address 172.16.16.6 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet1/0/2 no switchport ip address 172.16.26.6 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet1/0/10 switchport access vlan 102 switchport mode access ! </pre>

VTEP 1	VTEP 2	VTEP 3
<pre> interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:101::1/64 ipv6 enable ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:102::1/64 ipv6 enable ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode 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 mcast-group 225.0.0.102 ! 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 ! </pre>	<pre> interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:101::1/64 ipv6 enable ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:102::1/64 ipv6 enable ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode 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 mcast-group 225.0.0.102 ! 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 ! </pre>	<pre> interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:101::1/64 ipv6 enable ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:102::1/64 ipv6 enable ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode 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 mcast-group 225.0.0.102 ! router ospf 1 router-id 172.16.255.6 ! 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 ! </pre>

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

VTEP 1	VTEP 2	VTEP 3
<pre> address-family ipv4 exit-address-family ! address-family ipv4 mvpn 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 ipv6 mvpn 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 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 ! 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 vrf green rp-address 10.2.255.255 ! ipv6 pim vrf green rp-address FC00:2:255::255 ipv6 pim vrf green register-source Loopback901 ! end Leaf-01# </pre>	<pre> address-family ipv4 exit-address-family ! address-family ipv4 mvpn 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 ipv6 mvpn 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 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 ! 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 vrf green rp-address 10.2.255.255 ! ipv6 pim vrf green rp-address FC00:2:255::255 ipv6 pim vrf green register-source Loopback901 ! end Leaf-02# </pre>	<pre> address-family ipv4 exit-address-family ! address-family ipv4 mvpn 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 ipv6 mvpn 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 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 ! 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 vrf green rp-address 10.2.255.255 ! ipv6 pim vrf green rp-address FC00:2:255::255 ipv6 pim vrf green register-source Loopback901 ! end Leaf-03# </pre>

Table 2: Configuring Spine Switch 1 and Spine Switch 2 to Configure TRM in PIM-SM with Anycast RP for IPv4 and IPv6 Multicast Traffic

Spine Switch 1	Spine Switch 2
<pre> Spine-01# show running-config hostname Spine-01 ! ip routing ! ip multicast-routing ! ipv6 unicast-routing ! system mtu 9198 ! 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 ! interface GigabitEthernet1/0/4 no switchport ip address 172.16.16.1 255.255.255.0 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 neighbor 172.16.255.3 remote-as 65001 neighbor 172.16.255.3 update-source Loopback0 neighbor 172.16.255.4 remote-as 65001 neighbor 172.16.255.4 update-source Loopback0 neighbor 172.16.255.6 remote-as 65001 neighbor 172.16.255.6 update-source Loopback0 ! </pre>	<pre> Spine-02# show running-config hostname Spine-02 ! ip routing ! ip multicast-routing ! ipv6 unicast-routing ! system mtu 9198 ! 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 ! interface GigabitEthernet1/0/4 no switchport ip address 172.16.26.2 255.255.255.0 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 neighbor 172.16.255.3 remote-as 65001 neighbor 172.16.255.3 update-source Loopback0 neighbor 172.16.255.4 remote-as 65001 neighbor 172.16.255.4 update-source Loopback0 neighbor 172.16.255.6 remote-as 65001 neighbor 172.16.255.6 update-source Loopback0 ! </pre>

Spine Switch 1	Spine Switch 2
<pre> address-family ipv4 exit-address-family ! address-family ipv4 mvpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family ipv6 mvpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family l2vpn evpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client 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 ipv4 exit-address-family ! address-family ipv4 mvpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family ipv6 mvpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family l2vpn evpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client 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>

### Verifying TRM in PIM-SM with Anycast RP for IPv4 and IPv6 Multicast Traffic

The following sections provide sample outputs for **show** commands to verify TRM with PIM-SM on the devices in the topology configured above:

- [Outputs to Verify the Configuration on VTEP 1, on page 31](#)
- [Outputs to Verify the Configuration on VTEP 2, on page 38](#)
- [Outputs to Verify the Configuration on VTEP 3, on page 45](#)
- [Outputs to Verify the Configuration on Spine Switch 1, on page 53](#)

- [Outputs to Verify the Configuration on Spine Switch 2, on page 57](#)

### Outputs to Verify the Configuration on VTEP 1

The following example shows the output for the **show nve peers** command on VTEP 1:

```
Leaf-01# show nve peers
Interface VNI      Type Peer-IP           RMAC/Num_RTs  eVNI      state flags UP time
nve1     50901    L3CP 172.16.254.6     0c75.bd67.ef48 50901      UP  A/-/4 01:47:43
nve1     50901    L3CP 172.16.254.4     7c21.0dbd.9548 50901      UP  A/-/4 01:47:43
nve1     50901    L3CP 172.16.254.6     0c75.bd67.ef48 50901      UP  A/M/6 01:47:43
nve1     50901    L3CP 172.16.254.4     7c21.0dbd.9548 50901      UP  A/M/6 01:47:43
nve1     10102    L2CP 172.16.254.4     7              10102      UP   N/A 01:47:43
nve1     10102    L2CP 172.16.254.6     7              10102      UP   N/A 01:47:43
Leaf-01#
```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on VTEP 1:

```
Leaf-01# show l2vpn evpn peers vxlan
Interface VNI      Peer-IP           Num routes eVNI      UP time
-----
nve1     10102    172.16.254.4     7          10102     01:47:43
nve1     10102    172.16.254.6     7          10102     01:47:43
```

```
Leaf-01#show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.3, local AS number 65001
BGP table version is 8, main routing table version 8
3 network entries using 1176 bytes of memory
4 path entries using 640 bytes of memory
2/2 BGP path/bestpath attribute entries using 608 bytes of memory
4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
14 BGP extended community entries using 1848 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 4456 total bytes of memory
BGP activity 69/0 prefixes, 92/2 paths, scan interval 60 secs
3 networks peaked at 11:32:31 Sep 16 2020 UTC (01:42:43.716 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001   140    127     8     0    0 01:48:48    1
172.16.255.2  4      65001   146    128     8     0    0 01:48:40    1
Leaf-01#
```

The following example shows the output for the **show bgp ipv6 mvpn all** command on VTEP 1:

```
Leaf-01# show bgp ipv6 mvpn all
BGP table version is 8, local router ID is 172.16.255.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

Network      Next Hop           Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
*> [5] [1:1] [FC00:1:101::11] [FF06:1::1]/42
```

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

```

::: 32768 ?
*>i [7][1:1][65001][FC00:1:101::11][FF06:1::1]/46
172.16.255.4 0 100 0 ?
Route Distinguisher: 172.16.254.3:101
* i [7][172.16.254.3:101][65001][FC00:1:101::11][FF06:1::1]/46
172.16.255.4 0 100 0 ?
*>i 172.16.255.4 0 100 0 ?
Leaf-01#

```

The following example shows the output for the **show bgp l2vpn evpn summary** command on VTEP 1:

```

Leaf-01# show bgp l2vpn evpn summary
BGP router identifier 172.16.255.3, local AS number 65001
BGP table version is 65, main routing table version 65
42 network entries using 16128 bytes of memory
60 path entries using 12720 bytes of memory
11/11 BGP path/bestpath attribute entries using 3168 bytes of memory
4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
14 BGP extended community entries using 1848 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 34048 total bytes of memory
BGP activity 69/0 prefixes, 92/2 paths, scan interval 60 secs
42 networks peaked at 11:27:30 Sep 16 2020 UTC (01:47:45.010 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001   140    127     65    0    0 01:48:48      18
172.16.255.2  4      65001   146    128     65    0    0 01:48:40      18
Leaf-01#

```

The following example shows the output for the **show bgp l2vpn evpn** command on VTEP 1:

```

Leaf-01# show bgp l2vpn evpn summary
BGP table version is 65, local router ID is 172.16.255.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

Network      Next Hop      Metric LocPrf Weight Path
Route Distinguisher: 172.16.254.3:101
*> [2][172.16.254.3:101][0][48][10B3D56A8FC1][32][10.1.101.1]/24
::: 32768 ?
*> [2][172.16.254.3:101][0][48][10B3D56A8FC1][128][FC00:1:101::1]/36
::: 32768 ?
*> [2][172.16.254.3:101][0][48][F4CFE24334C1][0][*]/20
::: 32768 ?
*> [2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24
::: 32768 ?
*> [2][172.16.254.3:101][0][48][F4CFE24334C1][128][FC00:1:101::11]/36
::: 32768 ?
*> [2][172.16.254.3:101][0][48][F4CFE24334C1][128][FE80::F6CF:E2FF:FE43:34C1]/36
::: 32768 ?
Route Distinguisher: 172.16.254.3:102
*>i [2][172.16.254.3:102][0][48][0C75BD67EF4D][32][10.1.102.1]/24
172.16.254.6 0 100 0 ?

```



```

*>i [2] [172.16.254.3:102] [0] [48] [0C75BD67EF4D] [128] [FC00:1:102::1]/36
    172.16.254.6          0      100      0 ?
*>i [2] [172.16.254.3:102] [0] [48] [44D3CA286CC5] [0] [*]/20
    172.16.254.4          0      100      0 ?
*>i [2] [172.16.254.3:102] [0] [48] [44D3CA286CC5] [32] [10.1.102.12]/24
    172.16.254.4          0      100      0 ?
*>i [2] [172.16.254.3:102] [0] [48] [44D3CA286CC5] [128] [FC00:1:102::12]/36
    172.16.254.4          0      100      0 ?
*>i [2] [172.16.254.3:102] [0] [48] [44D3CA286CC5] [128] [FE80::46D3:CAFF:FE28:6CC5]/36
    172.16.254.4          0      100      0 ?
*>i [2] [172.16.254.3:102] [0] [48] [7C210DBD954D] [32] [10.1.102.1]/24
    172.16.254.4          0      100      0 ?
*>i [2] [172.16.254.3:102] [0] [48] [7C210DBD954D] [128] [FC00:1:102::1]/36
    172.16.254.4          0      100      0 ?
*>i [2] [172.16.254.3:102] [0] [48] [ECE1A93792C5] [0] [*]/20
    172.16.254.6          0      100      0 ?
*>i [2] [172.16.254.3:102] [0] [48] [ECE1A93792C5] [32] [10.1.102.13]/24
    172.16.254.6          0      100      0 ?
*>i [2] [172.16.254.3:102] [0] [48] [ECE1A93792C5] [128] [FC00:1:102::13]/36
    172.16.254.6          0      100      0 ?
*>i [2] [172.16.254.3:102] [0] [48] [ECE1A93792C5] [128] [FE80::EEE1:A9FF:FE37:92C5]/36
    172.16.254.6          0      100      0 ?
Route Distinguisher: 172.16.254.4:102
*>i [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [0] [*]/20
    172.16.254.4          0      100      0 ?
* i      172.16.254.4          0      100      0 ?
*>i [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [32] [10.1.102.12]/24
    172.16.254.4          0      100      0 ?
* i      172.16.254.4          0      100      0 ?
*>i [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [128] [FC00:1:102::12]/36
    172.16.254.4          0      100      0 ?
* i      172.16.254.4          0      100      0 ?
*>i [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [128] [FE80::46D3:CAFF:FE28:6CC5]/36
    172.16.254.4          0      100      0 ?
* i      172.16.254.4          0      100      0 ?
*>i [2] [172.16.254.4:102] [0] [48] [7C210DBD954D] [32] [10.1.102.1]/24
    172.16.254.4          0      100      0 ?
* i      172.16.254.4          0      100      0 ?
*>i [2] [172.16.254.4:102] [0] [48] [7C210DBD954D] [128] [FC00:1:102::1]/36
    172.16.254.4          0      100      0 ?
* i      172.16.254.4          0      100      0 ?
Route Distinguisher: 172.16.254.6:102
*>i [2] [172.16.254.6:102] [0] [48] [0C75BD67EF4D] [32] [10.1.102.1]/24
    172.16.254.6          0      100      0 ?
* i      172.16.254.6          0      100      0 ?
*>i [2] [172.16.254.6:102] [0] [48] [0C75BD67EF4D] [128] [FC00:1:102::1]/36
    172.16.254.6          0      100      0 ?
* i      172.16.254.6          0      100      0 ?
*>i [2] [172.16.254.6:102] [0] [48] [ECE1A93792C5] [0] [*]/20
    172.16.254.6          0      100      0 ?
* i      172.16.254.6          0      100      0 ?
*>i [2] [172.16.254.6:102] [0] [48] [ECE1A93792C5] [32] [10.1.102.13]/24
    172.16.254.6          0      100      0 ?
* i      172.16.254.6          0      100      0 ?
*>i [2] [172.16.254.6:102] [0] [48] [ECE1A93792C5] [128] [FC00:1:102::13]/36
    172.16.254.6          0      100      0 ?
* i      172.16.254.6          0      100      0 ?
*>i [2] [172.16.254.6:102] [0] [48] [ECE1A93792C5] [128] [FE80::EEE1:A9FF:FE37:92C5]/36
    172.16.254.6          0      100      0 ?
* i      172.16.254.6          0      100      0 ?
Route Distinguisher: 1:1 (default for vrf green)
*> [5] [1:1] [0] [24] [10.1.101.0]/17
    0.0.0.0                0                32768 ?
*>i [5] [1:1] [0] [24] [10.1.102.0]/17

```

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

```

          172.16.254.4          0 100 0 ?
* i          172.16.254.4          0 100 0 ?
*> [5] [1:1] [0] [32] [10.1.255.1]/17
          0.0.0.0          0          32768 ?
*>i [5] [1:1] [0] [32] [10.1.255.2]/17
          172.16.254.4          0 100 0 ?
* i          172.16.254.4          0 100 0 ?
*>i [5] [1:1] [0] [32] [10.1.255.3]/17
          172.16.254.6          0 100 0 ?
* i          172.16.254.6          0 100 0 ?
*> [5] [1:1] [0] [32] [10.2.255.255]/17
          0.0.0.0          0          32768 ?
*> [5] [1:1] [0] [64] [FC00:1:101::]/29
          ::          0          32768 ?
*>i [5] [1:1] [0] [64] [FC00:1:102::]/29
          172.16.254.4          0 100 0 ?
* i          172.16.254.4          0 100 0 ?
*> [5] [1:1] [0] [128] [FC00:1:255::1]/29
          ::          0          32768 ?
*>i [5] [1:1] [0] [128] [FC00:1:255::2]/29
          172.16.254.4          0 100 0 ?
* i          172.16.254.4          0 100 0 ?
*>i [5] [1:1] [0] [128] [FC00:1:255::3]/29
          172.16.254.6          0 100 0 ?
* i          172.16.254.6          0 100 0 ?
*> [5] [1:1] [0] [128] [FC00:2:255::255]/29
          ::          0          32768 ?
Leaf-01#

```

The following example shows the output for the **show ipv6 pim vrf vrf-name group-map** command on VTEP 1:

```

Leaf-01# show ipv6 pim vrf green group-map ff06:1::1
IP PIM Group Mapping Table
(* indicates group mappings being used)

FF00::/8*
  SM, RP: FC00:2:255::255
  RPF: Tu2,FC00:2:255::255 (us)
  Info source: Static
  Uptime: 01:49:05, Groups: 1
Leaf-01#

```

The following example shows the output for the **show ipv6 route vrf** command on VTEP 1:

```

Leaf-01# show ipv6 route vrf green FC00:2:255::255
Routing entry for FC00:2:255::255/128
  Known via "connected", distance 0, metric 0, type receive, connected
  Redistributing via bgp 65001
  Route count is 1/1, share count 0
  Routing paths:
    receive via Loopback255
    Last updated 01:49:06 ago
Leaf-01#

```

The following example shows the output for the **show ipv6 mld vrf vrf-name groups** command on VTEP 1:

```
Leaf-01# show ipv6 mld vrf green groups
No groups found.
Leaf-01#
```

The following example shows the output for the **show ipv6 mroute vrf vrf-name** command on VTEP 1:

```
Leaf-01# show ipv6 mroute vrf green
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, I - Received Source Specific Host Report,
       P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
       J - Join SPT, Y - Joined MDT-data group,
       y - Sending to MDT-data group
       g - BGP signal originated, G - BGP Signal received,
       N - BGP Shared-Tree Prune received, n - BGP C-Mroute suppressed,
       q - BGP Src-Active originated, Q - BGP Src-Active received
       E - Extranet
Timers: Uptime/Expires
Interface state: Interface, State

(FC00:1:101::11, FF06:1::1), 01:42:44/00:03:19, flags: SFTGq
Incoming interface: Vlan101
RPF nbr: FE80::F6CF:E2FF:FE43:34C1
Immediate Outgoing interface list:
  Vlan901, Forward, 01:42:44/never
Leaf-01#
```

The following example shows the output for the **show ipv6 mfib vrf vrf-name** command on VTEP 1:

```
Leaf-01# show ipv6 mfib vrf green
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             ET - Data Rate Exceeds Threshold, K - Keepalive
             DDE - Data Driven Event, HW - Hardware Installed
             ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
             MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
             MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
             e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
               NS - Negate Signalling, SP - Signal Present,
               A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
               MA - MFIB Accept, A2 - Accept backup,
               RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
VRF green
(FC00:1:101::11,FF06:1::1) Flags: HW
SW Forwarding: 0/0/0/0, Other: 1/0/1
HW Forwarding: 3161/0/118/0, Other: 0/0/0
Vlan101 Flags: A
Vlan901, VXLAN v4 Encap (50901, 239.1.1.1) Flags: F
Pkts: 0/0/0   Rate: 0 pps
Leaf-01#
```

The following example shows the output for the **show ip mroute** command on VTEP 1:

```
Leaf-01# show ip mroute
IP Multicast Routing Table
```

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

```

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

(*, 239.1.1.1), 01:48:56/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, 01:48:56/00:02:56

(172.16.254.3, 239.1.1.1), 01:42:42/00:03:20, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 01:42:42/00:03:03

(*, 224.0.1.40), 01:49:06/00:02:55, RP 172.16.255.255, flags: SJCL
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Loopback0, Forward/Sparse, 01:49:05/00:02:55

(*, 225.0.0.102), 01:48:56/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 01:48:56/00:02:56

(172.16.254.4, 225.0.0.102), 01:48:17/00:01:19, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 01:48:17/00:02:56

(172.16.254.6, 225.0.0.102), 01:48:23/00:01:18, flags: Tx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 01:48:23/00:02:56

(*, 225.0.0.101), 01:49:01/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, 01:48:56/00:02:56

(172.16.254.3, 225.0.0.101), 01:49:01/00:02:45, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 01:48:25/00:03:12
Leaf-01#

```

The following example shows the output for the **show ip mfib** command on VTEP 1:

```

Leaf-01# show ip mfib
Entry Flags:      C - Directly Connected, S - Signal, IA - Inherit A flag,

```

```

ET - Data Rate Exceeds Threshold, K - Keepalive
DDE - Data Driven Event, HW - Hardware Installed
ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
NS - Negate Signalling, SP - Signal Present,
A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
MA - MFIB Accept, A2 - Accept backup,
RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Loopback0 Flags: F IC NS
    Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 2/0/125/0, Other: 1/0/1
  HW Forwarding: 554/0/163/0, Other: 0/0/0
  Null0 Flags: A
  GigabitEthernet1/0/2 Flags: F NS
    Pkts: 0/0/1   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 1/0/172/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/154/0, Other: 0/0/0
  HW Forwarding: 561/0/176/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 1/1/0
  HW Forwarding: 504/0/205/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps

```

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

```
(172.16.254.3,239.1.1.1) Flags: HW
SW Forwarding: 1/0/150/0, Other: 1/1/0
HW Forwarding: 3071/0/156/0, Other: 0/0/0
Null0 Flags: A
GigabitEthernet1/0/2 Flags: F NS
Pkts: 0/0/0 Rate: 0 pps
Leaf-01#
```

Return to [Verifying TRM in PIM-SM with Anycast RP for IPv4 and IPv6 Multicast Traffic](#), on page 30

## Outputs to Verify the Configuration on VTEP 2

The following example shows the output for the **show nve peers** command on VTEP 2:

```
Leaf-02# show nve peers
Interface VNI      Type Peer-IP          RMAC/Num_RTs  eVNI      state flags UP time
nve1      50901  L3CP 172.16.254.6   0c75.bd67.ef48 50901      UP  A/-/4 01:52:57
nve1      50901  L3CP 172.16.254.3    10b3.d56a.8fc8 50901      UP  A/-/4 01:52:57
nve1      50901  L3CP 172.16.254.6    0c75.bd67.ef48 50901      UP  A/M/6 01:52:57
nve1      50901  L3CP 172.16.254.3    10b3.d56a.8fc8 50901      UP  A/M/6 01:52:57
nve1      10101  L2CP 172.16.254.3     7              10101      UP  N/A   01:52:57
nve1      10102  L2CP 172.16.254.6     7              10102      UP  N/A   01:52:57
Leaf-02#
```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on VTEP 2:

```
Leaf-02# show l2vpn evpn peers vxlan
Interface VNI      Peer-IP          Num routes eVNI      UP time
-----
nve1      10101  172.16.254.3    7          10101    01:52:57
nve1      10102  172.16.254.6    7          10102    01:52:57
Leaf-02#
```

The following example shows the output for the **show bgp ipv6 mvpn all summary** command on VTEP 2:

```
Leaf-02# show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.4, local AS number 65001
BGP table version is 5, main routing table version 5
2 network entries using 784 bytes of memory
3 path entries using 480 bytes of memory
2/2 BGP path/bestpath attribute entries using 608 bytes of memory
4 BGP rinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
14 BGP extended community entries using 1848 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 3904 total bytes of memory
BGP activity 70/0 prefixes, 101/6 paths, scan interval 60 secs
2 networks peaked at 11:37:07 Sep 16 2020 UTC (01:47:58.150 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001   150   133     5      0     0 01:53:34      1
172.16.255.2  4      65001   151   134     5      0     0 01:53:30      1
Leaf-02#
```

The following example shows the output for the **show bgp ipv6 mvpn all** command on VTEP 2:

```
Leaf-02# show bgp ipv6 mvpn all
BGP table version is 5, local router ID is 172.16.255.4
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
* i   [5][1:1][FC00:1:101::11][FF06:1::1]/42
      172.16.255.3          0      100      0 ?
*>i   172.16.255.3          0      100      0 ?
Route Distinguisher: 172.16.254.3:101
*>   [7][172.16.254.3:101][65001][FC00:1:101::11][FF06:1::1]/46
      ::                      32768 ?
Leaf-02#
```

The following example shows the output for the **show bgp l2vpn evpn summary** command on VTEP 2:

```
Leaf-02# show bgp l2vpn evpn summary
BGP router identifier 172.16.255.4, local AS number 65001
BGP table version is 43, main routing table version 43
42 network entries using 16128 bytes of memory
64 path entries using 13568 bytes of memory
12/12 BGP path/bestpath attribute entries using 3456 bytes of memory
4 BGP rinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
14 BGP extended community entries using 1848 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 35184 total bytes of memory
BGP activity 70/0 prefixes, 101/6 paths, scan interval 60 secs
42 networks peaked at 11:32:07 Sep 16 2020 UTC (01:52:58.436 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ OutQ Up/Down  State/PfxRcd
172.16.255.1  4      65001   150    133     43    0   0 01:53:35    20
172.16.255.2  4      65001   151    134     43    0   0 01:53:31    20
Leaf-02#
```

The following example shows the output for the **show bgp l2vpn evpn** command on VTEP 2:

```
Leaf-02# show bgp l2vpn evpn
BGP table version is 43, local router ID is 172.16.255.4
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 172.16.254.3:101
*>i   [2][172.16.254.3:101][0][48][10B3D56A8FC1][32][10.1.101.1]/24
      172.16.254.3          0      100      0 ?
* i   172.16.254.3          0      100      0 ?
```

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

```

*>i [2][172.16.254.3:101][0][48][10B3D56A8FC1][128][FC00:1:101::1]/36
      172.16.254.3          0    100    0 ?
* i      172.16.254.3          0    100    0 ?
*>i [2][172.16.254.3:101][0][48][F4CFE24334C1][0][*]/20
      172.16.254.3          0    100    0 ?
* i      172.16.254.3          0    100    0 ?
*>i [2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24
      172.16.254.3          0    100    0 ?
* i      172.16.254.3          0    100    0 ?
*>i [2][172.16.254.3:101][0][48][F4CFE24334C1][128][FC00:1:101::11]/36
      172.16.254.3          0    100    0 ?
* i      172.16.254.3          0    100    0 ?
*>i [2][172.16.254.3:101][0][48][F4CFE24334C1][128][FE80::F6CF:E2FF:FE43:34C1]/36
      172.16.254.3          0    100    0 ?
* i      172.16.254.3          0    100    0 ?
Route Distinguisher: 172.16.254.4:101
*>i [2][172.16.254.4:101][0][48][10B3D56A8FC1][32][10.1.101.1]/24
      172.16.254.3          0    100    0 ?
*>i [2][172.16.254.4:101][0][48][10B3D56A8FC1][128][FC00:1:101::1]/36
      172.16.254.3          0    100    0 ?
*>i [2][172.16.254.4:101][0][48][F4CFE24334C1][0][*]/20
      172.16.254.3          0    100    0 ?
*>i [2][172.16.254.4:101][0][48][F4CFE24334C1][32][10.1.101.11]/24
      172.16.254.3          0    100    0 ?
*>i [2][172.16.254.4:101][0][48][F4CFE24334C1][128][FC00:1:101::11]/36
      172.16.254.3          0    100    0 ?
*>i [2][172.16.254.4:101][0][48][F4CFE24334C1][128][FE80::F6CF:E2FF:FE43:34C1]/36
      172.16.254.3          0    100    0 ?
Route Distinguisher: 172.16.254.4:102
*>i [2][172.16.254.4:102][0][48][0C75BD67EF4D][32][10.1.102.1]/24
      172.16.254.6          0    100    0 ?
*>i [2][172.16.254.4:102][0][48][0C75BD67EF4D][128][FC00:1:102::1]/36
      172.16.254.6          0    100    0 ?
*> [2][172.16.254.4:102][0][48][44D3CA286CC5][0][*]/20
      ::                      32768 ?
*> [2][172.16.254.4:102][0][48][44D3CA286CC5][32][10.1.102.12]/24
      ::                      32768 ?
*> [2][172.16.254.4:102][0][48][44D3CA286CC5][128][FC00:1:102::12]/36
      ::                      32768 ?
*> [2][172.16.254.4:102][0][48][44D3CA286CC5][128][FE80::46D3:CAFF:FE28:6CC5]/36
      ::                      32768 ?
*> [2][172.16.254.4:102][0][48][7C210DBD954D][32][10.1.102.1]/24
      ::                      32768 ?
*> [2][172.16.254.4:102][0][48][7C210DBD954D][128][FC00:1:102::1]/36
      ::                      32768 ?
*>i [2][172.16.254.4:102][0][48][ECE1A93792C5][0][*]/20
      172.16.254.6          0    100    0 ?
*>i [2][172.16.254.4:102][0][48][ECE1A93792C5][32][10.1.102.13]/24
      172.16.254.6          0    100    0 ?
*>i [2][172.16.254.4:102][0][48][ECE1A93792C5][128][FC00:1:102::13]/36
      172.16.254.6          0    100    0 ?
*>i [2][172.16.254.4:102][0][48][ECE1A93792C5][128][FE80::EEE1:A9FF:FE37:92C5]/36
      172.16.254.6          0    100    0 ?
Route Distinguisher: 172.16.254.6:102
*>i [2][172.16.254.6:102][0][48][0C75BD67EF4D][32][10.1.102.1]/24
      172.16.254.6          0    100    0 ?
* i      172.16.254.6          0    100    0 ?
*>i [2][172.16.254.6:102][0][48][0C75BD67EF4D][128][FC00:1:102::1]/36
      172.16.254.6          0    100    0 ?
* i      172.16.254.6          0    100    0 ?
*>i [2][172.16.254.6:102][0][48][ECE1A93792C5][0][*]/20
      172.16.254.6          0    100    0 ?
* i      172.16.254.6          0    100    0 ?
*>i [2][172.16.254.6:102][0][48][ECE1A93792C5][32][10.1.102.13]/24

```



```

          172.16.254.6          0    100    0 ?
* i          172.16.254.6          0    100    0 ?
*>i [2] [172.16.254.6:102] [0] [48] [ECE1A93792C5] [128] [FC00:1:102::13]/36
          172.16.254.6          0    100    0 ?
* i          172.16.254.6          0    100    0 ?
*>i [2] [172.16.254.6:102] [0] [48] [ECE1A93792C5] [128] [FE80::EEE1:A9FF:FE37:92C5]/36
          172.16.254.6          0    100    0 ?
* i          172.16.254.6          0    100    0 ?
Route Distinguisher: 1:1 (default for vrf green)
*>i [5] [1:1] [0] [24] [10.1.101.0]/17
          172.16.254.3          0    100    0 ?
* i          172.16.254.3          0    100    0 ?
*> [5] [1:1] [0] [24] [10.1.102.0]/17
          0.0.0.0                0          32768 ?
*>i [5] [1:1] [0] [32] [10.1.255.1]/17
          172.16.254.3          0    100    0 ?
* i          172.16.254.3          0    100    0 ?
*> [5] [1:1] [0] [32] [10.1.255.2]/17
          0.0.0.0                0          32768 ?
*>i [5] [1:1] [0] [32] [10.1.255.3]/17
          172.16.254.6          0    100    0 ?
* i          172.16.254.6          0    100    0 ?
* i [5] [1:1] [0] [32] [10.2.255.255]/17
          172.16.254.3          0    100    0 ?
* i          172.16.254.3          0    100    0 ?
*> [5] [1:1] [0] [64] [FC00:1:101::]/29
          172.16.254.3          0    100    0 ?
* i          172.16.254.3          0    100    0 ?
*> [5] [1:1] [0] [64] [FC00:1:102::]/29
          ::                    0          32768 ?
*>i [5] [1:1] [0] [128] [FC00:1:255::1]/29
          172.16.254.3          0    100    0 ?
* i          172.16.254.3          0    100    0 ?
*> [5] [1:1] [0] [128] [FC00:1:255::2]/29
          ::                    0          32768 ?
*>i [5] [1:1] [0] [128] [FC00:1:255::3]/29
          172.16.254.6          0    100    0 ?
* i          172.16.254.6          0    100    0 ?
* i [5] [1:1] [0] [128] [FC00:2:255::255]/29
          172.16.254.3          0    100    0 ?
* i          172.16.254.3          0    100    0 ?
*> [5] [1:1] [0] [128] [FC00:2:255::255]/29
          ::                    0          32768 ?
Leaf-02#

```

The following example shows the output for the **show ipv6 pim vrf vrf-name group-map** command on VTEP 2:

```

Leaf-02# show ipv6 pim vrf green group-map ff06:1::1
IP PIM Group Mapping Table
(* indicates group mappings being used)

FF00::/8*
  SM, RP: FC00:2:255::255
  RPF: Tu2,FC00:2:255::255 (us)
  Info source: Static
  Uptime: 01:54:21, Groups: 1
Leaf-02#

```

The following example shows the output for the **show ipv6 route vrf** command on VTEP 2:

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

```
Leaf-02# show ipv6 route vrf green FC00:2:255::255
Routing entry for FC00:2:255::255/128
  Known via "connected", distance 0, metric 0, type receive, connected
  Redistributing via bgp 65001
  Route count is 1/1, share count 0
  Routing paths:
    receive via Loopback255
    Last updated 01:54:21 ago
Leaf-02#
```

The following example shows the output for the **show ipv6 mld vrf vrf-name groups** command on VTEP 2:

```
Leaf-02# show ipv6 mld vrf green groups
MLD Connected Group Membership
Group Address                               Interface
  Uptime    Expires
FF06:1::1                                     Vlan102
  01:53:45  00:03:52
Leaf-02#
```

The following example shows the output for the **show ipv6 mroute vrf vrf-name** command on VTEP 2:

```
Leaf-02# show ipv6 mroute vrf green
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, I - Received Source Specific Host Report,
       P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
       J - Join SPT, Y - Joined MDT-data group,
       y - Sending to MDT-data group
       g - BGP signal originated, G - BGP Signal received,
       n - BGP Shared-Tree Prune received, N - BGP C-Mroute suppressed,
       q - BGP Src-Active originated, Q - BGP Src-Active received
       E - Extranet
Timers: Uptime/Expires
Interface state: Interface, State

(*, FF06:1::1), 01:53:45/never, RP FC00:2:255::255, flags: SCJ
  Incoming interface: Tunnel2
  RPF nbr: FC00:2:255::255
  Immediate Outgoing interface list:
    Vlan102, Forward, 01:53:45/never

(FC00:1:101::11, FF06:1::1), 01:47:58/never, flags: STgQ
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.3
  Inherited Outgoing interface list:
    Vlan102, Forward, 01:53:45/never
Leaf-02#
```

The following example shows the output for the **show ipv6 mfib vrf vrf-name** command on VTEP 2:

```
Leaf-02# show ipv6 mfib vrf green
Entry Flags:   C - Directly Connected, S - Signal, IA - Inherit A flag,
              DDE - Data Rate Exceeds Threshold, K - Keepalive
              DDE - Data Driven Event, HW - Hardware Installed
              ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
              MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
              MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
```

```

e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,
                A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                MA - MFIB Accept, A2 - Accept backup,
                RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
VRF green
(*,FF06:1::1) Flags: C HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnel2 Flags: A NS
Vlan102 Flags: F NS
Pkts: 0/0/0   Rate: 0 pps
(FC00:1:101::11,FF06:1::1) Flags: HW
SW Forwarding: 1/0/100/0, Other: 0/0/0
HW Forwarding: 3225/0/126/0, Other: 0/0/0
Vlan901, VXLAN Decap Flags: A
Vlan102 Flags: F NS
Pkts: 0/0/1   Rate: 0 pps
Leaf-02#

```

The following example shows the output for the **show ip mroute** command on VTEP 2:

```

Leaf-02# show ip mroute
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,
e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 239.1.1.1), 01:54:12/stopped, RP 172.16.255.255, flags: SJCx
Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
Outgoing interface list:
Tunnel0, Forward/Sparse, 01:54:12/00:00:41

(172.16.254.3, 239.1.1.1), 01:47:56/00:02:39, flags: JTx
Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
Outgoing interface list:
Tunnel0, Forward/Sparse, 01:47:56/00:00:03

(*, 224.0.1.40), 01:54:21/00:02:39, RP 172.16.255.255, flags: SJCL
Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
Outgoing interface list:
Loopback0, Forward/Sparse, 01:54:20/00:02:39

```

```

(*, 225.0.0.102), 01:54:12/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, 01:54:12/00:00:41

(172.16.254.6, 225.0.0.102), 01:53:36/00:00:58, flags: Tx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 01:53:36/00:00:41

(172.16.254.4, 225.0.0.102), 01:53:47/00:02:53, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 01:53:36/00:02:40, A

(*, 225.0.0.101), 01:54:12/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 01:54:12/00:00:41

(172.16.254.3, 225.0.0.101), 01:53:11/00:01:39, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 01:53:11/00:00:48
Leaf-02#

```

The following example shows the output for the **show ip mfib** command on VTEP 2:

```

Leaf-02# show ip mfib
Entry Flags:   C - Directly Connected, S - Signal, IA - Inherit A flag,
               ET - Data Rate Exceeds Threshold, K - Keepalive
               DDE - Data Driven Event, HW - Hardware Installed
               ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
               MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
               MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
               e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,
                A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                MA - MFIB Accept, A2 - Accept backup,
                RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Loopback0 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 1/0/190/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW

```

```

SW Forwarding: 1/0/172/0, Other: 0/0/0
HW Forwarding: 529/0/177/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1    Rate: 0 pps
(*,225.0.0.102) Flags: C HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0    Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
SW Forwarding: 2/0/163/0, Other: 3/1/2
HW Forwarding: 631/0/163/0, Other: 0/0/0
Null0 Flags: A
GigabitEthernet1/0/2 Flags: F
  Pkts: 0/0/2    Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 530/0/205/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0    Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 1/0/168/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0    Rate: 0 pps
(172.16.254.3,239.1.1.1) Flags: HW
SW Forwarding: 1/0/150/0, Other: 0/0/0
HW Forwarding: 3224/0/168/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1    Rate: 0 pps
Leaf-02#

```

Return to [Verifying TRM in PIM-SM with Anycast RP for IPv4 and IPv6 Multicast Traffic, on page 30](#)

### Outputs to Verify the Configuration on VTEP 3

The following example shows the output for the **show nve peers** command on VTEP 3:

```

Leaf-03# show nve peers
Interface  VNI      Type Peer-IP      RMAC/Num_RTs  eVNI      state flags UP time
nve1      50901    L3CP 172.16.254.3  10b3.d56a.8fc8 50901     UP  A/-/4 02:01:22
nve1      50901    L3CP 172.16.254.4  7c21.0dbd.9548 50901     UP  A/-/4 02:01:22
nve1      50901    L3CP 172.16.254.3  10b3.d56a.8fc8 50901     UP  A/M/6 02:01:22
nve1      50901    L3CP 172.16.254.4  7c21.0dbd.9548 50901     UP  A/M/6 02:01:22
nve1      10101    L2CP 172.16.254.3  7          10101     UP  N/A   02:01:22
nve1      10102    L2CP 172.16.254.4  7          10102     UP  N/A   02:01:22
Leaf-03#

```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on VTEP 3:

```

Leaf-03# show l2vpn evpn peers vxlan

```

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

Interface	VNI	Peer-IP	Num routes	eVNI	UP time
nve1	10101	172.16.254.3	7	10101	02:01:23
nve1	10102	172.16.254.4	7	10102	02:01:23

Leaf-03#

The following example shows the output for the **show bgp ipv6 mvpn all summary** command on VTEP 3:

```
Leaf-03# show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.6, local AS number 65001
BGP table version is 5, main routing table version 5
2 network entries using 784 bytes of memory
3 path entries using 480 bytes of memory
2/2 BGP path/bestpath attribute entries using 608 bytes of memory
4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
14 BGP extended community entries using 1848 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 3904 total bytes of memory
BGP activity 66/0 prefixes, 97/0 paths, scan interval 60 secs
2 networks peaked at 11:29:08 Sep 16 2020 UTC (01:56:22.908 ago)
```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
172.16.255.1	4	65001	160	143	5	0	0	02:01:59	1
172.16.255.2	4	65001	159	142	5	0	0	02:01:59	1

Leaf-03#

The following example shows the output for the **show bgp ipv6 mvpn all** command on VTEP 3:

```
Leaf-03# show bgp ipv6 mvpn all
BGP table version is 5, local router ID is 172.16.255.6
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found
```

Network	Next Hop	Metric	LocPrf	Weight	Path
Route Distinguisher: 1:1 (default for vrf green)					
* i [5][1:1][FC00:1:101::11][FF06:1::1]/42	172.16.255.3	0	100	0	?
*>i	172.16.255.3	0	100	0	?
Route Distinguisher: 172.16.254.3:101					
*> [7][172.16.254.3:101][65001][FC00:1:101::11][FF06:1::1]/46	::			32768	?

Leaf-03#

The following example shows the output for the **show bgp l2vpn evpn summary** command on VTEP 3:

```
Leaf-03# show bgp l2vpn evpn summary
BGP router identifier 172.16.255.6, local AS number 65001
BGP table version is 51, main routing table version 51
42 network entries using 16128 bytes of memory
68 path entries using 14416 bytes of memory
12/12 BGP path/bestpath attribute entries using 3456 bytes of memory
```

```

4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
14 BGP extended community entries using 1848 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 36032 total bytes of memory
BGP activity 66/0 prefixes, 97/0 paths, scan interval 60 secs
42 networks peaked at 11:24:07 Sep 16 2020 UTC (02:01:24.200 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001   160    143     51    0    0 02:02:00      22
172.16.255.2  4      65001   159    142     51    0    0 02:01:59      22
Leaf-03#

```

The following example shows the output for the **show bgp l2vpn evpn** command on VTEP 3:

```

Leaf-03# show bgp l2vpn evpn
BGP table version is 51, local router ID is 172.16.255.6
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 172.16.254.3:101
*>i  [2] [172.16.254.3:101] [0] [48] [10B3D56A8FC1] [32] [10.1.101.1]/24
      172.16.254.3          0      100      0 ?
* i   172.16.254.3          0      100      0 ?
*>i  [2] [172.16.254.3:101] [0] [48] [10B3D56A8FC1] [128] [FC00:1:101::1]/36
      172.16.254.3          0      100      0 ?
* i   172.16.254.3          0      100      0 ?
*>i  [2] [172.16.254.3:101] [0] [48] [F4CFE24334C1] [0] [*]/20
      172.16.254.3          0      100      0 ?
* i   172.16.254.3          0      100      0 ?
*>i  [2] [172.16.254.3:101] [0] [48] [F4CFE24334C1] [32] [10.1.101.11]/24
      172.16.254.3          0      100      0 ?
* i   172.16.254.3          0      100      0 ?
*>i  [2] [172.16.254.3:101] [0] [48] [F4CFE24334C1] [128] [FC00:1:101::11]/36
      172.16.254.3          0      100      0 ?
* i   172.16.254.3          0      100      0 ?
*>i  [2] [172.16.254.3:101] [0] [48] [F4CFE24334C1] [128] [FE80::F6CF:E2FF:FE43:34C1]/36
      172.16.254.3          0      100      0 ?
* i   172.16.254.3          0      100      0 ?
Route Distinguisher: 172.16.254.4:102
*>i  [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [0] [*]/20
      172.16.254.4          0      100      0 ?
* i   172.16.254.4          0      100      0 ?
*>i  [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [32] [10.1.102.12]/24
      172.16.254.4          0      100      0 ?
* i   172.16.254.4          0      100      0 ?
*>i  [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [128] [FC00:1:102::12]/36
      172.16.254.4          0      100      0 ?
* i   172.16.254.4          0      100      0 ?
*>i  [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [128] [FE80::46D3:CAFF:FE28:6CC5]/36
      172.16.254.4          0      100      0 ?
* i   172.16.254.4          0      100      0 ?
*>i  [2] [172.16.254.4:102] [0] [48] [7C210DBD954D] [32] [10.1.102.1]/24
      172.16.254.4          0      100      0 ?
* i   172.16.254.4          0      100      0 ?
*>i  [2] [172.16.254.4:102] [0] [48] [7C210DBD954D] [128] [FC00:1:102::1]/36

```

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

```

          172.16.254.4          0 100 0 ?
* i          172.16.254.4          0 100 0 ?
Route Distinguisher: 172.16.254.6:101
*>i [2][172.16.254.6:101][0][48][10B3D56A8FC1][32][10.1.101.1]/24
          172.16.254.3          0 100 0 ?
*>i [2][172.16.254.6:101][0][48][10B3D56A8FC1][128][FC00:1:101::1]/36
          172.16.254.3          0 100 0 ?
*>i [2][172.16.254.6:101][0][48][F4CFE24334C1][0][*]/20
          172.16.254.3          0 100 0 ?
*>i [2][172.16.254.6:101][0][48][F4CFE24334C1][32][10.1.101.11]/24
          172.16.254.3          0 100 0 ?
*>i [2][172.16.254.6:101][0][48][F4CFE24334C1][128][FC00:1:101::11]/36
          172.16.254.3          0 100 0 ?
*>i [2][172.16.254.6:101][0][48][F4CFE24334C1][128][FE80::F6CF:E2FF:FE43:34C1]/36
          172.16.254.3          0 100 0 ?
Route Distinguisher: 172.16.254.6:102
*> [2][172.16.254.6:102][0][48][0C75BD67EF4D][32][10.1.102.1]/24
          ::                      32768 ?
*> [2][172.16.254.6:102][0][48][0C75BD67EF4D][128][FC00:1:102::1]/36
          ::                      32768 ?
*>i [2][172.16.254.6:102][0][48][44D3CA286CC5][0][*]/20
          172.16.254.4          0 100 0 ?
*>i [2][172.16.254.6:102][0][48][44D3CA286CC5][32][10.1.102.12]/24
          172.16.254.4          0 100 0 ?
*>i [2][172.16.254.6:102][0][48][44D3CA286CC5][128][FC00:1:102::12]/36
          172.16.254.4          0 100 0 ?
*>i [2][172.16.254.6:102][0][48][44D3CA286CC5][128][FE80::46D3:CAFF:FE28:6CC5]/36
          172.16.254.4          0 100 0 ?
*>i [2][172.16.254.6:102][0][48][7C210DBD954D][32][10.1.102.1]/24
          172.16.254.4          0 100 0 ?
*>i [2][172.16.254.6:102][0][48][7C210DBD954D][128][FC00:1:102::1]/36
          172.16.254.4          0 100 0 ?
*> [2][172.16.254.6:102][0][48][ECE1A93792C5][0][*]/20
          ::                      32768 ?
*> [2][172.16.254.6:102][0][48][ECE1A93792C5][32][10.1.102.13]/24
          ::                      32768 ?
*> [2][172.16.254.6:102][0][48][ECE1A93792C5][128][FC00:1:102::13]/36
          ::                      32768 ?
*> [2][172.16.254.6:102][0][48][ECE1A93792C5][128][FE80::EEE1:A9FF:FE37:92C5]/36
          ::                      32768 ?
Route Distinguisher: 1:1 (default for vrf green)
*>i [5][1:1][0][24][10.1.101.0]/17
          172.16.254.3          0 100 0 ?
* i          172.16.254.3          0 100 0 ?
* i [5][1:1][0][24][10.1.102.0]/17
          172.16.254.4          0 100 0 ?
* i          172.16.254.4          0 100 0 ?
*>          0.0.0.0          0 32768 ?
*>i [5][1:1][0][32][10.1.255.1]/17
          172.16.254.3          0 100 0 ?
* i          172.16.254.3          0 100 0 ?
*>i [5][1:1][0][32][10.1.255.2]/17
          172.16.254.4          0 100 0 ?
* i          172.16.254.4          0 100 0 ?
*> [5][1:1][0][32][10.1.255.3]/17
          0.0.0.0          0 32768 ?
* i [5][1:1][0][32][10.2.255.255]/17
          172.16.254.3          0 100 0 ?
* i          172.16.254.3          0 100 0 ?
*>          0.0.0.0          0 32768 ?
*>i [5][1:1][0][64][FC00:1:101::]/29
          172.16.254.3          0 100 0 ?
* i          172.16.254.3          0 100 0 ?
* i [5][1:1][0][64][FC00:1:102::]/29

```



```

          172.16.254.4          0    100    0 ?
* i          172.16.254.4          0    100    0 ?
*>          ::          0          32768 ?
*>i [5] [1:1] [0] [128] [FC00:1:255::1]/29
          172.16.254.3          0    100    0 ?
* i          172.16.254.3          0    100    0 ?
*>i [5] [1:1] [0] [128] [FC00:1:255::2]/29
          172.16.254.4          0    100    0 ?
* i          172.16.254.4          0    100    0 ?
*> [5] [1:1] [0] [128] [FC00:1:255::3]/29
          ::          0          32768 ?
* i [5] [1:1] [0] [128] [FC00:2:255::255]/29
          172.16.254.3          0    100    0 ?
* i          172.16.254.3          0    100    0 ?
*>          ::          0          32768 ?
Leaf-03#

```

The following example shows the output for the **show ipv6 pim vrf vrf-name group-map** command on VTEP 3:

```

Leaf-03# show ipv6 pim vrf green group-map ff06:1::1
IP PIM Group Mapping Table
(* indicates group mappings being used)

FF00::/8*
  SM, RP: FC00:2:255::255
  RPF: Tu2,FC00:2:255::255 (us)
  Info source: Static
  Uptime: 02:02:54, Groups: 1
Leaf-03#

```

The following example shows the output for the **show ipv6 route vrf** command on VTEP 3:

```

Leaf-03# show ipv6 route vrf green FC00:2:255::255
Routing entry for FC00:2:255::255/128
  Known via "connected", distance 0, metric 0, type receive, connected
  Redistributing via bgp 65001
  Route count is 1/1, share count 0
  Routing paths:
    receive via Loopback255
    Last updated 02:02:55 ago
Leaf-03#

```

The following example shows the output for the **show ipv6 mld vrf vrf-name groups** command on VTEP 3:

```

Leaf-03# show ipv6 mld vrf green groups
MLD Connected Group Membership
Group Address                               Interface
  Uptime    Expires
FF06:1::1                               Vlan102
  02:02:06  00:03:50
Leaf-03#

```

The following example shows the output for the **show ipv6 mroute vrf vrf-name** command on VTEP 3:

```

Leaf-03# show ipv6 mroute vrf green
Multicast Routing Table

```

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

```

Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, I - Received Source Specific Host Report,
       P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
       J - Join SPT, Y - Joined MDT-data group,
       y - Sending to MDT-data group
       g - BGP signal originated, G - BGP Signal received,
       N - BGP Shared-Tree Prune received, n - BGP C-Mroute suppressed,
       q - BGP Src-Active originated, Q - BGP Src-Active received
       E - Extranet
Timers: Uptime/Expires
Interface state: Interface, State

(*, FF06:1::1), 02:02:06/never, RP FC00:2:255::255, flags: SCJ
  Incoming interface: Tunnel2
  RPF nbr: FC00:2:255::255
  Immediate Outgoing interface list:
    Vlan102, Forward, 02:02:06/never

(FC00:1:101::11, FF06:1::1), 01:56:23/never, flags: STgQ
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.3
  Inherited Outgoing interface list:
    Vlan102, Forward, 02:02:06/never
Leaf-03#

```

The following example shows the output for the **show ipv6 mfib vrf vrf-name** command on VTEP 3:

```

Leaf-03# show ipv6 mfib vrf green
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             ET - Data Rate Exceeds Threshold, K - Keepalive
             DDE - Data Driven Event, HW - Hardware Installed
             ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
             MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
             MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
             e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
               NS - Negate Signalling, SP - Signal Present,
               A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
               MA - MFIB Accept, A2 - Accept backup,
               RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
VRF green
(*,FF06:1::1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnel2 Flags: A NS
  Vlan102 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(FC00:1:101::11,FF06:1::1) Flags: HW
  SW Forwarding: 1/0/100/0, Other: 0/0/0
  HW Forwarding: 3475/0/126/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A
  Vlan102 Flags: F NS
    Pkts: 0/0/1   Rate: 0 pps
Leaf-03#

```

The following example shows the output for the **show ip mroute** command on VTEP 3:

```

Leaf-03# show ip mroute
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,
e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 239.1.1.1), 02:02:45/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 02:02:45/00:01:07

(172.16.254.3, 239.1.1.1), 01:56:21/00:02:07, flags: JTx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 01:56:21/00:00:37

(*, 224.0.1.40), 02:02:55/00:02:10, RP 0.0.0.0, flags: DCL
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    Loopback0, Forward/Sparse, 02:02:54/00:02:10

(*, 225.0.0.102), 02:02:45/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 02:02:45/00:01:07

(172.16.254.4, 225.0.0.102), 02:01:56/00:02:46, flags: JTx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 02:01:56/00:01:07

(172.16.254.6, 225.0.0.102), 02:02:08/00:02:37, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    TenGigabitEthernet1/0/2, Forward/Sparse, 02:01:58/00:02:59

(*, 225.0.0.101), 02:02:45/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 02:02:45/00:01:07

(172.16.254.3, 225.0.0.101), 02:01:36/00:01:06, flags: JTx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 02:01:36/00:01:23
Leaf-03#

```

The following example shows the output for the **show ip mfib** command on VTEP 3:

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

```

Leaf-03# show ip mfib
Entry Flags:      C - Directly Connected, S - Signal, IA - Inherit A flag,
                  ET - Data Rate Exceeds Threshold, K - Keepalive
                  DDE - Data Driven Event, HW - Hardware Installed
                  ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
                  MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
                  MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
                  e - Encap helper tunnel flag.
I/O Item Flags:  IC - Internal Copy, NP - Not platform switched,
                  NS - Negate Signalling, SP - Signal Present,
                  A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                  MA - MFIB Accept, A2 - Accept backup,
                  RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:   HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnel0, VXLAN Decap Flags: NS
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Loopback0 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.0/8) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 1/0/190/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 1/0/172/0, Other: 0/0/0
  HW Forwarding: 568/0/177/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 1/0/172/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/154/0, Other: 0/0/0
  HW Forwarding: 632/0/176/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 2/0/180/0, Other: 3/0/3
  HW Forwarding: 610/0/189/0, Other: 0/0/0
  Null0 Flags: A
  TenGigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW

```

```

SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 1/0/168/0, Other: 0/0/0
TenGigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
Pkts: 0/0/0 Rate: 0 pps
(172.16.254.3,239.1.1.1) Flags: HW
SW Forwarding: 1/0/150/0, Other: 0/0/0
HW Forwarding: 3474/0/168/0, Other: 0/0/0
TenGigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
Pkts: 0/0/1 Rate: 0 pps
Leaf-03#

```

Return to [Verifying TRM in PIM-SM with Anycast RP for IPv4 and IPv6 Multicast Traffic](#), on page 30

### Outputs to Verify the Configuration on Spine Switch 1

The following example shows the output for the **show bgp ipv6 mvpn all summary** command on Spine Switch 1:

```

Spine-01# show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.1, local AS number 65001
BGP table version is 20, main routing table version 20
2 network entries using 784 bytes of memory
5 path entries using 800 bytes of memory
2/2 BGP path/bestpath attribute entries using 608 bytes of memory
3 BGP rinfo entries using 120 bytes of memory
1 BGP community entries using 24 bytes of memory
13 BGP extended community entries using 1808 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 4144 total bytes of memory
BGP activity 1001/969 prefixes, 7359/7288 paths, scan interval 60 secs
2 networks peaked at 11:16:15 Sep 16 2020 UTC (02:20:36.059 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.3  4      65001   148    161     20    0    0 02:08:00      1
172.16.255.4  4      65001   148    165     20    0    0 02:07:32      1
172.16.255.6  4      65001   149    166     20    0    0 02:07:32      1
Spine-01#

```

The following example shows the output for the **show bgp ipv6 mvpn all** command on Spine Switch 1:

```

Spine-01# show bgp ipv6 mvpn all
BGP table version is 20, local router ID is 172.16.255.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

Network      Next Hop      Metric LocPrf Weight Path
Route Distinguisher: 1:1
* i  [5] [1:1] [FC00:1:101::11] [FF06:1::1] /42
      172.16.255.3      0    100    0 ?
*>i  172.16.255.3      0    100    0 ?
Route Distinguisher: 172.16.254.3:101
* i  [7] [172.16.254.3:101] [65001] [FC00:1:101::11] [FF06:1::1] /46

```

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

```

172.16.255.4          0    100    0 ?
*>i                 172.16.255.4      0    100    0 ?
* i                  172.16.255.6      0    100    0 ?
Spine-01#

```

The following example shows the output for the **show bgp l2vpn evpn summary** command on Spine Switch 1:

```

Spine-01# show bgp l2vpn evpn summary
BGP router identifier 172.16.255.1, local AS number 65001
BGP table version is 785, main routing table version 785
30 network entries using 10320 bytes of memory
66 path entries using 13728 bytes of memory
11/11 BGP path/bestpath attribute entries using 3168 bytes of memory
3 BGP rrinfo entries using 120 bytes of memory
1 BGP community entries using 24 bytes of memory
13 BGP extended community entries using 1808 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 29168 total bytes of memory
BGP activity 1001/969 prefixes, 7359/7288 paths, scan interval 60 secs
44 networks peaked at 10:13:07 Aug 6 2020 UTC (5w6d ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.3  4      65001   148    161     785    0    0 02:08:00    12
172.16.255.4  4      65001   148    165     785    0    0 02:07:33    12
172.16.255.6  4      65001   149    166     785    0    0 02:07:33    12
Spine-01#

```

The following example shows the output for the **show bgp l2vpn evpn** command on Spine Switch 1:

```

Spine-01# show bgp l2vpn evpn
BGP table version is 785, local router ID is 172.16.255.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network      Next Hop      Metric LocPrf Weight Path
Route Distinguisher: 172.16.254.3:101
* i [2][172.16.254.3:101][0][48][10B3D56A8FC1][32][10.1.101.1]/24
      172.16.254.3      0    100    0 ?
*>i                 172.16.254.3      0    100    0 ?
* i [2][172.16.254.3:101][0][48][10B3D56A8FC1][128][FC00:1:101::1]/36
      172.16.254.3      0    100    0 ?
*>i                 172.16.254.3      0    100    0 ?
* i [2][172.16.254.3:101][0][48][F4CFE24334C1][0][*]/20
      172.16.254.3      0    100    0 ?
*>i                 172.16.254.3      0    100    0 ?
* i [2][172.16.254.3:101][0][48][F4CFE24334C1][32][10.1.101.11]/24
      172.16.254.3      0    100    0 ?
*>i                 172.16.254.3      0    100    0 ?
* i [2][172.16.254.3:101][0][48][F4CFE24334C1][128][FC00:1:101::11]/36
      172.16.254.3      0    100    0 ?
*>i                 172.16.254.3      0    100    0 ?
* i [2][172.16.254.3:101][0][48][F4CFE24334C1][128][FE80::F6CF:E2FF:FE43:34C1]/36
      172.16.254.3      0    100    0 ?
*>i                 172.16.254.3      0    100    0 ?
Route Distinguisher: 172.16.254.4:102

```

```

* i [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [0] [*] /20
    172.16.254.4 0 100 0 ?
*>i 172.16.254.4 0 100 0 ?
* i [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [32] [10.1.102.12] /24
    172.16.254.4 0 100 0 ?
*>i 172.16.254.4 0 100 0 ?
* i [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [128] [FC00:1:102::12] /36
    172.16.254.4 0 100 0 ?
*>i 172.16.254.4 0 100 0 ?
* i [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [128] [FE80::46D3:CAFF:FE28:6CC5] /36
    172.16.254.4 0 100 0 ?
*>i 172.16.254.4 0 100 0 ?
* i [2] [172.16.254.4:102] [0] [48] [7C210DBD954D] [32] [10.1.102.1] /24
    172.16.254.4 0 100 0 ?
*>i 172.16.254.4 0 100 0 ?
* i [2] [172.16.254.4:102] [0] [48] [7C210DBD954D] [128] [FC00:1:102::1] /36
    172.16.254.4 0 100 0 ?
*>i 172.16.254.4 0 100 0 ?
Route Distinguisher: 172.16.254.6:102
* i [2] [172.16.254.6:102] [0] [48] [0C75BD67EF4D] [32] [10.1.102.1] /24
    172.16.254.6 0 100 0 ?
*>i 172.16.254.6 0 100 0 ?
* i [2] [172.16.254.6:102] [0] [48] [0C75BD67EF4D] [128] [FC00:1:102::1] /36
    172.16.254.6 0 100 0 ?
*>i 172.16.254.6 0 100 0 ?
* i [2] [172.16.254.6:102] [0] [48] [ECE1A93792C5] [0] [*] /20
    172.16.254.6 0 100 0 ?
*>i 172.16.254.6 0 100 0 ?
* i [2] [172.16.254.6:102] [0] [48] [ECE1A93792C5] [32] [10.1.102.13] /24
    172.16.254.6 0 100 0 ?
*>i 172.16.254.6 0 100 0 ?
* i [2] [172.16.254.6:102] [0] [48] [ECE1A93792C5] [128] [FC00:1:102::13] /36
    172.16.254.6 0 100 0 ?
*>i 172.16.254.6 0 100 0 ?
* i [2] [172.16.254.6:102] [0] [48] [ECE1A93792C5] [128] [FE80::EEE1:A9FF:FE37:92C5] /36
    172.16.254.6 0 100 0 ?
*>i 172.16.254.6 0 100 0 ?
Route Distinguisher: 1:1
* i [5] [1:1] [0] [24] [10.1.101.0] /17
    172.16.254.3 0 100 0 ?
*>i 172.16.254.3 0 100 0 ?
*>i [5] [1:1] [0] [24] [10.1.102.0] /17
    172.16.254.4 0 100 0 ?
* i 172.16.254.4 0 100 0 ?
* i 172.16.254.6 0 100 0 ?
* i [5] [1:1] [0] [32] [10.1.255.1] /17
    172.16.254.3 0 100 0 ?
*>i 172.16.254.3 0 100 0 ?
* i [5] [1:1] [0] [32] [10.1.255.2] /17
    172.16.254.4 0 100 0 ?
*>i 172.16.254.4 0 100 0 ?
* i [5] [1:1] [0] [32] [10.1.255.3] /17
    172.16.254.6 0 100 0 ?
*>i 172.16.254.6 0 100 0 ?
* i [5] [1:1] [0] [32] [10.2.255.255] /17
    172.16.254.4 0 100 0 ?
* i 172.16.254.6 0 100 0 ?
* i 172.16.254.3 0 100 0 ?
*>i 172.16.254.3 0 100 0 ?
* i [5] [1:1] [0] [64] [FC00:1:101::] /29
    172.16.254.3 0 100 0 ?
*>i 172.16.254.3 0 100 0 ?
*>i [5] [1:1] [0] [64] [FC00:1:102::] /29
    172.16.254.4 0 100 0 ?

```

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

```

* i          172.16.254.4          0 100 0 ?
* i          172.16.254.6          0 100 0 ?
* i [5][1:1][0][128][FC00:1:255::1]/29
    172.16.254.3          0 100 0 ?
*>i         172.16.254.3          0 100 0 ?
* i [5][1:1][0][128][FC00:1:255::2]/29
    172.16.254.4          0 100 0 ?
*>i         172.16.254.4          0 100 0 ?
* i [5][1:1][0][128][FC00:1:255::3]/29
    172.16.254.6          0 100 0 ?
*>i         172.16.254.6          0 100 0 ?
* i [5][1:1][0][128][FC00:2:255::255]/29
    172.16.254.4          0 100 0 ?
* i          172.16.254.6          0 100 0 ?
* i          172.16.254.3          0 100 0 ?
*>i         172.16.254.3          0 100 0 ?
Spine-01#

```

The following example shows the output for the **show ip pim rp mapping** command on Spine Switch 1:

```

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 (?)
Spine-01#

```

The following example shows the output for the **show ip mroute** command on Spine Switch 1:

```

Spine-01# show ip mroute
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

(*, 224.0.1.40), 1w2d/00:02:38, RP 172.16.255.255, flags: SJCL
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    Loopback2, Forward/Sparse, 1w2d/00:02:38

(*, 225.0.0.102), 1w2d/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, 225.0.0.102), 02:04:11/00:02:37, flags: PA
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.14.4
  Outgoing interface list: Null

```



```
(172.16.254.6, 225.0.0.102), 02:07:34/00:00:34, flags: PTA
  Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.16.6
  Outgoing interface list: Null
Spine-01#
```

The following example shows the output for the **show ip mfib** command on Spine Switch 1:

```
Spine-01# show ip mfib
Entry Flags:      C - Directly Connected, S - Signal, IA - Inherit A flag,
                  ET - Data Rate Exceeds Threshold, K - Keepalive
                  DDE - Data Driven Event, HW - Hardware Installed
                  ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
                  MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
                  MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client.
I/O Item Flags:  IC - Internal Copy, NP - Not platform switched,
                  NS - Negate Signalling, SP - Signal Present,
                  A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                  MA - MFIB Accept, A2 - Accept backup,
                  RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:   HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 84/84/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
Loopback2 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 4/0/193/0, Other: 41/0/41
  HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/2 Flags: NS
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/206/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
GigabitEthernet1/0/4 Flags: A NS
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
Spine-01#
```

Return to [Verifying TRM in PIM-SM with Anycast RP for IPv4 and IPv6 Multicast Traffic, on page 30](#)

## Outputs to Verify the Configuration on Spine Switch 2

The following example shows the output for the **show bgp ipv6 mvpn all summary** command on Spine Switch 2:

```
Spine-02# show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.2, local AS number 65001
```

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

```

BGP table version is 20, main routing table version 20
2 network entries using 784 bytes of memory
5 path entries using 800 bytes of memory
2/2 BGP path/bestpath attribute entries using 608 bytes of memory
3 BGP rrinfo entries using 120 bytes of memory
1 BGP community entries using 24 bytes of memory
13 BGP extended community entries using 1808 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 4144 total bytes of memory
BGP activity 1031/999 prefixes, 7443/7372 paths, scan interval 60 secs
2 networks peaked at 11:17:12 Sep 16 2020 UTC (02:22:21.833 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.3  4      65001   150    169     20    0    0 02:09:38      1
172.16.255.4  4      65001   151    168     20    0    0 02:09:14      1
172.16.255.6  4      65001   150    167     20    0    0 02:09:18      1
Spine-02#

```

The following example shows the output for the **show bgp ipv6 mvpn all** command on Spine Switch 2:

```

Spine-02# show bgp ipv6 mvpn all
BGP table version is 20, local router ID is 172.16.255.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1
 * i   [5][1:1][FC00:1:101::11][FF06:1::1]/42
           172.16.255.3          0    100    0 ?
 *>i   172.16.255.3          0    100    0 ?
Route Distinguisher: 172.16.254.3:101
 *>i   [7][172.16.254.3:101][65001][FC00:1:101::11][FF06:1::1]/46
           172.16.255.4          0    100    0 ?
 * i   172.16.255.4          0    100    0 ?
 * i   172.16.255.6          0    100    0 ?
Spine-02#

```

The following example shows the output for the **show bgp l2vpn evpn summary** command on Spine Switch 2:

```

Spine-02# show bgp l2vpn evpn summary
BGP router identifier 172.16.255.2, local AS number 65001
BGP table version is 712, main routing table version 712
30 network entries using 10320 bytes of memory
66 path entries using 13728 bytes of memory
11/11 BGP path/bestpath attribute entries using 3168 bytes of memory
3 BGP rrinfo entries using 120 bytes of memory
1 BGP community entries using 24 bytes of memory
13 BGP extended community entries using 1808 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 29168 total bytes of memory
BGP activity 1031/999 prefixes, 7443/7372 paths, scan interval 60 secs
44 networks peaked at 10:13:54 Aug 6 2020 UTC (5w6d ago)

```

```

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.3  4      65001   150    169     712   0    0 02:09:38    12
172.16.255.4  4      65001   151    168     712   0    0 02:09:15    12
172.16.255.6  4      65001   150    167     712   0    0 02:09:18    12
Spine-02#

```

The following example shows the output for the **show bgp l2vpn evpn** command on Spine Switch 2:

```

Spine-02# show bgp l2vpn evpn
BGP table version is 712, local router ID is 172.16.255.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 172.16.254.3:101
* i [2] [172.16.254.3:101] [0] [48] [10B3D56A8FC1] [32] [10.1.101.1]/24
      172.16.254.3          0      100      0 ?
*>i      172.16.254.3          0      100      0 ?
* i [2] [172.16.254.3:101] [0] [48] [10B3D56A8FC1] [128] [FC00:1:101::1]/36
      172.16.254.3          0      100      0 ?
*>i      172.16.254.3          0      100      0 ?
* i [2] [172.16.254.3:101] [0] [48] [F4CFE24334C1] [0] [*]/20
      172.16.254.3          0      100      0 ?
*>i      172.16.254.3          0      100      0 ?
* i [2] [172.16.254.3:101] [0] [48] [F4CFE24334C1] [32] [10.1.101.11]/24
      172.16.254.3          0      100      0 ?
*>i      172.16.254.3          0      100      0 ?
* i [2] [172.16.254.3:101] [0] [48] [F4CFE24334C1] [128] [FC00:1:101::11]/36
      172.16.254.3          0      100      0 ?
*>i      172.16.254.3          0      100      0 ?
* i [2] [172.16.254.3:101] [0] [48] [F4CFE24334C1] [128] [FE80::F6CF:E2FF:FE43:34C1]/36
      172.16.254.3          0      100      0 ?
*>i      172.16.254.3          0      100      0 ?
Route Distinguisher: 172.16.254.4:102
* i [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [0] [*]/20
      172.16.254.4          0      100      0 ?
*>i      172.16.254.4          0      100      0 ?
* i [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [32] [10.1.102.12]/24
      172.16.254.4          0      100      0 ?
*>i      172.16.254.4          0      100      0 ?
* i [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [128] [FC00:1:102::12]/36
      172.16.254.4          0      100      0 ?
*>i      172.16.254.4          0      100      0 ?
* i [2] [172.16.254.4:102] [0] [48] [44D3CA286CC5] [128] [FE80::46D3:CAFF:FE28:6CC5]/36
      172.16.254.4          0      100      0 ?
*>i      172.16.254.4          0      100      0 ?
* i [2] [172.16.254.4:102] [0] [48] [7C210DBD954D] [32] [10.1.102.1]/24
      172.16.254.4          0      100      0 ?
*>i      172.16.254.4          0      100      0 ?
* i [2] [172.16.254.4:102] [0] [48] [7C210DBD954D] [128] [FC00:1:102::1]/36
      172.16.254.4          0      100      0 ?
*>i      172.16.254.4          0      100      0 ?
Route Distinguisher: 172.16.254.6:102
* i [2] [172.16.254.6:102] [0] [48] [0C75BD67EF4D] [32] [10.1.102.1]/24
      172.16.254.6          0      100      0 ?
*>i      172.16.254.6          0      100      0 ?
* i [2] [172.16.254.6:102] [0] [48] [0C75BD67EF4D] [128] [FC00:1:102::1]/36
      172.16.254.6          0      100      0 ?

```

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

```

*>i          172.16.254.6          0 100 0 ?
* i [2][172.16.254.6:102][0][48][ECE1A93792C5][0][*]/20
          172.16.254.6          0 100 0 ?
*>i          172.16.254.6          0 100 0 ?
* i [2][172.16.254.6:102][0][48][ECE1A93792C5][32][10.1.102.13]/24
          172.16.254.6          0 100 0 ?
*>i          172.16.254.6          0 100 0 ?
* i [2][172.16.254.6:102][0][48][ECE1A93792C5][128][FC00:1:102::13]/36
          172.16.254.6          0 100 0 ?
*>i          172.16.254.6          0 100 0 ?
* i [2][172.16.254.6:102][0][48][ECE1A93792C5][128][FE80::EEE1:A9FF:FE37:92C5]/36
          172.16.254.6          0 100 0 ?
*>i          172.16.254.6          0 100 0 ?
Route Distinguisher: 1:1
* i [5][1:1][0][24][10.1.101.0]/17
          172.16.254.3          0 100 0 ?
*>i          172.16.254.3          0 100 0 ?
*>i [5][1:1][0][24][10.1.102.0]/17
          172.16.254.4          0 100 0 ?
* i          172.16.254.4          0 100 0 ?
* i          172.16.254.6          0 100 0 ?
* i [5][1:1][0][32][10.1.255.1]/17
          172.16.254.3          0 100 0 ?
*>i          172.16.254.3          0 100 0 ?
* i [5][1:1][0][32][10.1.255.2]/17
          172.16.254.4          0 100 0 ?
*>i          172.16.254.4          0 100 0 ?
* i [5][1:1][0][32][10.1.255.3]/17
          172.16.254.6          0 100 0 ?
*>i          172.16.254.6          0 100 0 ?
* i [5][1:1][0][32][10.2.255.255]/17
          172.16.254.4          0 100 0 ?
* i          172.16.254.6          0 100 0 ?
* i          172.16.254.3          0 100 0 ?
*>i          172.16.254.3          0 100 0 ?
* i [5][1:1][0][64][FC00:1:101::]/29
          172.16.254.3          0 100 0 ?
*>i          172.16.254.3          0 100 0 ?
*>i [5][1:1][0][64][FC00:1:102::]/29
          172.16.254.4          0 100 0 ?
* i          172.16.254.4          0 100 0 ?
* i          172.16.254.6          0 100 0 ?
* i [5][1:1][0][128][FC00:1:255::1]/29
          172.16.254.3          0 100 0 ?
*>i          172.16.254.3          0 100 0 ?
* i [5][1:1][0][128][FC00:1:255::2]/29
          172.16.254.4          0 100 0 ?
*>i          172.16.254.4          0 100 0 ?
* i [5][1:1][0][128][FC00:1:255::3]/29
          172.16.254.6          0 100 0 ?
*>i          172.16.254.6          0 100 0 ?
* i [5][1:1][0][128][FC00:2:255::255]/29
          172.16.254.4          0 100 0 ?
* i          172.16.254.6          0 100 0 ?
* i          172.16.254.3          0 100 0 ?
*>i          172.16.254.3          0 100 0 ?
Spine-02#

```

The following example shows the output for the **show ip pim rp mapping** command on Spine Switch 2:

```

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 (?)
Spine-02#

```

The following example shows the output for the **show ip mroute** command on Spine Switch 2:

```

Spine-02# show ip mroute
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

(*, 239.1.1.1), 22:51:54/00:03:26, RP 172.16.255.255, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/1, Forward/Sparse, 02:09:47/00:03:26
    GigabitEthernet1/0/2, Forward/Sparse, 02:09:20/00:02:34
    GigabitEthernet1/0/4, Forward/Sparse, 02:09:16/00:03:12

(172.16.254.3, 239.1.1.1), 02:03:40/00:02:43, flags: TA
  Incoming interface: GigabitEthernet1/0/1, RPF nbr 172.16.23.3
  Outgoing interface list:
    GigabitEthernet1/0/4, Forward/Sparse, 02:03:40/00:03:12
    GigabitEthernet1/0/2, Forward/Sparse, 02:03:40/00:02:46

(*, 224.0.1.40), 1w2d/00:03:18, RP 172.16.255.255, flags: SJCL
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 00:02:09/00:03:18
    GigabitEthernet1/0/1, Forward/Sparse, 00:02:10/00:03:17
    Loopback2, Forward/Sparse, 1w2d/00:02:45

(*, 225.0.0.102), 1w2d/00:03:22, RP 172.16.255.255, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/1, Forward/Sparse, 02:09:47/00:02:35
    GigabitEthernet1/0/2, Forward/Sparse, 02:09:20/00:03:16
    GigabitEthernet1/0/4, Forward/Sparse, 02:09:16/00:03:22

(172.16.254.6, 225.0.0.102), 02:09:47/00:01:33, flags: MT
  Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.26.6
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 02:09:16/00:03:16
    GigabitEthernet1/0/1, Forward/Sparse, 02:09:16/00:03:05

(172.16.254.4, 225.0.0.102), 02:09:47/00:02:06, flags: MT
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.4
  Outgoing interface list:
    GigabitEthernet1/0/1, Forward/Sparse, 02:09:19/00:03:10

```

## Example: Configuring TRM in PIM Sparse Mode with Anycast RP

```

GigabitEthernet1/0/4, Forward/Sparse, 02:09:16/00:03:22

(*, 225.0.0.101), 1w2d/00:03:29, RP 172.16.255.255, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/1, Forward/Sparse, 02:09:47/00:03:29
    GigabitEthernet1/0/2, Forward/Sparse, 02:09:20/00:02:31
    GigabitEthernet1/0/4, Forward/Sparse, 02:09:16/00:03:29

(172.16.254.3, 225.0.0.101), 02:09:22/00:03:25, flags: TA
  Incoming interface: GigabitEthernet1/0/1, RPF nbr 172.16.23.3
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 02:09:20/00:02:39
    GigabitEthernet1/0/4, Forward/Sparse, 02:09:16/00:03:29
Spine-02#

```

The following example shows the output for the **show ip mfib** command on Spine Switch 2:

```

Spine-02# show ip mfib
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             ET - Data Rate Exceeds Threshold, K - Keepalive
             DDE - Data Driven Event, HW - Hardware Installed
             ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
             MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
             MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
               NS - Negate Signalling, SP - Signal Present,
               A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
               MA - MFIB Accept, A2 - Accept backup,
               RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 1/1/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
Loopback2 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 2/0/140/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  604/0/178/0, Other: 0/0/0
  GigabitEthernet1/0/1 Flags: A NS

```

```

GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
SW Forwarding: 4/0/124/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 668/0/176/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 600/0/205/0, Other: 0/0/0
GigabitEthernet1/0/4 Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
SW Forwarding: 17/0/397/0, Other: 4/4/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,239.1.1.1) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 3693/0/168/0, Other: 0/0/0
GigabitEthernet1/0/1 Flags: A
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
Spine-02#

```

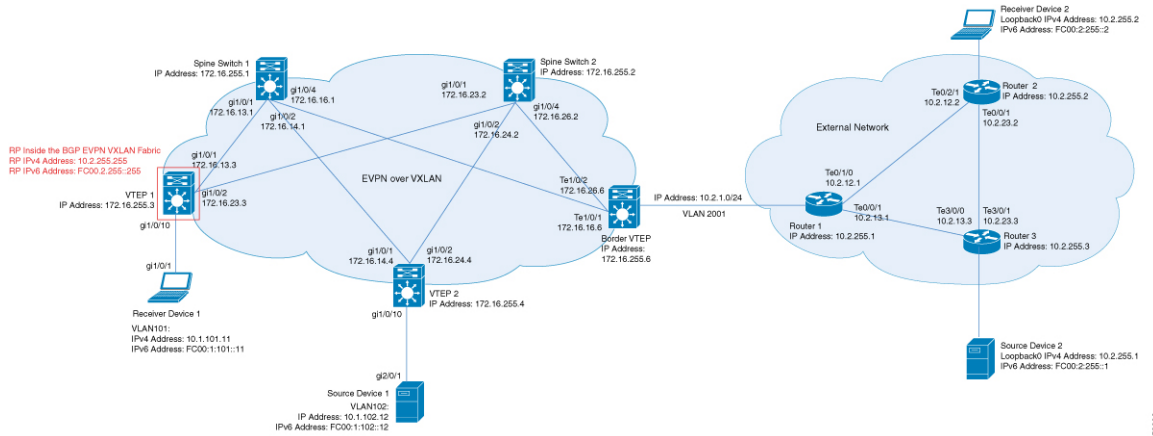
Return to [Verifying TRM in PIM-SM with Anycast RP for IPv4 and IPv6 Multicast Traffic, on page 30](#)

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

This example shows how to configure and verify Layer 3 TRM with PIM-SM for IPv4 multicast traffic when the RP is inside the BGP EVPN VXLAN fabric. The example uses the following topology:

Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

Figure 12: TRM with PIM-SM when the RP is Inside the BGP EVPN VXLAN Fabric



The topology shows an EVPN VXLAN network, with two spine switches and three VTEPs, connected to an external network with three routers. VTEP 1 inside the BGP EVPN VXLAN fabric acts as the RP in this topology and Border VTEP connects the fabric to the external network through Router 1. The IPv4 multicast group is 226.1.1.1 in this topology. The following tables provide sample configurations for the devices in this topology:



**Table 3: Configuring VTEP 1, Border VTEP, and VTEP 2 to Configure TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric**

VTEP 1	Border VTEP	VTEP 2
<pre>Leaf-01# show running-config hostname Leaf-01 ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 ip multicast-routing vrf green ! 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 ! system mtu 9198 ! 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 pim sparse-mode ip ospf 1 area 0</pre>	<pre>Border# show running-config hostname Border ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 ip multicast-routing vrf green ! 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 ! system mtu 9198 ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 ! vlan 2001 !</pre>	<pre>Leaf-02# show running-config hostname Leaf-02 ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp route-target export 1:1 route-target import 1:1 route-target export 1:1 stitching route-target import 1:1 stitching exit-address-famil ! ip routing ! ip multicast-routing ip multicast-routing vrf green ! 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 ! system mtu 9198 ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 !</pre>

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

VTEP 1	Border VTEP	VTEP 2
<pre> ! interface Loopback1 ip address 172.16.254.3 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface Loopback255 vrf forwarding green ip address 10.2.255.255 255.255.255.255 ip pim sparse-mode ! 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 ! 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 access vlan 101 switchport mode access ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode no autostate ! </pre>	<pre> interface Loopback0 ip address 172.16.255.6 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.6 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface TenGigabitEthernet1/0/1 no switchport ip address 172.16.16.6 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet1/0/2 no switchport ip address 172.16.26.6 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet1/0/5 switchport trunk allowed vlan 2001 switchport mode trunk ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode no autostate ! </pre>	<pre> interface Loopback0 ip address 172.16.255.4 255.255.255.255 ip pim sparse-mode 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 ! 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 access vlan 102 switchport mode access ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode no autostate </pre>

VTEP 1	Border VTEP	VTEP 2
<pre> 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 mcast-group 225.0.0.102 ! 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 redistribute connected redistribute static exit-address-family ! address-family ipv4 mvpn 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 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 </pre>	<pre> interface Vlan2001 vrf forwarding green ip address 10.2.1.1 255.255.255.0 ip mtu 1500 ip pim sparse-mode ip ospf network point-to-point ip ospf 2 area 0 ! 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 mcast-group 225.0.0.102 ! router ospf 2 vrf green redistribute bgp 65001 ! router ospf 1 router-id 172.16.255.6 ! 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 ipv4 mvpn 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 </pre>	<pre> ! 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 mcast-group 225.0.0.102 ! 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 redistribute connected redistribute static exit-address-family ! address-family ipv4 mvpn 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 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 ! </pre>

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

VTEP 1	Border VTEP	VTEP 2
<pre> ! address-family ipv4 vrf green advertise l2vpn evpn redistribute connected redistribute static exit-address-family ! ip pim rp-address 172.16.255.255 ip pim ssm default ip pim vrf green rp-address 10.2.255.255 ! end ! Leaf-01# </pre>	<pre> ! address-family l2vpn evpn neighbor 172.16.255.1 activate neighbor 172.16.255.1 send-community both neighbor 172.16.255.2 activate neighbor 172.16.255.2 send-community both exit-address-family ! address-family ipv4 vrf green advertise l2vpn evpn redistribute connected redistribute static redistribute ospf 2 match internal external 1 external 2 exit-address-family ! ip pim rp-address 172.16.255.255 ip pim ssm default ip pim vrf green rp-address 10.2.255.255 ! end ! Border# </pre>	<pre> address-family ipv4 vrf green advertise l2vpn evpn redistribute connected redistribute static exit-address-family ! ip pim rp-address 172.16.255.255 ip pim ssm default ip pim vrf green rp-address 10.2.255.255 ! end ! Leaf-02# </pre>

**Table 4: Configuring Spine Switch 1 and Spine Switch 2 to Configure TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric**

Spine Switch 1	Spine Switch 2
<pre> Spine-01# show running-config hostname Spine-01 ! ip routing ! ip multicast-routing ! system mtu 9198 ! 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 ! interface GigabitEthernet1/0/4 no switchport ip address 172.16.16.1 255.255.255.0 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 neighbor 172.16.255.3 remote-as 65001 neighbor 172.16.255.3 update-source Loopback0 neighbor 172.16.255.4 remote-as 65001 neighbor 172.16.255.4 update-source Loopback0 neighbor 172.16.255.6 remote-as 65001 neighbor 172.16.255.6 update-source Loopback0 ! </pre>	<pre> Spine-02# show running-config hostname Spine-02 ! ip routing ! ip multicast-routing ! system mtu 9198 ! 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 ! interface GigabitEthernet1/0/4 no switchport ip address 172.16.26.2 255.255.255.0 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 neighbor 172.16.255.3 remote-as 65001 neighbor 172.16.255.3 update-source Loopback0 neighbor 172.16.255.4 remote-as 65001 neighbor 172.16.255.4 update-source Loopback0 neighbor 172.16.255.6 remote-as 65001 neighbor 172.16.255.6 update-source Loopback0 ! </pre>

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

Spine Switch 1	Spine Switch 2
<pre> address-family ipv4 exit-address-family ! address-family ipv4 mvpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family l2vpn evpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client 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 ! end ! Spine-01# </pre>	<pre> address-family ipv4 exit-address-family ! address-family ipv4 mvpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family l2vpn evpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client 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 ! end ! Spine-02# </pre>

**Table 5: Configuring Router 1, Router 2, and Router 3 to Configure TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric**

Router 1	Router 2	Router 3
<pre> Router-01# show running-config hostname R1 ! ip multicast-routing distributed ! interface Loopback0 ip address 10.2.255.1 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface TenGigabitEthernet0/0/0 ip address 10.2.12.1 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet0/0/1 ip address 10.2.13.1 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface GigabitEthernet0/0/1.2001 encapsulation dot1Q 2001 ip address 10.2.1.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 router ospf 1 router-id 10.2.255.1 ! ip pim rp-address 10.2.255.255 ! end ! R1#                     </pre>	<pre> Router-02# show running-config hostname R2 ! ip multicast-routing distributed ! interface Loopback0 ip address 10.2.255.2 255.255.255.255 ip pim sparse-mode ip igmp join-group 226.1.1.1 ip ospf 1 area 0 ! interface TenGigabitEthernet0/0/0 ip address 10.2.12.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet0/0/1 ip address 10.2.23.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! router ospf 1 router-id 10.2.255.2 ! ip pim rp-address 10.2.255.255 ! end ! R2#                     </pre>	<pre> Router-03# show running-config hostname R3 ! ip multicast-routing distributed ! interface Loopback0 ip address 10.2.255.3 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface TenGigabitEthernet0/0/0 ip address 10.2.13.3 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet0/0/1 ip address 10.2.23.3 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! router ospf 1 router-id 10.2.255.3 ! ip pim rp-address 10.2.255.255 ! end ! R3#                     </pre>

**Verifying TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric**

The following sections provide sample outputs for **show** commands to verify TRM with PIM-SM on the devices in the topology configured above:

- [Outputs to Verify the Configuration on VTEP 1 \(RP Inside the BGP EVPN VXLAN Fabric\)](#)
- [Outputs to Verify the Configuration on VTEP 2](#)
- [Outputs to Verify the Configuration on Border VTEP](#)
- [Outputs to Verify the Configuration on Spine Switch 1](#)

- [Outputs to Verify the Configuration on Spine Switch 2](#)

### Outputs to Verify the Configuration on VTEP 1 (RP Inside the BGP EVPN VXLAN Fabric)

The following example shows the output for the **show nve peers** command on VTEP 1:

```
Leaf-01# show nve peers
Interface VNI      Type Peer-IP          RMAC/Num_RTs  eVNI      state flags UP time
nve1     50901   L3CP 172.16.254.6   0c75.bd67.ef48 50901      UP  A/-/4 1d05h
nve1     50901   L3CP 172.16.254.4   7c21.0dbd.9548 50901      UP  A/-/4 1d05h
nve1     50901   L3CP 172.16.254.6   0c75.bd67.ef48 50901      UP  A/M/6 1d05h
nve1     50901   L3CP 172.16.254.4   7c21.0dbd.9548 50901      UP  A/M/6 1d05h
nve1     10102   L2CP 172.16.254.4    7              10102      UP  N/A   1d05h
nve1     10102   L2CP 172.16.254.6    5              10102      UP  N/A   1d05h
Leaf-01#
```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on VTEP 1:

```
Leaf-01# show l2vpn evpn peers vxlan
Interface VNI      Peer-IP          Num routes eVNI      UP time
-----
nve1     10102   172.16.254.4    7          10102    1d05h
nve1     10102   172.16.254.6    5          10102    1d05h
Leaf-01#
```

The following example shows the output for the **show bgp ipv4 mvpn all summary** command on VTEP 1:

```
Leaf-01# show bgp ipv4 mvpn all summary
BGP router identifier 172.16.255.4, local AS number 65001
BGP table version is 111, main routing table version 111
7 network entries using 2128 bytes of memory
9 path entries using 1224 bytes of memory
5/5 BGP path/bestpath attribute entries using 1560 bytes of memory
4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
18 BGP extended community entries using 2396 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 7492 total bytes of memory
BGP activity 140/45 prefixes, 240/112 paths, scan interval 60 secs
9 networks peaked at 12:22:24 Aug 6 2020 UTC (1d05h ago)

Neighbor      V      AS MsgRcvd MsgSent   TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001   2104   1988     111    0    0 1d05h    2
172.16.255.2  4      65001   2099   1988     111    0    0 1d05h    2
Leaf-01#
```

The following example shows the output for the **show ip pim vrf vrf-name rp mapping** command on VTEP 1:

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

Group(s): 224.0.0.0/4, Static
          RP: 10.2.255.255 (?)
```



```
Leaf-01#
```

The following example shows the output for the **show ip routing vrf** command on VTEP 1:

```
Leaf-01# show ip routing vrf green 10.2.255.255
Routing Table: green
Routing entry for 10.2.255.255/32
  Known via "connected", distance 0, metric 0 (connected, via interface)
  Redistributing via bgp 65001
  Advertised by bgp 65001
  Routing Descriptor Blocks:
  * directly connected, via Loopback255
    Route metric is 0, traffic share count is 1
Leaf-01#
```

The following example shows the output for the **show ip igmp vrf vrf-name groups** command on VTEP 1:

```
Leaf-01# show ip igmp vrf green groups
IGMP Connected Group Membership
Group Address      Interface          Uptime    Expires    Last Reporter    Group Accounted
226.1.1.1          Vlan102           1d05h    00:02:50   10.1.102.12
224.0.1.40         Vlan901           1d05h    00:02:03   172.16.254.4
Leaf-01#
```

The following example shows the output for the **show ip mroute vrf vrf-name** command on VTEP 1:

```
Leaf-01# show ip mroute vrf green
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,
       e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 226.1.1.1), 1d01h/stopped, RP 10.2.255.255, flags: SJCGx
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    Vlan101, Forward/Sparse, 1d01h/00:02:33
    Vlan901, Forward/Sparse, 03:54:15/stopped

(10.2.255.1, 226.1.1.1), 00:01:13/00:01:50, flags: Tgx
  Incoming interface: Vlan901, RPF nbr 172.16.254.6
  Outgoing interface list:
    Vlan101, Forward/Sparse, 00:01:13/00:02:33

(10.1.102.12, 226.1.1.1), 00:01:36/00:01:24, flags: Tgx
```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

```

Incoming interface: Vlan901, RPF nbr 172.16.254.4
Outgoing interface list:
  Vlan101, Forward/Sparse, 00:01:36/00:02:33

(*, 224.0.1.40), 1d05h/00:02:09, RP 10.2.255.255, flags: SJCLGx
Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list:
  Loopback901, Forward/Sparse, 1d05h/00:02:09
  Vlan901, Forward/Sparse, 03:54:15/stopped
Leaf-01#

```

The following example shows the output for the **show ip mfib vrf vrf-name** command on VTEP 1:

```

Leaf-01# show ip mfib vrf green
Entry Flags:      C - Directly Connected, S - Signal, IA - Inherit A flag,
                  ET - Data Rate Exceeds Threshold, K - Keepalive
                  DDE - Data Driven Event, HW - Hardware Installed
                  ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
                  MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
                  MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
                  e - Encap helper tunnel flag.
I/O Item Flags:  IC - Internal Copy, NP - Not platform switched,
                  NS - Negate Signalling, SP - Signal Present,
                  A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                  MA - MFIB Accept, A2 - Accept backup,
                  RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:   HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
VRF green
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 2/2/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
Tunnel6 Flags: A
Loopback901 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
Vlan901, VXLAN v4 Encap (50901, 239.1.1.1) Flags: F
  Pkts: 0/0/0   Rate: 0 pps
(*,226.1.1.1) Flags: C HW
  SW Forwarding: 1/0/100/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
Tunnel6 Flags: A
Vlan101 Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
Vlan901, VXLAN v4 Encap (50901, 239.1.1.1) Flags: F
  Pkts: 0/0/1   Rate: 0 pps
(10.1.102.12,226.1.1.1) Flags: HW
  SW Forwarding: 2/0/100/0, Other: 0/0/0
  HW Forwarding:  44/0/126/0, Other: 0/0/0
Vlan901, VXLAN Decap Flags: A
Vlan101 Flags: F NS
  Pkts: 0/0/2   Rate: 0 pps
(10.2.255.1,226.1.1.1) Flags: HW
  SW Forwarding: 5/0/100/0, Other: 12576/1/12575
  HW Forwarding:  3801/1/126/0, Other: 0/0/0
Vlan901, VXLAN Decap Flags: A
Vlan901 Flags: SP
Vlan101 Flags: F NS

```

```
Pkts: 0/0/5    Rate: 0 pps
Leaf-01#
```

The following example shows the output for the **show bgp ipv4 mvpn all** command on VTEP 1:

```
Leaf-01# show bgp ipv4 mvpn all
BGP table version is 94, local router ID is 172.16.255.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
* i   [5] [1:1] [10.1.102.12] [226.1.1.1]/18
      172.16.255.4          0    100    0 ?
*>i   172.16.255.4          0    100    0 ?
*>i   [5] [1:1] [10.2.255.1] [226.1.1.1]/18
      172.16.255.6          0    100    0 ?
* i   172.16.255.6          0    100    0 ?
* i   [6] [1:1] [65001] [10.2.255.255/32] [224.0.1.40/32]/22
      172.16.255.4          0    100    0 ?
*>i   172.16.255.4          0    100    0 ?
* i   [6] [1:1] [65001] [10.2.255.255/32] [226.1.1.1/32]/22
      172.16.255.4          0    100    0 ?
*>i   172.16.255.4          0    100    0 ?
*>   [7] [1:1] [65001] [10.2.255.1/32] [226.1.1.1/32]/22
      0.0.0.0                32768 ?
Route Distinguisher: 172.16.254.4:102
*>   [7] [172.16.254.4:102] [65001] [10.1.102.12/32] [226.1.1.1/32]/22
      0.0.0.0                32768 ?
Leaf-01#
```

The following example shows the output for the **show ip mroute** command on VTEP 1:

```
Leaf-01# show ip mroute
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,
       e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 239.1.1.1), 1d05h/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, 1d05h/00:02:10
```

**Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric**

```

(172.16.254.6, 239.1.1.1), 00:01:11/00:01:48, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 00:01:11/00:01:48

(172.16.254.3, 239.1.1.1), 00:01:37/00:01:22, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0, Registering
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 00:01:37/00:02:51, A

(172.16.254.4, 239.1.1.1), 04:17:32/00:02:31, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 04:17:32/00:00:27

(*, 224.0.1.40), 1d05h/00:02:12, RP 172.16.255.255, flags: SJCL
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Loopback0, Forward/Sparse, 1d05h/00:02:12

(*, 225.0.0.102), 1d05h/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d05h/00:02:10

(172.16.254.4, 225.0.0.102), 1d05h/00:01:20, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d05h/00:01:32

(172.16.254.6, 225.0.0.102), 1d05h/00:02:44, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d05h/00:02:10

(*, 225.0.0.101), 1d05h/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, 1d05h/00:02:10

(172.16.254.3, 225.0.0.101), 1d05h/00:02:36, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 1d05h/00:03:20
Leaf-01#

```

The following example shows the output for the **show ip mfib** command on VTEP 1:

```

Leaf-01# show ip mfib
Entry Flags:   C - Directly Connected, S - Signal, IA - Inherit A flag,
               ET - Data Rate Exceeds Threshold, K - Keepalive
               DDE - Data Driven Event, HW - Hardware Installed
               ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
               MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
               MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
               e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,
                A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                MA - MFIB Accept, A2 - Accept backup,
                RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

```

```

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count  Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Loopback0 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  1/0/114/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 13/0/127/0, Other: 2/2/0
  HW Forwarding:  12525/0/165/0, Other: 0/0/0
  Null0 Flags: A
  GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  2/0/172/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/154/0, Other: 0/0/0
  HW Forwarding:  9155/0/176/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/154/0, Other: 0/0/0
  HW Forwarding:  3762/0/163/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 2/2/0
  HW Forwarding:  15/0/168/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,239.1.1.1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 2/1/1
  HW Forwarding:  0/0/0/0, Other: 0/0/0
  Null0 Flags: A
  GigabitEthernet1/0/2 Flags: F
  Pkts: 0/0/0   Rate: 0 pps
  Tunnel4 Flags: F
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
  SW Forwarding: 1/0/150/0, Other: 0/0/0
  HW Forwarding:  7707/0/167/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A

```

```

Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
SW Forwarding: 2/0/150/0, Other: 0/0/0
HW Forwarding: 68/1/168/1, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/2   Rate: 0 pps
Leaf-01#

```

Return to [Verifying TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric, on page 71](#)

## Outputs to Verify the Configuration on VTEP 2

The following example shows the output for the **show nve peers** command on VTEP 2:

```

Leaf-02# show nve peers
Interface VNI      Type Peer-IP          RMAC/Num_RTs  eVNI      state flags UP time
nve1     50901  L3CP 172.16.254.6    0c75.bd67.ef48 50901      UP  A/-/4 1d05h
nve1     50901  L3CP 172.16.254.3    10b3.d56a.8fc8 50901      UP  A/-/4 1d05h
nve1     50901  L3CP 172.16.254.6    0c75.bd67.ef48 50901      UP  A/M/6 1d05h
nve1     50901  L3CP 172.16.254.3    10b3.d56a.8fc8 50901      UP  A/M/6 1d05h
nve1     10101  L2CP 172.16.254.3     6              10101      UP  N/A   1d05h
nve1     10102  L2CP 172.16.254.6     5              10102      UP  N/A   1d05h
Leaf-02#

```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on VTEP 2:

```

Leaf-02# show l2vpn evpn peers vxlan
Interface VNI      Peer-IP          Num routes eVNI      UP time
-----
nve1     10101  172.16.254.3    6          10101    1d05h
nve1     10102  172.16.254.6    5          10102    1d05h
Leaf-02#

```

The following example shows the output for the **show bgp ipv4 mvpn all summary** command on VTEP 2:

```

Leaf-02# show bgp ipv4 mvpn all summary
BGP router identifier 172.16.255.4, local AS number 65001
BGP table version is 62, main routing table version 62
7 network entries using 2128 bytes of memory
9 path entries using 1224 bytes of memory
4/4 BGP path/bestpath attribute entries using 1248 bytes of memory
4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
17 BGP extended community entries using 2372 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 7156 total bytes of memory
BGP activity 121/28 prefixes, 202/77 paths, scan interval 60 secs
9 networks peaked at 12:22:24 Aug 6 2020 UTC (16:43:21.423 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001   1229   1151     62    0    0 16:57:50      2
172.16.255.2  4      65001   1227   1152     62    0    0 16:57:51      2

```

Leaf-02#

The following example shows the output for the **show ip pim vrf vrf-name rp mapping** command on VTEP 2:

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

Group(s): 224.0.0.0/4, Static
         RP: 10.2.255.255 (?)
Leaf-02#
```

The following example shows the output for the **show ip routing vrf** command on VTEP 2:

```
Leaf-02# show ip routing vrf green 10.2.255.255
Routing Table: green
Routing entry for 10.2.255.255/32
  Known via "bgp 65001", distance 200, metric 0, type internal
  Last update from 172.16.254.3 on Vlan901, 03:59:59 ago
  Routing Descriptor Blocks:
  * 172.16.254.3 (default), from 172.16.255.1, 03:59:59 ago, via Vlan901
    opaque_ptr 0x7F65B8B9E9F0
    Route metric is 0, traffic share count is 1
    AS Hops 0
    MPLS label: none
Leaf-02#
```

The following example shows the output for the **show ip igmp vrf vrf-name groups** command on VTEP 2:

```
Leaf-02# show ip igmp vrf green groups
IGMP Connected Group Membership
Group Address      Interface          Uptime    Expires    Last Reporter    Group Accounted
226.1.1.1          Vlan102           16:58:00  00:02:11  10.1.102.12
224.0.1.40         Vlan901           16:58:37  00:02:33  172.16.254.4
Leaf-02#
```

The following example shows the output for the **show ip mroute vrf vrf-name** command on VTEP 2:

```
Leaf-02# show ip mroute vrf green
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,
       e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode
```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

```

(*, 226.1.1.1), 1d05h/stopped, RP 10.2.255.255, flags: SJCFg
  Incoming interface: Vlan901, RPF nbr 172.16.254.3
  Outgoing interface list:
    Vlan102, Forward/Sparse, 1d05h/00:02:50

(10.2.255.1, 226.1.1.1), 00:06:57/00:02:09, flags: TgQ
  Incoming interface: Vlan901, RPF nbr 172.16.254.6
  Outgoing interface list:
    Vlan102, Forward/Sparse, 00:06:57/00:02:50

(10.1.102.12, 226.1.1.1), 00:07:21/00:01:45, flags: FTGqx
  Incoming interface: Vlan102, RPF nbr 0.0.0.0
  Outgoing interface list:
    Vlan901, Forward/Sparse, 00:07:21/stopped

(*, 224.0.1.40), 1d05h/00:02:03, RP 10.2.255.255, flags: SJPLGx
  Incoming interface: Vlan901, RPF nbr 172.16.254.3
  Outgoing interface list: Null
Leaf-02#

```

The following example shows the output for the **show ip mfib vrf vrf-name** command on VTEP 2:

```

Leaf-02# show ip mfib vrf green
Entry Flags:      C - Directly Connected, S - Signal, IA - Inherit A flag,
                  ET - Data Rate Exceeds Threshold, K - Keepalive
                  DDE - Data Driven Event, HW - Hardware Installed
                  ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
                  MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
                  MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
                  e - Encap helper tunnel flag.
I/O Item Flags:  IC - Internal Copy, NP - Not platform switched,
                  NS - Negate Signalling, SP - Signal Present,
                  A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                  MA - MFIB Accept, A2 - Accept backup,
                  RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:   HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
VRF green
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A IC NS
(*,226.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 3/0/126/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A NS
  Vlan102 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(10.1.102.12,226.1.1.1) Flags: HW
  SW Forwarding: 2/0/100/0, Other: 0/0/0
  HW Forwarding: 215/0/118/0, Other: 0/0/0
  Vlan102 Flags: A
  Vlan901, VXLAN v4 Encap (50901, 239.1.1.1) Flags: F
    Pkts: 0/0/2   Rate: 0 pps
(10.2.255.1,226.1.1.1) Flags: HW
  SW Forwarding: 2/0/100/0, Other: 0/0/0
Leaf-02#

```



The following example shows the output for the **show bgp ipv4 mvpn all** command on VTEP 2:

```
Leaf-02# show bgp ipv4 mvpn all
BGP table version is 94, local router ID is 172.16.255.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
* i   [5][1:1][10.1.102.12][226.1.1.1]/18
      172.16.255.4          0      100      0 ?
*>i   172.16.255.4          0      100      0 ?
*>i   [5][1:1][10.2.255.1][226.1.1.1]/18
      172.16.255.6          0      100      0 ?
* i   172.16.255.6          0      100      0 ?
* i   [6][1:1][65001][10.2.255.255/32][224.0.1.40/32]/22
      172.16.255.4          0      100      0 ?
*>i   172.16.255.4          0      100      0 ?
* i   [6][1:1][65001][10.2.255.255/32][226.1.1.1/32]/22
      172.16.255.4          0      100      0 ?
*>i   172.16.255.4          0      100      0 ?
*>   [7][1:1][65001][10.2.255.1/32][226.1.1.1/32]/22
      0.0.0.0                32768 ?
Route Distinguisher: 172.16.254.4:102
*>   [7][172.16.254.4:102][65001][10.1.102.12/32][226.1.1.1/32]/22
      0.0.0.0                32768 ?
Leaf-02#
```

The following example shows the output for the **show ip mroute** command on VTEP 2:

```
Leaf-02# show ip mroute
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,
       e - encaps-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 239.1.1.1), 1d05h/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, 1d05h/00:01:59

(172.16.254.6, 239.1.1.1), 00:06:55/00:01:59, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 00:06:55/00:02:04
```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

```
(172.16.254.4, 239.1.1.1), 04:23:16/00:03:29, flags: FTx
Incoming interface: Loopback1, RPF nbr 0.0.0.0
Outgoing interface list:
  GigabitEthernet1/0/2, Forward/Sparse, 04:23:16/00:02:57

(*, 224.0.1.40), 1d05h/00:02:02, RP 172.16.255.255, flags: SJCL
Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
Outgoing interface list:
  Loopback0, Forward/Sparse, 1d05h/00:02:02
Leaf-02#
```

The following example shows the output for the **show ip mfib** command on VTEP 2:

```
Leaf-02# show ip mfib
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             ET - Data Rate Exceeds Threshold, K - Keepalive
             DDE - Data Driven Event, HW - Hardware Installed
             ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
             MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
             MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
             e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
               NS - Negate Signalling, SP - Signal Present,
               A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
               MA - MFIB Accept, A2 - Accept backup,
               RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Loopback0 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 2/0/170/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 1/0/150/0, Other: 0/0/0
  HW Forwarding: 12469/0/177/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 1/0/224/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 2/0/163/0, Other: 3/1/2
  HW Forwarding: 9233/0/164/0, Other: 0/0/0
```

```

Null0 Flags: A
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
SW Forwarding: 1/0/206/0, Other: 0/0/0
HW Forwarding:  3767/0/163/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding:  8/0/168/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
SW Forwarding: 1/0/150/0, Other: 22/18/4
HW Forwarding:  7870/0/156/0, Other: 0/0/0
Null0 Flags: A
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
SW Forwarding: 2/0/150/0, Other: 0/0/0
HW Forwarding:  412/1/168/1, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/2   Rate: 0 pps
Leaf-02#

```

Return to [Verifying TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric, on page 71](#)

### Outputs to Verify the Configuration on Border VTEP

The following example shows the output for the **show nve peers** command on Border VTEP:

```

Border# show nve peers
Interface VNI      Type Peer-IP          RMAC/Num_RT's  eVNI      state flags UP time
nve1     50901      L3CP 172.16.254.3      10b3.d56a.8fc8 50901      UP  A/-/4 1d05h
nve1     50901      L3CP 172.16.254.4      7c21.0dbd.9548 50901      UP  A/-/4 1d05h
nve1     50901      L3CP 172.16.254.3      10b3.d56a.8fc8 50901      UP  A/M/6 1d05h
nve1     50901      L3CP 172.16.254.4      7c21.0dbd.9548 50901      UP  A/M/6 1d05h
nve1     10101      L2CP 172.16.254.3        6             10101      UP  N/A 1d05h
nve1     10102      L2CP 172.16.254.4        7             10102      UP  N/A 1d05h
Border#

```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on Border VTEP:

```

Border# show l2vpn evpn peers vxlan
Interface VNI      Peer-IP          Num routes eVNI      UP time
-----
nve1     10101      172.16.254.3    6          10101     1d05h
nve1     10102      172.16.254.4    7          10102     1d05h
Border#

```

The following example shows the output for the **show bgp ipv4 mvpn all summary** command on Border VTEP:

```
Border# show bgp ipv4 mvpn all summary
BGP router identifier 172.16.255.6, local AS number 65001
BGP table version is 102, main routing table version 102
6 network entries using 1824 bytes of memory
8 path entries using 1088 bytes of memory
5/5 BGP path/bestpath attribute entries using 1560 bytes of memory
4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
20 BGP extended community entries using 2706 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 7362 total bytes of memory
BGP activity 133/39 prefixes, 265/144 paths, scan interval 60 secs
8 networks peaked at 12:14:22 Aug 6 2020 UTC (1d05h ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001   2114   1995    102   0    0 1d05h    2
172.16.255.2  4      65001   2112   1990    102   0    0 1d05h    2
Border#
```

The following example shows the output for the **show ip pim vrf vrf-name rp mapping** command on Border VTEP:

```
Border# show ip pim vrf green rp mapping
PIM Group-to-RP Mappings

Group(s): 224.0.0.0/4, Static
          RP: 10.2.255.255 (?)
Border#
```

The following example shows the output for the **show ip routing vrf vrf-name** command on Border VTEP:

```
Border# show ip routing vrf green 10.2.255.255
Routing Table: green
Routing entry for 10.2.255.255/32
  Known via "bgp 65001", distance 200, metric 0, type internal
  Redistributing via ospf 2
  Advertised by ospf 2 subnets
  Last update from 172.16.254.3 on Vlan901, 04:02:51 ago
  Routing Descriptor Blocks:
  * 172.16.254.3 (default), from 172.16.255.1, 04:02:51 ago, via Vlan901
    opaque_ptr 0x7FEF6836D190
    Route metric is 0, traffic share count is 1
    AS Hops 0
    MPLS label: none
Border#
```

The following example shows the output for the **show ip igmp vrf vrf-name groups** command on Border VTEP:

```
Border# show ip igmp vrf green groups
IGMP Connected Group Membership
Group Address  Interface      Uptime    Expires    Last Reporter  Group Accounted
224.0.1.40    Vlan901        1d05h     00:01:58  172.16.254.6
Border#
```

The following example shows the output for the **show ip mroute vrf vrf-name** command on Border VTEP:

```
Border# show ip mroute vrf green
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,
       e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 226.1.1.1), 1d05h/00:03:07, RP 10.2.255.255, flags: SJgx
  Incoming interface: Vlan901, RPF nbr 172.16.254.3
  Outgoing interface list:
    Vlan2001, Forward/Sparse, 04:02:51/00:03:07

(10.2.255.1, 226.1.1.1), 00:09:51/00:01:02, flags: TGqx
  Incoming interface: Vlan2001, RPF nbr 10.2.1.2
  Outgoing interface list:
    Vlan901, Forward/Sparse, 00:09:49/stopped

(10.1.102.12, 226.1.1.1), 00:10:12/00:03:09, flags: TgQx
  Incoming interface: Vlan901, RPF nbr 172.16.254.4
  Outgoing interface list:
    Vlan2001, Forward/Sparse, 00:10:12/00:03:07

(*, 224.0.1.40), 1d05h/00:03:10, RP 10.2.255.255, flags: SJCLgx
  Incoming interface: Vlan901, RPF nbr 172.16.254.3
  Outgoing interface list:
    Vlan2001, Forward/Sparse, 04:02:51/00:03:10
Border#
```

The following example shows the output for the **show ip mfib vrf vrf-name** command on Border VTEP:

```
Border# show ip mfib vrf green
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
            ET - Data Rate Exceeds Threshold, K - Keepalive
            DDE - Data Driven Event, HW - Hardware Installed
            ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
            MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
            MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
            e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
              NS - Negate Signalling, SP - Signal Present,
              A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
              MA - MFIB Accept, A2 - Accept backup,
              RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

```

Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
VRF green
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A IC NS
  Vlan2001 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(*,226.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 6/0/122/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A NS
  Vlan2001 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(10.1.102.12,226.1.1.1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 304/0/126/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A
  Vlan2001 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(10.2.255.1,226.1.1.1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 1/0/1
  HW Forwarding: 582/1/122/0, Other: 0/0/0
  Vlan2001 Flags: A
  Vlan901, VXLAN v4 Encap (50901, 239.1.1.1) Flags: F
    Pkts: 0/0/0   Rate: 0 pps
Border#

```

The following example shows the output for the **show bgp ipv4 mvpn all** command on Border VTEP:

```

Border# show bgp ipv4 mvpn allBGP table version is 102, local router ID is 172.16.255.6
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
              x best-external, a additional-path, c RIB-compressed,
              t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
* i   [5][1:1][10.1.102.12][226.1.1.1]/18
      172.16.255.4          0      100      0 ?
*>i   172.16.255.4          0      100      0 ?
*>   [5][1:1][10.2.255.1][226.1.1.1]/18
      0.0.0.0                32768 ?
*>   [6][1:1][65001][10.2.255.255/32][224.0.1.40/32]/22
      0.0.0.0                32768 ?
*>   [6][1:1][65001][10.2.255.255/32][226.1.1.1/32]/22
      0.0.0.0                32768 ?
*>i   [7][1:1][65001][10.2.255.1/32][226.1.1.1/32]/22
      172.16.255.3          0      100      0 ?
* i   172.16.255.3          0      100      0 ?
Route Distinguisher: 172.16.254.4:102
*>   [7][172.16.254.4:102][65001][10.1.102.12/32][226.1.1.1/32]/22
      0.0.0.0                32768 ?
Border#

```

The following example shows the output for the **show ip mroute** command on Border VTEP:

```

Border# show ip mroute
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,
       e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 239.1.1.1), 1d05h/stopped, RP 172.16.255.255, flags: SJCFx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d05h/00:01:56

(172.16.254.6, 239.1.1.1), 00:09:47/00:02:24, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    TenGigabitEthernet1/0/2, Forward/Sparse, 00:09:47/00:02:33

(172.16.254.4, 239.1.1.1), 04:26:08/00:02:10, flags: JTx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 04:26:08/00:00:51

(*, 224.0.1.40), 1d05h/00:02:56, RP 172.16.255.255, flags: SJCL
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Loopback0, Forward/Sparse, 1d05h/00:02:56

(*, 225.0.0.102), 1d05h/stopped, RP 172.16.255.255, flags: SJCFx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d05h/00:01:56

(172.16.254.4, 225.0.0.102), 1d05h/00:01:27, flags: JTx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d05h/00:01:56

(172.16.254.6, 225.0.0.102), 1d05h/00:01:53, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    TenGigabitEthernet1/0/2, Forward/Sparse, 1d05h/00:02:43, A

(*, 225.0.0.101), 1d05h/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d05h/00:01:56

(172.16.254.3, 225.0.0.101), 1d05h/00:01:10, flags: JTx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2

```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

```

Outgoing interface list:
  Tunnel0, Forward/Sparse, 1d05h/00:02:08
Border#

```

The following example shows the output for the **show ip mfib** command on Border VTEP:

```

Border# show ip mfib
Entry Flags:      C - Directly Connected, S - Signal, IA - Inherit A flag,
                  ET - Data Rate Exceeds Threshold, K - Keepalive
                  DDE - Data Driven Event, HW - Hardware Installed
                  ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
                  MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
                  MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
                  e - Encap helper tunnel flag.
I/O Item Flags:  IC - Internal Copy, NP - Not platform switched,
                  NS - Negate Signalling, SP - Signal Present,
                  A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                  MA - MFIB Accept, A2 - Accept backup,
                  RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Loopback0 Flags: F IC NS
    Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 8/0/146/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 7/0/125/0, Other: 0/0/0
  HW Forwarding: 12570/0/177/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/7   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 1/0/172/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/154/0, Other: 0/0/0
  HW Forwarding: 9199/0/176/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 17/0/174/0, Other: 10/9/1
  HW Forwarding: 3789/0/151/0, Other: 0/0/0
  Null0 Flags: A

```



```

TenGigabitEthernet1/0/2 Flags: F
  Pkts: 0/0/16   Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 9/0/168/0, Other: 0/0/0
TenGigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
  SW Forwarding: 1/0/150/0, Other: 0/0/0
  HW Forwarding: 7961/0/167/0, Other: 0/0/0
TenGigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
  SW Forwarding: 2/0/150/0, Other: 2/2/0
  HW Forwarding: 580/1/156/1, Other: 0/0/0
Null0 Flags: A
TenGigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
Border#

```

Return to [Verifying TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric, on page 71](#)

### Outputs to Verify the Configuration on Spine Switch 1

The following example shows the output for the **show bgp ipv4 mvpn all summary** command on Spine Switch 1:

```

Spine-01# show bgp ipv4 mvpn all summary
BGP router identifier 172.16.255.1, local AS number 65001
BGP table version is 204, main routing table version 204
6 network entries using 1824 bytes of memory
16 path entries using 2176 bytes of memory
4/4 BGP path/bestpath attribute entries using 1216 bytes of memory
3 BGP rrinfo entries using 120 bytes of memory
1 BGP community entries using 24 bytes of memory
17 BGP extended community entries using 2356 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 7716 total bytes of memory
BGP activity 266/218 prefixes, 3029/2926 paths, scan interval 60 secs
8 networks peaked at 12:20:11 Aug 6 2020 UTC (1d05h ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.3  4      65001   1985   2115    204   0    0 1d05h      2
172.16.255.4  4      65001   1995   2111    204   0    0 1d05h      4
172.16.255.6  4      65001   1999   2118    204   0    0 1d05h      4
Spine-01#

```

The following example shows the output for the **show ip pim rp mapping** command on Spine Switch 1:

```

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

```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

```
Group(s): 224.0.0.0/4, Static
  RP: 172.16.255.255 (?)
Spine-01#
```

The following example shows the output for the **show bgp ipv4 mvpn all** command on Spine Switch 1:

```
Spine-01# show bgp ipv4 mvpn all
BGP table version is 204, local router ID is 172.16.255.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1
* i [5][1:1][10.1.102.12][226.1.1.1]/18
      172.16.255.4          0    100    0 ?
*>i          172.16.255.4          0    100    0 ?
* i [5][1:1][10.2.255.1][226.1.1.1]/18
      172.16.255.6          0    100    0 ?
*>i          172.16.255.6          0    100    0 ?
* i [6][1:1][65001][10.2.255.255/32][224.0.1.40/32]/22
      172.16.255.4          0    100    0 ?
*>i          172.16.255.4          0    100    0 ?
* i          172.16.255.6          0    100    0 ?
* i [6][1:1][65001][10.2.255.255/32][226.1.1.1/32]/22
      172.16.255.4          0    100    0 ?
*>i          172.16.255.4          0    100    0 ?
* i          172.16.255.6          0    100    0 ?
* i [7][1:1][65001][10.2.255.1/32][226.1.1.1/32]/22
      172.16.255.4          0    100    0 ?
* i          172.16.255.3          0    100    0 ?
*>i          172.16.255.3          0    100    0 ?
Route Distinguisher: 172.16.254.4:102
* i [7][172.16.254.4:102][65001][10.1.102.12/32][226.1.1.1/32]/22
      172.16.255.6          0    100    0 ?
* i          172.16.255.3          0    100    0 ?
*>i          172.16.255.3          0    100    0 ?
Spine-01#
```

The following example shows the output for the **show ip mroute** command on Spine Switch 1:

```
Spine-01# show ip mroute
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

(*, 239.1.1.1), 04:29:40/stopped, RP 172.16.255.255, flags: SP
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list: Null

(172.16.254.6, 239.1.1.1), 00:13:17/00:02:24, flags: PA
  Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.16.6
  Outgoing interface list: Null

(172.16.254.4, 239.1.1.1), 04:27:38/00:02:41, flags: PTA
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.14.4
  Outgoing interface list: Null

(*, 224.0.1.40), 1w0d/00:02:43, RP 172.16.255.255, flags: SJCL
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    Loopback2, Forward/Sparse, 1w0d/00:02:43

(*, 225.0.0.102), 1w0d/stopped, RP 172.16.255.255, flags: SP
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list: Null
Spine-01#

```

The following example shows the output for the **show ip mfib** command on Spine Switch 1:

```

Spine-01# show ip mfib
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             ET - Data Rate Exceeds Threshold, K - Keepalive
             DDE - Data Driven Event, HW - Hardware Installed
             ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
             MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
             MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
               NS - Negate Signalling, SP - Signal Present,
               A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
               MA - MFIB Accept, A2 - Accept backup,
               RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 83/83/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
Loopback2 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 1/0/206/0, Other: 282/0/282
  HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/2 Flags: NS

```

```
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
  GigabitEthernet1/0/4 Flags: NS
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 4/3/1
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
(172.16.254.4,239.1.1.1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 7/0/158/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
(172.16.254.6,239.1.1.1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
  GigabitEthernet1/0/4 Flags: NS
Spine-01#
```

Return to [Verifying TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric](#), on page 71

## Outputs to Verify the Configuration on Spine Switch 2

The following example shows the output for the **show bgp ipv4 mvpn all summary** command on Spine Switch 2:

```
Spine-02# show bgp ipv4 mvpn all summary
BGP router identifier 172.16.255.2, local AS number 65001
BGP table version is 164, main routing table version 164
6 network entries using 1824 bytes of memory
16 path entries using 2176 bytes of memory
4/4 BGP path/bestpath attribute entries using 1216 bytes of memory
3 BGP rrinfo entries using 120 bytes of memory
1 BGP community entries using 24 bytes of memory
17 BGP extended community entries using 2356 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 7716 total bytes of memory
BGP activity 297/249 prefixes, 3131/3028 paths, scan interval 60 secs
8 networks peaked at 12:20:59 Aug 6 2020 UTC (1d05h ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.3  4      65001  1988   2114    164   0    0  1d05h   2
172.16.255.4  4      65001  1998   2110    164   0    0  1d05h   4
172.16.255.6  4      65001  1996   2119    164   0    0  1d05h   4
Spine-02#
```

The following example shows the output for the **show ip pim rp mapping** command on Spine Switch 2:

```
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 (?)
Spine-02#
```

The following example shows the output for the **show bgp ipv4 mvpn all** command on Spine Switch 2:

```
Spine-02# show bgp ipv4 mvpn all
BGP table version is 164, local router ID is 172.16.255.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1
* i   [5][1:1][10.1.102.12][226.1.1.1]/18
      172.16.255.4          0    100    0 ?
*>i   172.16.255.4          0    100    0 ?
* i   [5][1:1][10.2.255.1][226.1.1.1]/18
      172.16.255.6          0    100    0 ?
*>i   172.16.255.6          0    100    0 ?
*>i   [6][1:1][65001][10.2.255.255/32][224.0.1.40/32]/22
      172.16.255.4          0    100    0 ?
* i   172.16.255.4          0    100    0 ?
* i   172.16.255.6          0    100    0 ?
*>i   [6][1:1][65001][10.2.255.255/32][226.1.1.1/32]/22
      172.16.255.4          0    100    0 ?
* i   172.16.255.4          0    100    0 ?
* i   172.16.255.6          0    100    0 ?
* i   [7][1:1][65001][10.2.255.1/32][226.1.1.1/32]/22
      172.16.255.4          0    100    0 ?
* i   172.16.255.3          0    100    0 ?
*>i   172.16.255.3          0    100    0 ?
Route Distinguisher: 172.16.254.4:102
* i   [7][172.16.254.4:102][65001][10.1.102.12/32][226.1.1.1/32]/22
      172.16.255.6          0    100    0 ?
* i   172.16.255.3          0    100    0 ?
*>i   172.16.255.3          0    100    0 ?
Spine-02#
```

The following example shows the output for the **show ip mroute** command on Spine Switch 2:

```
Spine-02# show ip mroute
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
```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

```

(*, 239.1.1.1), 3d12h/00:03:14, RP 172.16.255.255, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 1d05h/00:02:31
    GigabitEthernet1/0/1, Forward/Sparse, 1d05h/00:03:14
    GigabitEthernet1/0/4, Forward/Sparse, 1d05h/00:03:09

(172.16.254.6, 239.1.1.1), 00:15:48/00:01:26, flags: T
  Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.26.6
  Outgoing interface list:
    GigabitEthernet1/0/1, Forward/Sparse, 00:15:48/00:03:24
    GigabitEthernet1/0/2, Forward/Sparse, 00:15:48/00:03:26

(172.16.254.4, 239.1.1.1), 04:32:09/00:01:28, flags: T
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.4
  Outgoing interface list:
    GigabitEthernet1/0/4, Forward/Sparse, 04:32:09/00:03:09
    GigabitEthernet1/0/1, Forward/Sparse, 04:32:09/00:03:14

(*, 224.0.1.40), 1w0d/00:03:29, RP 172.16.255.255, flags: SJCL
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 1d05h/00:02:48
    GigabitEthernet1/0/1, Forward/Sparse, 1d05h/00:03:29
    GigabitEthernet1/0/4, Forward/Sparse, 1d05h/00:03:17
    Loopback2, Forward/Sparse, 1w0d/00:02:34

(*, 225.0.0.102), 1w0d/00:03:28, RP 172.16.255.255, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 1d05h/00:02:55
    GigabitEthernet1/0/1, Forward/Sparse, 1d05h/00:03:00
    GigabitEthernet1/0/4, Forward/Sparse, 1d05h/00:03:28

(172.16.254.4, 225.0.0.102), 1d05h/00:02:09, flags: MT
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.4
  Outgoing interface list:
    GigabitEthernet1/0/4, Forward/Sparse, 1d05h/00:03:28
    GigabitEthernet1/0/1, Forward/Sparse, 1d05h/00:03:17

(172.16.254.6, 225.0.0.102), 1d05h/00:01:40, flags: MT
  Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.26.6
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 1d05h/00:02:59
    GigabitEthernet1/0/1, Forward/Sparse, 1d05h/00:03:05

(*, 225.0.0.101), 3d12h/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, 1d05h/00:02:33
    GigabitEthernet1/0/1, Forward/Sparse, 1d05h/00:03:21
    GigabitEthernet1/0/4, Forward/Sparse, 1d05h/00:02:47

(172.16.254.3, 225.0.0.101), 1d05h/00:02:05, flags: TA
  Incoming interface: GigabitEthernet1/0/1, RPF nbr 172.16.23.3
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 1d05h/00:02:57
    GigabitEthernet1/0/4, Forward/Sparse, 1d05h/00:02:47
Spine-02#

```

The following example shows the output for the **show ip mfib** command on Spine Switch 2:

```

Spine-02# show ip mfib
Entry Flags:    C - Directly Connected, S - Signal, IA - Inherit A flag,
                ET - Data Rate Exceeds Threshold, K - Keepalive
                DDE - Data Driven Event, HW - Hardware Installed
                ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
                MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
                MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,
                A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                MA - MFIB Accept, A2 - Accept backup,
                RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
  GigabitEthernet1/0/1 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  GigabitEthernet1/0/2 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  GigabitEthernet1/0/4 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  Loopback2 Flags: F IC NS
    Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 9/0/112/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
  GigabitEthernet1/0/1 Flags: F NS
    Pkts: 0/0/2   Rate: 0 pps
  GigabitEthernet1/0/2 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  GigabitEthernet1/0/4 Flags: F NS
    Pkts: 0/0/2   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 4/0/132/0, Other: 0/0/0
  HW Forwarding: 12607/0/177/0, Other: 0/0/0
  GigabitEthernet1/0/1 Flags: A
  GigabitEthernet1/0/2 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  GigabitEthernet1/0/4 Flags: F NS
    Pkts: 0/0/4   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 27/0/101/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
  GigabitEthernet1/0/1 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  GigabitEthernet1/0/2 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  GigabitEthernet1/0/4 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  9232/0/176/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A

```

```

GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 3789/0/163/0, Other: 0/0/0
GigabitEthernet1/0/4 Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
  SW Forwarding: 10/0/150/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/4   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/4   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/4   Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 8144/0/167/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 942/1/168/1, Other: 0/0/0
GigabitEthernet1/0/4 Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
Spine-02#

```

Return to [Verifying TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric](#), on page 71

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

This example shows how to configure and verify Layer 3 TRM with PIM-SM for IPv4 and IPv6 multicast traffic when the RP is inside the BGP EVPN VXLAN fabric. The example uses the topology in the [Figure 12: TRM with PIM-SM when the RP is Inside the BGP EVPN VXLAN Fabric](#) figure.

The topology shows an EVPN VXLAN network, with two spine switches and three VTEPs, connected to an external network with three routers. VTEP 1 inside the BGP EVPN VXLAN fabric acts as the RP in this topology and Border VTEP connects the fabric to the external network through Router 1. The IPv4 multicast group is 226.1.1.1 and the IPv6 multicast group is FF06:1::1 in this topology. The following tables provide sample configurations for the devices in this topology:



**Table 6: Configuring VTEP 1, Border VTEP, and VTEP 2 to Configure TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric**

VTEP 1	Border VTEP	VTEP 2
<pre>Leaf-01# show running-config hostname Leaf-01 ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 ip multicast-routing vrf green ! ipv6 unicast-routing ipv6 multicast-routing vrf green ! 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 ! system mtu 9198 ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 !</pre>	<pre>Border# show running-config hostname Border ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 ip multicast-routing vrf green ! ipv6 unicast-routing ipv6 multicast-routing vrf green ! 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 ! system mtu 9198 ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 !</pre>	<pre>Leaf-02# show running-config hostname Leaf-02 ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 ip multicast-routing vrf green ! ipv6 unicast-routing ipv6 multicast-routing vrf green ! 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 ! system mtu 9198 ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 !</pre>

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

VTEP 1	Border VTEP	VTEP 2
<pre> interface Loopback0 ip address 172.16.255.3 255.255.255.255 ip pim sparse-mode 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 Loopback255 vrf forwarding green ip address 10.2.255.255 255.255.255.255 ip pim sparse-mode ipv6 address FC00:2:255::255/128 ipv6 enable ! interface Loopback901 vrf forwarding green ip address 10.1.255.1 255.255.255.255 ip pim sparse-mode ipv6 address FC00:1:255::1/128 ipv6 enable ! 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 ! 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 access vlan 101 switchport mode access ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:101::1/64 ipv6 enable </pre>	<pre> vlan 2001 ! interface Loopback0 ip address 172.16.255.6 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.6 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface Loopback901 vrf forwarding green ip address 10.1.255.4 255.255.255.255 ip pim sparse-mode ipv6 address FC00:1:255::4/128 ipv6 enable ! interface TenGigabitEthernet1/0/1 no switchport ip address 172.16.16.6 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet1/0/2 no switchport ip address 172.16.26.6 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet1/0/5 switchport trunk allowed vlan 2001 switchport mode trunk ! interface TenGigabitEthernet1/0/10 switchport access vlan 102 switchport mode access ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:101::1/64 ipv6 enable ! </pre>	<pre> interface Loopback0 ip address 172.16.255.4 255.255.255.255 ip pim sparse-mode 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 Loopback901 vrf forwarding green ip address 10.1.255.2 255.255.255.255 ip pim sparse-mode ipv6 address FC00:1:255::2/128 ipv6 enable ! 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 ! 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 access vlan 101 switchport mode access ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:101::1/64 ipv6 enable ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:102::1/64 ipv6 enable </pre>

VTEP 1	Border VTEP	VTEP 2
<pre> ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:102::1/64 ipv6 enable ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode 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 mcast-group 225.0.0.102 ! 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 redistribute connected redistribute static exit-address-family ! address-family ipv4 mvpn 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 ! </pre>	<pre> interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:102::1/64 ipv6 enable ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode ipv6 enable no autostate ! interface Vlan2001 vrf forwarding green ip address 10.2.1.1 255.255.255.0 ip mtu 1500 ip pim sparse-mode ip ospf network point-to-point ip ospf 2 area 0 ipv6 address FC00:2:1::1/64 ipv6 enable ipv6 mtu 1500 ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! 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 mcast-group 225.0.0.102 ! router ospfv3 1 ! address-family ipv6 unicast vrf green redistribute bgp 65001 exit-address-family ! router ospf 2 vrf green redistribute bgp 65001 ! router ospf 1 router-id 172.16.255.6 ! 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 </pre>	<pre> ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode 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 mcast-group 225.0.0.102 ! 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 redistribute connected redistribute static exit-address-family ! address-family ipv4 mvpn 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 ipv6 mvpn 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 </pre>

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

VTEP 1	Border VTEP	VTEP 2
<pre> address-family ipv6 mvpn 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 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 ! 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 ip pim vrf green rp-address 10.2.255.255 ! ipv6 pim vrf green rp-address FC00:2:255::255 ipv6 pim vrf green register-source Loopback901 ! end ! Leaf-01# </pre>	<pre> ! address-family ipv4 exit-address-family ! address-family ipv4 mvpn 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 ipv6 mvpn 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 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 ! 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 ip pim vrf green rp-address 10.2.255.255 ! ipv6 pim vrf green rp-address FC00:2:255::255 ipv6 pim vrf green register-source Loopback901 ! end ! Leaf-02# </pre>	<pre> ! 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 ! 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 ip pim vrf green rp-address 10.2.255.255 ! ipv6 pim vrf green rp-address FC00:2:255::255 ipv6 pim vrf green register-source Loopback901 ! end ! Leaf-02# </pre>

**Table 7: Configuring Spine Switch 1 and Spine Switch 2 to Configure TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric**

Spine Switch 1	Spine Switch 2
<pre> Spine-01# show running-config hostname Spine-01 ! ip routing ! ip multicast-routing ! system mtu 9198 ! 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 ! interface GigabitEthernet1/0/4 no switchport ip address 172.16.16.1 255.255.255.0 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 neighbor 172.16.255.3 remote-as 65001 neighbor 172.16.255.3 update-source Loopback0 neighbor 172.16.255.4 remote-as 65001 neighbor 172.16.255.4 update-source Loopback0 neighbor 172.16.255.6 remote-as 65001 neighbor 172.16.255.6 update-source Loopback0 ! </pre>	<pre> Spine-02# show running-config hostname Spine-02 ! ip routing ! ip multicast-routing ! system mtu 9198 ! 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 ! interface GigabitEthernet1/0/4 no switchport ip address 172.16.26.2 255.255.255.0 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 neighbor 172.16.255.3 remote-as 65001 neighbor 172.16.255.3 update-source Loopback0 neighbor 172.16.255.4 remote-as 65001 neighbor 172.16.255.4 update-source Loopback0 neighbor 172.16.255.6 remote-as 65001 neighbor 172.16.255.6 update-source Loopback0 ! </pre>

Spine Switch 1	Spine Switch 2
<pre> address-family ipv4 exit-address-family ! address-family ipv4 mvpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family ipv6 mvpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family l2vpn evpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client 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 ! end ! Spine-01# </pre>	<pre> address-family ipv4 exit-address-family ! address-family ipv4 mvpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family ipv6 mvpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family l2vpn evpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client 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 ! end ! Spine-02# </pre>

**Table 8: Configuring Router 1, Router 2, and Router 3 to Configure TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric**

Router 1	Router 2	Router 3
<pre> R1# show running-config hostname R1 ! ip multicast-routing distributed ! ipv6 unicast-routing ipv6 multicast-routing ! interface Loopback0 ip address 10.2.255.1 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ipv6 address FC00:2:255::1/128 ipv6 enable ospfv3 1 ipv6 area 0 ! interface TenGigabitEthernet0/0/0 ip address 10.2.12.1 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 cdp enable ipv6 address FC00:2:12::1/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! interface TenGigabitEthernet0/0/1 ip address 10.2.13.1 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 cdp enable ipv6 address FC00:2:13::1/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! interface GigabitEthernet0/0/1.2001 encapsulation dot1Q 2001 ip address 10.2.1.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ipv6 address FC00:2:1::2/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! </pre>	<pre> R2# show running-config hostname R2 ! ip multicast-routing distributed ! ipv6 unicast-routing ipv6 multicast-routing ! interface Loopback0 ip address 10.2.255.2 255.255.255.255 ip pim sparse-mode ip igmp join-group 226.1.1.1 ip ospf 1 area 0 ipv6 address FC00:2:255::2/128 ipv6 enable ipv6 mld join-group FF06:1::1 ospfv3 1 ipv6 area 0 ! interface TenGigabitEthernet0/0/0 ip address 10.2.12.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 cdp enable ipv6 address FC00:2:12::2/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! interface TenGigabitEthernet0/0/1 ip address 10.2.23.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 cdp enable ipv6 address FC00:2:23::2/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! router ospfv3 1 ! address-family ipv6 unicast exit-address-family ! router ospf 1 router-id 10.2.255.2 ! ip pim rp-address 10.2.255.255 </pre>	<pre> R3# show running-config hostname R3 ! ip multicast-routing distributed ! ipv6 unicast-routing ipv6 multicast-routing ! interface Loopback0 ip address 10.2.255.3 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ipv6 address FC00:2:255::3/128 ipv6 enable ospfv3 1 ipv6 area 0 ! interface TenGigabitEthernet0/0/0 ip address 10.2.13.3 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 cdp enable ipv6 address FC00:2:13::3/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! interface TenGigabitEthernet0/0/1 ip address 10.2.23.3 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 cdp enable ipv6 address FC00:2:23::3/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! router ospfv3 1 ! address-family ipv6 unicast exit-address-family ! router ospf 1 router-id 10.2.255.3 ! ip pim rp-address 10.2.255.255 ! </pre>

Router 1	Router 2	Router 3
<pre> router ospfv3 1 ! address-family ipv6 unicast exit-address-family ! router ospf 1 router-id 10.2.255.1 ! ip pim rp-address 10.2.255.255 ! ipv6 pim rp-address FC00:2:255::255 ! end ! R1# </pre>	<pre> ! ipv6 pim rp-address FC00:2:255::255 ! end ! R2# </pre>	<pre> ipv6 pim rp-address FC00:2:255::255 ! end ! R3# </pre>

### Verifying TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

The following sections provide sample outputs for **show** commands to verify TRM with PIM-SM on the devices in the topology configured above:

- [Outputs to Verify the Configuration on VTEP 1 \(RP Inside the BGP EVPN VXLAN Fabric\)](#)
- [Outputs to Verify the Configuration on VTEP 2](#)
- [Outputs to Verify the Configuration on Border VTEP](#)
- [Outputs to Verify the Configuration on Spine Switch 1](#)
- [Outputs to Verify the Configuration on Spine Switch 2](#)

#### Outputs to Verify the Configuration on VTEP 1 (RP Inside the BGP EVPN VXLAN Fabric)

The following example shows the output for the **show nve peers** command on VTEP 1:

```

Leaf-01# show nve peers
Interface VNI      Type Peer-IP          RMAC/Num_RTs  eVNI    state flags UP time
nve1      50901  L3CP 172.16.254.6   0c75.bd67.ef48 50901    UP    A/-/4 1d05h
nve1      50901  L3CP 172.16.254.4    7c21.0dbd.9548 50901    UP    A/-/4 1d05h
nve1      50901  L3CP 172.16.254.6    0c75.bd67.ef48 50901    UP    A/M/6 1d05h
nve1      50901  L3CP 172.16.254.4    7c21.0dbd.9548 50901    UP    A/M/6 1d05h
nve1      10102  L2CP 172.16.254.4     7              10102    UP    N/A   1d05h
nve1      10102  L2CP 172.16.254.6     5              10102    UP    N/A   1d05h
Leaf-01#

```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on VTEP 1:

```

Leaf-01# show l2vpn evpn peers vxlan
Interface VNI      Peer-IP          Num routes eVNI    UP time
-----
nve1      10102  172.16.254.4    7         10102  1d05h
nve1      10102  172.16.254.6    5         10102  1d05h
Leaf-01#

```



The following example shows the output for the **show bgp ipv6 mvpn all summary** command on VTEP 1:

```
Leaf-01# show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.3, local AS number 65001
BGP table version is 60, main routing table version 60
5 network entries using 1960 bytes of memory
8 path entries using 1280 bytes of memory
4/4 BGP path/bestpath attribute entries using 1248 bytes of memory
4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
18 BGP extended community entries using 2396 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 7068 total bytes of memory
BGP activity 139/41 prefixes, 275/138 paths, scan interval 60 secs
5 networks peaked at 15:46:09 Aug 6 2020 UTC (1d02h ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001   2135   2003     60    0    0 1d05h      3
172.16.255.2  4      65001   2131   2003     60    0    0 1d05h      3
Leaf-01#
```

The following example shows the output for the **show ipv6 pim vrf vrf-name group-map** command on VTEP 1:

```
Leaf-01# show ipv6 pim vrf green group-map ff06:1::1
IP PIM Group Mapping Table
(* indicates group mappings being used)

FF06:1::8*
  SM, RP: FC00:2:255::255
  RPF: Tu7,FC00:2:255::255 (us)
  Info source: Static
  Uptime: 1d02h, Groups: 1
Leaf-01#
```

The following example shows the output for the **show ipv6 routing vrf** command on VTEP 1:

```
Leaf-01# show ipv6 routing vrf green FC00:2:255::255
Routing entry for FC00:2:255::255/128
  Known via "connected", distance 0, metric 0, type receive, connected
  Redistributing via bgp 65001
  Route count is 1/1, share count 0
  Routing paths:
    receive via Loopback255
    Last updated 04:21:51 ago
Leaf-01#
```

The following example shows the output for the **show ipv6 mld vrf vrf-name groups** command on VTEP 1:

```
Leaf-01# show ipv6 mld vrf green groups
MLD Connected Group Membership
Group Address                               Interface
  Uptime    Expires
FF06:1::1                                Vlan101
  1d02h     00:02:28
Leaf-01#
```

The following example shows the output for the **show ipv6 mroute vrf vrf-name** command on VTEP 1:

```
Leaf-01# show ipv6 mroute vrf green
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, I - Received Source Specific Host Report,
       P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
       J - Join SPT, Y - Joined MDT-data group,
       y - Sending to MDT-data group
       g - BGP signal originated, G - BGP Signal received,
       n - BGP Shared-Tree Prune received, N - BGP C-Mroute suppressed,
       q - BGP Src-Active originated, Q - BGP Src-Active received
       E - Extranet
Timers: Uptime/Expires
Interface state: Interface, State

(*, FF06:1::1), 1d02h/00:03:13, RP FC00:2:255::255, flags: SCJG
  Incoming interface: Tunnel7
  RPF nbr: FC00:2:255::255
  Immediate Outgoing interface list:
    Vlan101, Forward, 1d02h/00:03:13
    Vlan901, Forward, 04:21:51/never

(FC00:1:102::12, FF06:1::1), 00:02:17/00:03:04, flags: SJTg
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.4
  Immediate Outgoing interface list:
    Vlan101, Forward, 00:02:13/00:03:23

(FC00:2:255::1, FF06:1::1), 00:01:24/00:03:04, flags: SJTg
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.6
  Immediate Outgoing interface list:
    Vlan101, Forward, 00:01:20/00:03:13
Leaf-01#
```

The following example shows the output for the **show ipv6 mfib vrf vrf-name** command on VTEP 1:

```
Leaf-01# show ipv6 mfib vrf green
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             ET - Data Rate Exceeds Threshold, K - Keepalive
             DDE - Data Driven Event, HW - Hardware Installed
             ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
             MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
             MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
             e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
               NS - Negate Signalling, SP - Signal Present,
               A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
               MA - MFIB Accept, A2 - Accept backup,
               RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
VRF green
(*,FF00::/8) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 412/412/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnel7 Flags: NS
```

```

(*,FF00::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF02::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF06:1::1) Flags: C HW
  SW Forwarding: 2/0/100/0, Other: 0/0/0
  HW Forwarding: 4/0/126/0, Other: 0/0/0
  Tunnel7 Flags: A NS
  Vlan101 Flags: F NS
    Pkts: 0/0/2    Rate: 0 pps
  Vlan901, VXLAN v4 Encap (50901, 239.1.1.1) Flags: F
    Pkts: 0/0/2    Rate: 0 pps
(FC00:1:102::12,FF06:1::1) Flags: HW
  SW Forwarding: 1/0/100/0, Other: 0/0/0
  HW Forwarding: 64/0/126/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A
  Vlan101 Flags: F NS
    Pkts: 0/0/1    Rate: 0 pps
(FC00:2:255::1,FF06:1::1) Flags: HW
  SW Forwarding: 2/0/100/0, Other: 0/0/0
  HW Forwarding: 38/0/126/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A
  Vlan101 Flags: F NS
    Pkts: 0/0/2    Rate: 0 pps
(*,FF10::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF12::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF20::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF22::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF30::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF32::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF33::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF34::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF35::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF36::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF37::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF38::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF39::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3A::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0

```

```

(*,FF3B::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3C::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3D::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3E::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3F::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF40::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF42::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF50::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF52::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF60::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF62::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF70::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF72::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF80::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF82::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF90::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF92::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFA0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFA2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFB0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFB2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFC0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFC2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFD0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFD2::/16) Flags:

```

```

SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFE0::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFE2::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFF0::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFF2::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
Leaf-01#

```

The following example shows the output for the **show bgp ipv6 mvpn all** command on VTEP 1:

```

Leaf-01# show bgp ipv6 mvpn all
BGP table version is 60, local router ID is 172.16.255.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
* i  [5] [1:1] [FC00:1:102::12] [FF06:1::1]/42
      172.16.255.4          0    100    0 ?
*>i  172.16.255.4          0    100    0 ?
* i  [5] [1:1] [FC00:2:255::1] [FF06:1::1]/42
      172.16.255.6          0    100    0 ?
*>i  172.16.255.6          0    100    0 ?
* i  [6] [1:1] [65001] [FC00:2:255::255] [FF06:1::1]/46
      172.16.255.4          0    100    0 ?
*>i  172.16.255.4          0    100    0 ?
*>  [7] [1:1] [65001] [FC00:2:255::1] [FF06:1::1]/46
      ::                      32768 ?
Route Distinguisher: 172.16.254.4:102
*>  [7] [172.16.254.4:102] [65001] [FC00:1:102::12] [FF06:1::1]/46
      ::                      32768 ?
Leaf-01#

```

The following example shows the output for the **show ip mroute** command on VTEP 1:

```

Leaf-01# show ip mroute
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,
       e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires

```

```

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

(*, 239.1.1.1), 1d05h/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, 1d05h/00:01:34

(172.16.254.3, 239.1.1.1), 00:02:17/00:02:05, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0, Registering
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 00:02:17/00:03:09, A

(172.16.254.6, 239.1.1.1), 00:28:47/00:02:22, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 00:28:47/00:01:12

(172.16.254.4, 239.1.1.1), 04:45:08/00:01:03, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 04:45:08/00:02:51

(*, 224.0.1.40), 1d05h/00:02:38, RP 172.16.255.255, flags: SJCL
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Loopback0, Forward/Sparse, 1d05h/00:02:38

(*, 225.0.0.102), 1d05h/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d05h/00:01:34

(172.16.254.4, 225.0.0.102), 1d05h/00:02:33, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d05h/00:00:56

(172.16.254.6, 225.0.0.102), 1d05h/00:01:12, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d05h/00:01:34

(*, 225.0.0.101), 1d05h/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, 1d05h/00:01:34

(172.16.254.3, 225.0.0.101), 1d05h/00:03:17, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 1d05h/00:03:17
Leaf-01#

```

The following example shows the output for the **show ip mfib** command on VTEP 1:

```

Leaf-01# show ip mfib
Entry Flags:      C - Directly Connected, S - Signal, IA - Inherit A flag,
                  ET - Data Rate Exceeds Threshold, K - Keepalive
                  DDE - Data Driven Event, HW - Hardware Installed
                  ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
                  MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
                  MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
                  e - Encap helper tunnel flag.

```

I/O Item Flags: IC - Internal Copy, NP - Not platform switched,  
 NS - Negate Signalling, SP - Signal Present,  
 A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,  
 MA - MFIB Accept, A2 - Accept backup,  
 RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second

Other counts: Total/RPF failed/Other drops

I/O Item Counts: HW Pkt Count/FS Pkt Count/PS Pkt Count Egress Rate in pps

Default

```
(* ,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(* ,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Loopback0 Flags: F IC NS
    Pkts: 0/0/0 Rate: 0 pps
(* ,225.0.0.101) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 1/0/114/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0 Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 13/0/127/0, Other: 2/2/0
  HW Forwarding: 12686/0/165/0, Other: 0/0/0
  Null0 Flags: A
  GigabitEthernet1/0/2 Flags: F NS
    Pkts: 0/0/1 Rate: 0 pps
(* ,225.0.0.102) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 2/0/172/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0 Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/154/0, Other: 0/0/0
  HW Forwarding: 9299/0/176/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/1 Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/154/0, Other: 0/0/0
  HW Forwarding: 3817/0/163/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/1 Rate: 0 pps
(* ,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(* ,239.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 4/4/0
  HW Forwarding: 15/0/168/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0 Rate: 0 pps
(172.16.254.3,239.1.1.1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 6/5/1
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Null0 Flags: A NS
  GigabitEthernet1/0/2 Flags: F
    Pkts: 0/0/0 Rate: 0 pps
```

```

Tunnel4 Flags: F
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
SW Forwarding: 1/0/150/0, Other: 0/0/0
HW Forwarding: 8525/0/167/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
SW Forwarding: 2/0/150/0, Other: 0/0/0
HW Forwarding: 1629/0/168/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/2   Rate: 0 pps
Leaf-01#

```

Return to [Verifying TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric](#), on page 104

### Outputs to Verify the Configuration on VTEP 2

The following example shows the output for the **show nve peers** command on VTEP 2:

```

Leaf-02# show nve peers
Interface VNI      Type Peer-IP      RMAC/Num_RTs  eVNI      state flags UP time
nve1     50901    L3CP 172.16.254.6  0c75.bd67.ef48 50901     UP  A/-/4 1d05h
nve1     50901    L3CP 172.16.254.3  10b3.d56a.8fc8 50901     UP  A/-/4 1d05h
nve1     50901    L3CP 172.16.254.6  0c75.bd67.ef48 50901     UP  A/M/6 1d05h
nve1     50901    L3CP 172.16.254.3  10b3.d56a.8fc8 50901     UP  A/M/6 1d05h
nve1     10101    L2CP 172.16.254.3   6          10101     UP  N/A   1d05h
nve1     10102    L2CP 172.16.254.6   5          10102     UP  N/A   1d05h
Leaf-02#

```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on VTEP 2:

```

Leaf-02# show l2vpn evpn peers vxlan

Interface VNI      Peer-IP      Num routes eVNI      UP time
-----
nve1     10101    172.16.254.3   6          10101     1d05h
nve1     10102    172.16.254.6   5          10102     1d05h
Leaf-02#

```

The following example shows the output for the **show bgp ipv6 mvpn all summary** command on VTEP 2:

```

Leaf-02# show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.4, local AS number 65001
BGP table version is 85, main routing table version 85
6 network entries using 2352 bytes of memory
8 path entries using 1280 bytes of memory
5/5 BGP path/bestpath attribute entries using 1560 bytes of memory
4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
18 BGP extended community entries using 2396 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 7772 total bytes of memory

```



```
BGP activity 145/47 prefixes, 249/117 paths, scan interval 60 secs
6 networks peaked at 15:50:41 Aug 6 2020 UTC (1d02h ago)
```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
172.16.255.1	4	65001	2143	2019	85	0	0	1d05h	2
172.16.255.2	4	65001	2139	2019	85	0	0	1d05h	2

Leaf-02#

The following example shows the output for the **show ip pim vrf vrf-name group-map** command on VTEP 2:

```
Leaf-02# show ip pim vrf green group-map ff06:1::1
IP PIM Group Mapping Table
(* indicates group mappings being used)

FF00::/8*
  SM, RP: FC00:2:255::255
  RPF: V1901,::FFFF:172.16.254.3
  Info source: Static
  Uptime: 1d05h, Groups: 1
Leaf-02#
```

The following example shows the output for the **show ip routing vrf** command on VTEP 2:

```
Leaf-02# show ip routing vrf green FC00:2:255::255
Routing entry for FC00:2:255::255/128
  Known via "bgp 65001", distance 200, metric 0, type internal
  Route count is 1/1, share count 0
  Routing paths:
    172.16.254.3%default, Vlan901%default
    From AC10:FF01::
    opaque_ptr 0x7F65BA333EC0
    Last updated 04:26:58 ago
Leaf-02#
```

The following example shows the output for the **show ipv6 mld vrf vrf-name groups** command on VTEP 2:

```
Leaf-02# show ipv6 mld vrf green groups
MLD Connected Group Membership
Group Address                               Interface
  Uptime    Expires
FF06:1::1                               Vlan102
  1d05h    00:03:53
Leaf-02#
```

The following example shows the output for the **show ipv6 mroute vrf vrf-name** command on VTEP 2:

```
Leaf-02# show ipv6 mroute vrf green
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
  C - Connected, L - Local, I - Received Source Specific Host Report,
  P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
  J - Join SPT, Y - Joined MDT-data group,
  y - Sending to MDT-data group
  g - BGP signal originated, G - BGP Signal received,
  N - BGP Shared-Tree Prune received, n - BGP C-Mroute suppressed,
  q - BGP Src-Active originated, Q - BGP Src-Active received
```

```

E - Extranet
Timers: Uptime/Expires
Interface state: Interface, State

(*, FF06:1::1), 1d05h/never, RP FC00:2:255::255, flags: SCJg
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.3
  Immediate Outgoing interface list:
    Vlan102, Forward, 1d05h/never

(FC00:1:102::12, FF06:1::1), 00:07:24/00:03:28, flags: SFJTGg
  Incoming interface: Vlan102
  RPF nbr: FE80::46D3:CAFF:FE28:6CC5
  Immediate Outgoing interface list:
    Vlan901, Forward, 00:07:24/never

(FC00:2:255::1, FF06:1::1), 00:06:31/00:00:32, flags: SJTgQ
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.6
  Inherited Outgoing interface list:
    Vlan102, Forward, 1d05h/never
Leaf-02#

```

The following example shows the output for the **show ipv6 mfib vrf vrf-name** command on VTEP 2:

```

Leaf-02# show ipv6 mfib vrf green
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             ET - Data Rate Exceeds Threshold, K - Keepalive
             DDE - Data Driven Event, HW - Hardware Installed
             ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
             MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
             MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
             e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
               NS - Negate Signalling, SP - Signal Present,
               A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
               MA - MFIB Accept, A2 - Accept backup,
               RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
VRF green
(*,FF00::/8) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF00::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF02::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 10/10/0
(*,FF06:1::1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 3/0/126/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A NS
  Vlan102 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(FC00:1:102::12,FF06:1::1) Flags: HW
  SW Forwarding: 2/0/100/0, Other: 0/0/0
  HW Forwarding: 217/0/118/0, Other: 0/0/0
  Vlan102 Flags: A F
    Pkts: 0/0/0   Rate: 0 pps

```

```

Vlan901, VXLAN v4 Encap (50901, 239.1.1.1) Flags: F
  Pkts: 0/0/1   Rate: 0 pps
(FC00:2:255::1,FF06:1::1) Flags: HW
  SW Forwarding: 2/0/100/0, Other: 0/0/0
  HW Forwarding: 191/0/126/0, Other: 0/0/0
Vlan901, VXLAN Decap Flags: A
Vlan102 Flags: F NS
  Pkts: 0/0/2   Rate: 0 pps
(*,FF10::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF12::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF20::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF22::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF30::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF32::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF33::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF34::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF35::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF36::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF37::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF38::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF39::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3A::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3B::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3C::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3D::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3E::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3F::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF40::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0

```

```

HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF42::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF50::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF52::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF60::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF62::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF70::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF72::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF80::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF82::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF90::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF92::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFA0::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFA2::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFB0::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFB2::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFC0::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFC2::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFD0::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFD2::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFE0::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFE2::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFF0::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFF2::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
Leaf-02#

```

The following example shows the output for the **show bgp ipv6 mvpn all** command on VTEP 2:

```

Leaf-02# show bgp ipv6 mvpn all
BGP table version is 85, local router ID is 172.16.255.4
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
*> [5] [1:1] [FC00:1:102::12] [FF06:1::1]/42
      ::                                32768 ?
* i [5] [1:1] [FC00:2:255::1] [FF06:1::1]/42
      172.16.255.6                    0 100 0 ?
*>i      172.16.255.6                    0 100 0 ?
*> [6] [1:1] [65001] [FC00:2:255::255] [FF06:1::1]/46
      ::                                32768 ?
*>i [7] [1:1] [65001] [FC00:1:102::12] [FF06:1::1]/46
      172.16.255.3                    0 100 0 ?
*> [7] [1:1] [65001] [FC00:2:255::1] [FF06:1::1]/46
      ::                                32768 ?
Route Distinguisher: 172.16.254.4:102
* i [7] [172.16.254.4:102] [65001] [FC00:1:102::12] [FF06:1::1]/46
      172.16.255.3                    0 100 0 ?
*>i      172.16.255.3                    0 100 0 ?
Leaf-02#

```

The following example shows the output for the **show ip mroute** command on VTEP 2:

```

Leaf-02# show ip mroute
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,
       e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 239.1.1.1), 1d05h/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, 1d05h/00:02:00

(172.16.254.6, 239.1.1.1), 00:33:54/00:01:36, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 00:33:54/00:02:05

(172.16.254.4, 239.1.1.1), 04:50:15/00:03:03, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0

```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

```

Outgoing interface list:
  GigabitEthernet1/0/2, Forward/Sparse, 04:50:15/00:03:29

(*, 224.0.1.40), 1d05h/00:02:01, RP 172.16.255.255, flags: SJCL
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Loopback0, Forward/Sparse, 1d05h/00:02:01

(*, 225.0.0.102), 1d05h/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, 1d05h/00:02:00

(172.16.254.6, 225.0.0.102), 1d05h/00:02:05, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d05h/00:02:00

(172.16.254.4, 225.0.0.102), 1d05h/00:02:29, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 1d05h/00:03:28

(*, 225.0.0.101), 1d05h/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d05h/00:02:00

(172.16.254.3, 225.0.0.101), 1d05h/00:01:04, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d05h/00:02:00
Leaf-02#

```

The following example shows the output for the **show ip mfib** command on VTEP 2:

```

Leaf-02# show ip mfib
Entry Flags:  C - Directly Connected, S - Signal, IA - Inherit A flag,
              ET - Data Rate Exceeds Threshold, K - Keepalive
              DDE - Data Driven Event, HW - Hardware Installed
              ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
              MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
              MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
              e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,
                A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                MA - MFIB Accept, A2 - Accept backup,
                RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Loopback0 Flags: F IC NS

```

```

    Pkts: 0/0/0    Rate: 0 pps
(*,225.0.0.101) Flags: C HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 2/0/170/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0    Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
SW Forwarding: 1/0/150/0, Other: 0/0/0
HW Forwarding: 12630/0/177/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/1    Rate: 0 pps
(*,225.0.0.102) Flags: C HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 1/0/224/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0    Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
SW Forwarding: 2/0/163/0, Other: 3/1/2
HW Forwarding: 9373/0/164/0, Other: 0/0/0
Null0 Flags: A
GigabitEthernet1/0/2 Flags: F NS
    Pkts: 0/0/1    Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
SW Forwarding: 1/0/206/0, Other: 0/0/0
HW Forwarding: 3825/0/163/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/1    Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 9/0/168/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0    Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
SW Forwarding: 1/0/150/0, Other: 24/20/4
HW Forwarding: 8667/0/156/0, Other: 0/0/0
Null0 Flags: A
GigabitEthernet1/0/2 Flags: F NS
    Pkts: 0/0/1    Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
SW Forwarding: 2/0/150/0, Other: 0/0/0
HW Forwarding: 1781/0/168/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/2    Rate: 0 pps
Leaf-02#

```

Return to [Verifying TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric, on page 104](#)

### Outputs to Verify the Configuration on Border VTEP

The following example shows the output for the **show nve peers** command on Border VTEP:

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

```

Border# show nve peers
Interface VNI      Type Peer-IP          RMAC/Num_RTs  eVNI      state flags UP time
nve1     50901   L3CP 172.16.254.3    10b3.d56a.8fc8 50901      UP  A/-/4 1d06h
nve1     50901   L3CP 172.16.254.4    7c21.0dbd.9548 50901      UP  A/-/4 1d06h
nve1     50901   L3CP 172.16.254.3    10b3.d56a.8fc8 50901      UP  A/M/6 1d06h
nve1     50901   L3CP 172.16.254.4    7c21.0dbd.9548 50901      UP  A/M/6 1d06h
nve1     10101   L2CP 172.16.254.3     6              10101      UP  N/A   1d06h
nve1     10102   L2CP 172.16.254.4     7              10102      UP  N/A   1d05h
Border#

```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on Border VTEP:

```

Border# show l2vpn evpn peers vxlan
Interface VNI      Peer-IP          Num routes eVNI      UP time
-----
nve1     10101   172.16.254.3    6         10101    1d06h
nve1     10102   172.16.254.4    7         10102    1d05h
Border#

```

The following example shows the output for the **show bgp ipv6 mvpn all summary** command on Border VTEP:

```

Border# show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.6, local AS number 65001
BGP table version is 85, main routing table version 85
5 network entries using 1960 bytes of memory
7 path entries using 1120 bytes of memory
5/5 BGP path/bestpath attribute entries using 1560 bytes of memory
4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
20 BGP extended community entries using 2706 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 7530 total bytes of memory
BGP activity 137/41 prefixes, 272/148 paths, scan interval 60 secs
5 networks peaked at 15:42:39 Aug 6 2020 UTC (1d02h ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001   2158   2031     85    0    0 1d06h    2
172.16.255.2  4      65001   2157   2025     85    0    0 1d06h    2
Border#

```

The following example shows the output for the **show ip pim vrf vrf-name group-map** command on Border VTEP:

```

Border# show ip pim vrf green group-map ff06:1::1
IP PIM Group Mapping Table
(* indicates group mappings being used)

FF00::/8*
  SM, RP: FC00:2:255::255
  RPF: V1901,::FFFF:172.16.254.3
  Info source: Static
  Uptime: 1d06h, Groups: 1
Border#

```

The following example shows the output for the **show ip routing vrf vrf-name** command on Border VTEP:



```

Border# show ip routing vrf green FC00:2:255::255
Routing entry for FC00:2:255::255/128
  Known via "bgp 65001", distance 200, metric 0, type internal
  Redistributing via ospf 1
  Route count is 1/1, share count 0
  Routing paths:
    172.16.254.3%default, Vlan901%default
      From AC10:FF01::
        opaque_ptr 0x7FEF699AEC28
        Last updated 04:34:38 ago
Border#

```

The following example shows the output for the **show ipv6 mld vrf vrf-name groups** command on Border VTEP:

```

Border# show ipv6 mld vrf green groups
MLD Connected Group Membership
Group Address                               Interface
  Uptime    Expires
FF06:1::1                                Vlan102
  1d05h    00:02:29
Border#

```

The following example shows the output for the **show ipv6 mroute vrf vrf-name** command on Border VTEP:

```

Border# show ipv6 mroute vrf green
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, I - Received Source Specific Host Report,
       P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
       J - Join SPT, Y - Joined MDT-data group,
       y - Sending to MDT-data group
       g - BGP signal originated, G - BGP Signal received,
       N - BGP Shared-Tree Prune received, n - BGP C-Mroute suppressed,
       q - BGP Src-Active originated, Q - BGP Src-Active received
       E - Extranet
Timers: Uptime/Expires
Interface state: Interface, State

(*, FF06:1::1), 1d05h/00:02:52, RP FC00:2:255::255, flags: SCg
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.3
  Immediate Outgoing interface list:
    Vlan102, Null, 1d05h/never
    Vlan2001, Forward, 04:34:39/00:02:52

(FC00:1:102::12, FF06:1::1), 00:15:05/00:02:32, flags: STgQ
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.4
  Immediate Outgoing interface list:
    Vlan2001, Forward, 00:15:03/00:02:32
  Inherited Outgoing interface list:
    Vlan102, Null, 1d05h/never

(FC00:2:255::1, FF06:1::1), 00:14:13/00:02:52, RP FC00:2:255::255, flags: SPR
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.3
  Immediate Outgoing interface list:
    Vlan2001, Null, 00:14:13/00:02:52
  Inherited Outgoing interface list:
    Vlan102, Null, 1d05h/never

```

```
(FC00:2:255::1, FF06:1::1), 00:14:12/never, flags: STGq
Incoming interface: Vlan2001
RPF nbr: FE80::A2B4:39FF:FE21:9183
Immediate Outgoing interface list:
  Vlan901, Forward, 00:14:12/never
Inherited Outgoing interface list:
  Vlan102, Null, 1d05h/never
Border#
```

The following example shows the output for the **show ipv6 mfib vrf vrf-name** command on Border VTEP:

```
Border# show ipv6 mfib vrf green
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             ET - Data Rate Exceeds Threshold, K - Keepalive
             DDE - Data Driven Event, HW - Hardware Installed
             ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
             MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
             MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
             e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
               NS - Negate Signalling, SP - Signal Present,
               A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
               MA - MFIB Accept, A2 - Accept backup,
               RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
VRF green
(*,FF00::/8) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF00::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF02::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 12/12/0
(*,FF06:1::1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 4/4/0
  HW Forwarding: 7/0/122/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A
  Vlan2001 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(FC00:1:102::12,FF06:1::1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 450/0/125/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A
  Vlan2001 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(FC00:2:255::1,FF06:1::1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 2/1/1
  HW Forwarding: 423/0/122/0, Other: 0/0/0
  Vlan2001 Flags: A
  Vlan901, VXLAN v4 Encap (50901, 239.1.1.1) Flags: F
    Pkts: 0/0/0   Rate: 0 pps
(*,FF10::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF12::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF20::/15) Flags: HW
```

```

SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF22::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF30::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF32::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF33::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF34::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF35::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF36::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF37::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF38::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF39::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3A::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3B::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3C::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3D::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3E::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3F::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF40::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF42::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF50::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF52::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF60::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF62::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF70::/15) Flags: HW

```

```

    SW Forwarding: 0/0/0/0, Other: 0/0/0
    HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF72::/16) Flags:
    SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF80::/15) Flags: HW
    SW Forwarding: 0/0/0/0, Other: 0/0/0
    HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF82::/16) Flags:
    SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF90::/15) Flags: HW
    SW Forwarding: 0/0/0/0, Other: 0/0/0
    HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF92::/16) Flags:
    SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFA0::/15) Flags: HW
    SW Forwarding: 0/0/0/0, Other: 0/0/0
    HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFA2::/16) Flags:
    SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFB0::/15) Flags: HW
    SW Forwarding: 0/0/0/0, Other: 0/0/0
    HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFB2::/16) Flags:
    SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFC0::/15) Flags: HW
    SW Forwarding: 0/0/0/0, Other: 0/0/0
    HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFC2::/16) Flags:
    SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFD0::/15) Flags: HW
    SW Forwarding: 0/0/0/0, Other: 0/0/0
    HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFD2::/16) Flags:
    SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFE0::/15) Flags: HW
    SW Forwarding: 0/0/0/0, Other: 0/0/0
    HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFE2::/16) Flags:
    SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFF0::/15) Flags: HW
    SW Forwarding: 0/0/0/0, Other: 0/0/0
    HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFF2::/16) Flags:
    SW Forwarding: 0/0/0/0, Other: 0/0/0
Border#

```

The following example shows the output for the **show bgp ipv6 mvpn all** command on Border VTEP:

```

Border# show bgp ipv6 mvpn all
BGP table version is 85, local router ID is 172.16.255.6
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
* i  [5][1:1][FC00:1:102::12][FF06:1::1]/42
                                     172.16.255.4          0    100    0 ?

```

```

*>i          172.16.255.4          0    100    0 ?
*>  [5] [1:1] [FC00:2:255::1] [FF06:1::1]/42
      ::                               32768 ?
*>  [6] [1:1] [65001] [FC00:2:255::255] [FF06:1::1]/46
      ::                               32768 ?
* i  [7] [1:1] [65001] [FC00:2:255::1] [FF06:1::1]/46
      172.16.255.3          0    100    0 ?
*>i          172.16.255.3          0    100    0 ?
Route Distinguisher: 172.16.254.4:102
*>  [7] [1:1] [65001] [FC00:1:102::12] [FF06:1::1]/46
      ::                               32768 ?
Border#

```

The following example shows the output for the **show ip mroute** command on Border VTEP:

```

Border# show ip mroute
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,
       e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 239.1.1.1), 1d06h/stopped, RP 172.16.255.255, flags: SJCFx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d06h/00:00:08

(172.16.254.6, 239.1.1.1), 00:41:35/00:02:45, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    TenGigabitEthernet1/0/2, Forward/Sparse, 00:41:35/00:03:11

(172.16.254.4, 239.1.1.1), 04:57:56/00:02:37, flags: JTx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 04:57:56/00:02:03

(*, 224.0.1.40), 1d06h/00:02:10, RP 172.16.255.255, flags: SJCL
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Loopback0, Forward/Sparse, 1d06h/00:02:10

(*, 225.0.0.102), 1d06h/stopped, RP 172.16.255.255, flags: SJCFx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d06h/00:00:08

(172.16.254.4, 225.0.0.102), 1d06h/00:01:56, flags: JTx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:

```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

```

Tunnel0, Forward/Sparse, 1d06h/00:00:08

(172.16.254.6, 225.0.0.102), 1d06h/00:02:16, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    TenGigabitEthernet1/0/2, Forward/Sparse, 1d06h/00:03:21, A

(*, 225.0.0.101), 1d06h/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d06h/00:00:08

(172.16.254.3, 225.0.0.101), 1d06h/00:02:00, flags: JTx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d06h/00:00:20
Border#

```

The following example shows the output for the **show ip mfib** command on Border VTEP:

```

Border# show ip mfib
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             ET - Data Rate Exceeds Threshold, K - Keepalive
             DDE - Data Driven Event, HW - Hardware Installed
             ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
             MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
             MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
             e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
               NS - Negate Signalling, SP - Signal Present,
               A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
               MA - MFIB Accept, A2 - Accept backup,
               RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Loopback0 Flags: F IC NS
    Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 8/0/146/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 7/0/125/0, Other: 0/0/0
  HW Forwarding: 12768/0/177/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/7   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 1/0/172/0, Other: 0/0/0

```

```

TenGigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
SW Forwarding: 1/0/154/0, Other: 0/0/0
HW Forwarding:  9363/0/176/0, Other: 0/0/0
TenGigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
SW Forwarding: 17/0/174/0, Other: 10/9/1
HW Forwarding:  3858/0/151/0, Other: 0/0/0
Null0 Flags: A
TenGigabitEthernet1/0/2 Flags: F
  Pkts: 0/0/16  Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding:  10/0/168/0, Other: 0/0/0
TenGigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
SW Forwarding: 1/0/150/0, Other: 0/0/0
HW Forwarding:  8909/0/167/0, Other: 0/0/0
TenGigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
SW Forwarding: 2/0/150/0, Other: 2/2/0
HW Forwarding:  2018/0/156/0, Other: 0/0/0
Null0 Flags: A
TenGigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
Border#

```

Return to [Verifying TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric, on page 104](#)

### Outputs to Verify the Configuration on Spine Switch 1

The following example shows the output for the **show bgp ipv6 mvpn all summary** command on Spine Switch 1:

```

Spine-01# show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.1, local AS number 65001
BGP table version is 78, main routing table version 78
5 network entries using 1960 bytes of memory
13 path entries using 2080 bytes of memory
4/4 BGP path/bestpath attribute entries using 1216 bytes of memory
3 BGP rinfo entries using 120 bytes of memory
1 BGP community entries using 24 bytes of memory
17 BGP extended community entries using 2356 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 7756 total bytes of memory
BGP activity 270/220 prefixes, 3041/2934 paths, scan interval 60 secs
5 networks peaked at 15:48:28 Aug 6 2020 UTC (1d02h ago)

Neighbor          V           AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd

```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

```

172.16.255.3    4          65001    2020    2157      78     0     0 1d06h      2
172.16.255.4    4          65001    2030    2154      78     0     0 1d06h      3
172.16.255.6    4          65001    2033    2160      78     0     0 1d06h      3
Spine-01#

```

The following example shows the output for the **show ip pim rp mapping** command on Spine Switch 1:

```

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 (?)
Spine-01#

```

The following example shows the output for the **show bgp ipv6 mvpn all** command on Spine Switch 1:

```

Spine-01# show bgp ipv6 mvpn all
BGP table version is 78, local router ID is 172.16.255.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1
* i [5][1:1][FC00:1:102::12][FF06:1::1]/42
   172.16.255.4          0    100    0 ?
*>i 172.16.255.4          0    100    0 ?
* i [5][1:1][FC00:2:255::1][FF06:1::1]/42
   172.16.255.6          0    100    0 ?
*>i 172.16.255.6          0    100    0 ?
* i [6][1:1][65001][FC00:2:255::255][FF06:1::1]/46
   172.16.255.6          0    100    0 ?
* i 172.16.255.4          0    100    0 ?
*>i 172.16.255.4          0    100    0 ?
* i [7][1:1][65001][FC00:2:255::1][FF06:1::1]/46
   172.16.255.4          0    100    0 ?
* i 172.16.255.3          0    100    0 ?
*>i 172.16.255.3          0    100    0 ?
Route Distinguisher: 172.16.254.4:102
* i [7][172.16.254.4:102][65001][FC00:1:102::12][FF06:1::1]/46
   172.16.255.6          0    100    0 ?
* i 172.16.255.3          0    100    0 ?
*>i 172.16.255.3          0    100    0 ?
Spine-01#

```

The following example shows the output for the **show ip mroute** command on Spine Switch 1:

```

Spine-01# show ip mroute
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

(*, 239.1.1.1), 04:59:49/stopped, RP 172.16.255.255, flags: SP
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list: Null

(172.16.254.6, 239.1.1.1), 00:43:26/00:02:24, flags: PA
  Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.16.6
  Outgoing interface list: Null

(172.16.254.4, 239.1.1.1), 04:57:47/00:01:01, flags: PTA
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.14.4
  Outgoing interface list: Null

(*, 224.0.1.40), 1w0d/00:02:32, RP 172.16.255.255, flags: SJCL
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    Loopback2, Forward/Sparse, 1w0d/00:02:32

(*, 225.0.0.102), 1w0d/stopped, RP 172.16.255.255, flags: SP
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list: Null

(172.16.254.6, 225.0.0.102), 02:11:00/00:01:54, flags: PA
  Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.16.6
  Outgoing interface list: Null

(172.16.254.4, 225.0.0.102), 1d06h/00:02:27, flags: PA
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.14.4
  Outgoing interface list: Null
Spine-01#

```

The following example shows the output for the **show ip mfib** command on Spine Switch 1:

```

Spine-01# show ip mfib
Entry Flags:      C - Directly Connected, S - Signal, IA - Inherit A flag,
                  ET - Data Rate Exceeds Threshold, K - Keepalive
                  DDE - Data Driven Event, HW - Hardware Installed
                  ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
                  MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
                  MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client.
I/O Item Flags:  IC - Internal Copy, NP - Not platform switched,
                  NS - Negate Signalling, SP - Signal Present,
                  A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                  MA - MFIB Accept, A2 - Accept backup,
                  RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:   HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 83/83/0

```

```

HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
Loopback2 Flags: F IC NS
Pkts: 0/0/0 Rate: 0 pps
(*,225.0.0.102) Flags: C HW
SW Forwarding: 1/0/206/0, Other: 282/0/282
HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
(172.16.254.4,225.0.0.102) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/2 Flags: NS
(172.16.254.6,225.0.0.102) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/4 Flags: NS
(*,232.0.0.0/8) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
SW Forwarding: 0/0/0/0, Other: 6/5/1
HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
(172.16.254.4,239.1.1.1) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 8/0/157/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A NS
(172.16.254.6,239.1.1.1) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/4 Flags: NS
Spine-01#

```

Return to [Verifying TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric](#), on page 104

## Outputs to Verify the Configuration on Spine Switch 2

The following example shows the output for the **show bgp ipv6 mvpn all summary** command on Spine Switch 2:

```

Spine-02# show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.2, local AS number 65001
BGP table version is 77, main routing table version 77
5 network entries using 1960 bytes of memory
13 path entries using 2080 bytes of memory
4/4 BGP path/bestpath attribute entries using 1216 bytes of memory
3 BGP rinfo entries using 120 bytes of memory
1 BGP community entries using 24 bytes of memory
17 BGP extended community entries using 2356 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 7756 total bytes of memory
BGP activity 301/251 prefixes, 3143/3036 paths, scan interval 60 secs
5 networks peaked at 15:49:16 Aug 6 2020 UTC (1d02h ago)

```

```

Neighbor      V          AS MsgRcvd MsgSent   TblVer  InQ  OutQ  Up/Down   State/PfxRcd
172.16.255.3  4          65001   2021    2155     77   0    0 1d06h     2
172.16.255.4  4          65001   2031    2152     77   0    0 1d06h     3
172.16.255.6  4          65001   2029    2161     77   0    0 1d06h     3
Spine-02#

```

The following example shows the output for the **show ip pim rp mapping** command on Spine Switch 2:

```

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 (?)
Spine-02#

```

The following example shows the output for the **show bgp ipv6 mvpn all** command on Spine Switch 2:

```

Spine-02# show bgp ipv6 mvpn all
BGP table version is 77, local router ID is 172.16.255.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1
* i   [5][1:1][FC00:1:102::12][FF06:1::1]/42
      172.16.255.4          0    100    0 ?
*>i   172.16.255.4          0    100    0 ?
* i   [5][1:1][FC00:2:255::1][FF06:1::1]/42
      172.16.255.6          0    100    0 ?
*>i   172.16.255.6          0    100    0 ?
* i   [6][1:1][65001][FC00:2:255::255][FF06:1::1]/46
      172.16.255.6          0    100    0 ?
* i   172.16.255.4          0    100    0 ?
*>i   172.16.255.4          0    100    0 ?
* i   [7][1:1][65001][FC00:2:255::1][FF06:1::1]/46
      172.16.255.4          0    100    0 ?
* i   172.16.255.3          0    100    0 ?
*>i   172.16.255.3          0    100    0 ?
Route Distinguisher: 172.16.254.4:102
* i   [7][172.16.254.4:102][65001][FC00:1:102::12][FF06:1::1]/46
      172.16.255.6          0    100    0 ?
* i   172.16.255.3          0    100    0 ?
*>i   172.16.255.3          0    100    0 ?
Spine-02#

```

The following example shows the output for the **show ip mroute** command on Spine Switch 2:

```

Spine-02# show ip mroute
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,

```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric

```

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

(*, 239.1.1.1), 3d13h/00:03:01, RP 172.16.255.255, flags: S
Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list:
  GigabitEthernet1/0/2, Forward/Sparse, 1d06h/00:03:01
  GigabitEthernet1/0/1, Forward/Sparse, 1d06h/00:02:41
  GigabitEthernet1/0/4, Forward/Sparse, 1d06h/00:02:43

(172.16.254.6, 239.1.1.1), 00:44:52/00:02:29, flags: T
Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.26.6
Outgoing interface list:
  GigabitEthernet1/0/1, Forward/Sparse, 00:44:52/00:02:58
  GigabitEthernet1/0/2, Forward/Sparse, 00:44:52/00:03:02

(172.16.254.4, 239.1.1.1), 05:01:13/00:02:28, flags: T
Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.4
Outgoing interface list:
  GigabitEthernet1/0/4, Forward/Sparse, 05:01:13/00:03:22
  GigabitEthernet1/0/1, Forward/Sparse, 05:01:13/00:02:56

(*, 224.0.1.40), 1w0d/00:03:12, RP 172.16.255.255, flags: SJCL
Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list:
  GigabitEthernet1/0/2, Forward/Sparse, 1d06h/00:03:12
  GigabitEthernet1/0/1, Forward/Sparse, 1d06h/00:02:54
  GigabitEthernet1/0/4, Forward/Sparse, 1d06h/00:02:44
  Loopback2, Forward/Sparse, 1w0d/00:02:32

(*, 225.0.0.102), 1w0d/00:03:26, RP 172.16.255.255, flags: S
Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list:
  GigabitEthernet1/0/2, Forward/Sparse, 1d06h/00:03:21
  GigabitEthernet1/0/1, Forward/Sparse, 1d06h/00:03:26
  GigabitEthernet1/0/4, Forward/Sparse, 1d06h/00:02:56

(172.16.254.4, 225.0.0.102), 1d06h/00:02:18, flags: MT
Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.4
Outgoing interface list:
  GigabitEthernet1/0/4, Forward/Sparse, 1d06h/00:03:15
  GigabitEthernet1/0/1, Forward/Sparse, 1d06h/00:03:26

(172.16.254.6, 225.0.0.102), 1d06h/00:02:40, flags: MT
Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.26.6
Outgoing interface list:
  GigabitEthernet1/0/2, Forward/Sparse, 1d06h/00:03:28
  GigabitEthernet1/0/1, Forward/Sparse, 1d06h/00:03:28

(*, 225.0.0.101), 3d13h/00:03:13, RP 172.16.255.255, flags: S
Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list:
  GigabitEthernet1/0/2, Forward/Sparse, 1d06h/00:02:59
  GigabitEthernet1/0/1, Forward/Sparse, 1d06h/00:02:53
  GigabitEthernet1/0/4, Forward/Sparse, 1d06h/00:03:13

```

```
(172.16.254.3, 225.0.0.101), 1d06h/00:03:09, flags: TA
  Incoming interface: GigabitEthernet1/0/1, RPF nbr 172.16.23.3
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 1d06h/00:03:27
    GigabitEthernet1/0/4, Forward/Sparse, 1d06h/00:03:13
Spine-02#
```

The following example shows the output for the **show ip mfib** command on Spine Switch 2:

```
Spine-02# show ip mfib
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             ET - Data Rate Exceeds Threshold, K - Keepalive
             DDE - Data Driven Event, HW - Hardware Installed
             ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
             MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
             MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
               NS - Negate Signalling, SP - Signal Present,
               A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
               MA - MFIB Accept, A2 - Accept backup,
               RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
Loopback2 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 9/0/112/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/2   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/2   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 4/0/132/0, Other: 0/0/0
  HW Forwarding: 12790/0/177/0, Other: 0/0/0
GigabitEthernet1/0/1 Flags: A
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/4   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 27/0/101/0, Other: 0/0/0
```

```

HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 9381/0/176/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 3853/0/163/0, Other: 0/0/0
GigabitEthernet1/0/4 Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
SW Forwarding: 10/0/150/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/4   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/4   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/4   Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 9007/0/167/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 2111/0/168/0, Other: 0/0/0
GigabitEthernet1/0/4 Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
Spine-02#

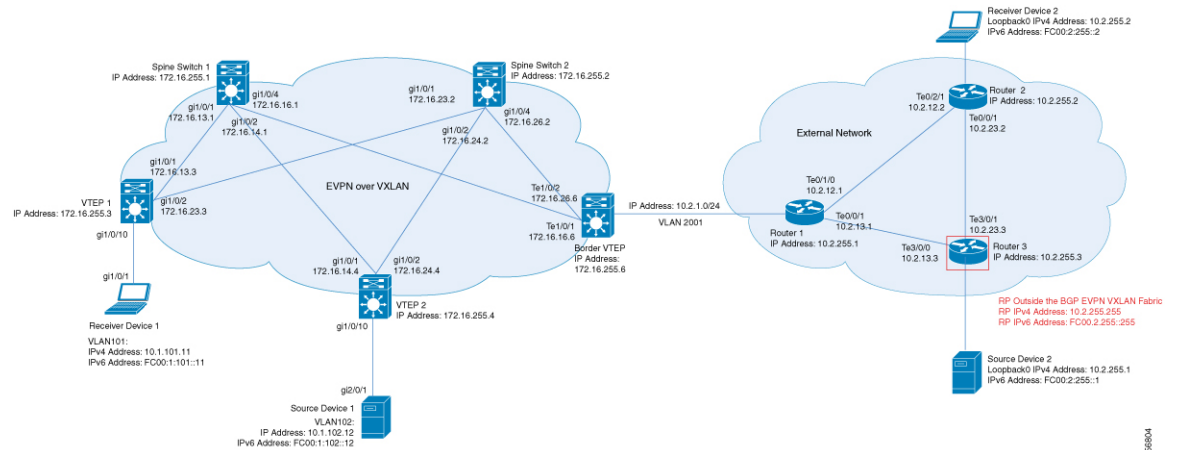
```

[Return to Verifying TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Inside the BGP EVPN VXLAN Fabric, on page 104](#)

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

This example shows how to configure and verify Layer 3 TRM with PIM-SM for IPv4 multicast traffic when the RP is outside the BGP EVPN VXLAN fabric. The example uses the following topology:

Figure 13: TRM with PIM-SM when the RP is Outside the BGP EVPN VXLAN Fabric



The topology shows an EVPN VXLAN network, with two spine switches and three VTEPs, connected to an external network with three routers. Router 3 in the external network acts as the RP in this topology and Border VTEP connects the fabric to the external network through Router 1. The IPv4 multicast group is 226.1.1.1 for this topology. The following tables provide sample configurations for the devices in this topology:

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

Table 9: Configuring VTEP 1, Border VTEP, and VTEP 2 to Configure TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

VTEP 1	Border VTEP	VTEP 2
<pre> Leaf-01# show running-config hostname Leaf-01 ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 ip multicast-routing vrf green ! 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 ! system mtu 9198 ! 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 pim sparse-mode 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> Border# show running-config hostname Border ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 ip multicast-routing vrf green ! 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 ! system mtu 9198 ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 ! vlan 2001 ! interface Loopback0 ip address 172.16.255.6 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.6 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! </pre>	<pre> Leaf-02# show running-config hostname Leaf-02 ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp route-target export 1:1 route-target import 1:1 route-target export 1:1 stitching route-target import 1:1 stitching exit-address-famil ! ip routing ! ip multicast-routing ip multicast-routing vrf green ! 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 ! system mtu 9198 ! 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 pim sparse-mode 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>



VTEP 1	Border VTEP	VTEP 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 access vlan 101 switchport mode access ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode 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 mcast-group 225.0.0.102 ! 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 redistribute connected redistribute static exit-address-family ! </pre>	<pre> interface TenGigabitEthernet1/0/1 no switchport ip address 172.16.16.6 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet1/0/2 no switchport ip address 172.16.26.6 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet1/0/5 switchport trunk allowed vlan 2001 switchport mode trunk ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode no autostate ! interface Vlan2001 vrf forwarding green ip address 10.2.1.1 255.255.255.0 ip mtu 1500 ip pim sparse-mode ip ospf network point-to-point ip ospf 2 area 0 ! 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 mcast-group 225.0.0.102 ! router ospf 2 vrf green redistribute bgp 65001 </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 access vlan 102 switchport mode access ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode 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 mcast-group 225.0.0.102 ! 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 redistribute connected redistribute static exit-address-family ! </pre>

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

VTEP 1	Border VTEP	VTEP 2
<pre> address-family ipv4 mvpn 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 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 ! ip pim rp-address 172.16.255.255 ip pim ssm default ip pim vrf green rp-address 10.2.255.255 ! end ! Leaf-01# </pre>	<pre> ! router ospf 1 router-id 172.16.255.6 ! 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 ipv4 mvpn 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 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 redistribute ospf 2 match internal external 1 external 2 exit-address-family ! ip pim rp-address 172.16.255.255 ip pim ssm default ip pim vrf green rp-address 10.2.255.255 ! end ! Border# </pre>	<pre> address-family ipv4 mvpn 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 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 ! ip pim rp-address 172.16.255.255 ip pim ssm default ip pim vrf green rp-address 10.2.255.255 ! end ! Leaf-02# </pre>

**Table 10: Configuring Spine Switch 1 and Spine Switch 2 to Configure TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric**

Spine Switch 1	Spine Switch 2
<pre> Spine-01# show running-config hostname Spine-01 ! ip routing ! ip multicast-routing ! system mtu 9198 ! 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 ! interface GigabitEthernet1/0/4 no switchport ip address 172.16.16.1 255.255.255.0 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 neighbor 172.16.255.3 remote-as 65001 neighbor 172.16.255.3 update-source Loopback0 neighbor 172.16.255.4 remote-as 65001 neighbor 172.16.255.4 update-source Loopback0 neighbor 172.16.255.6 remote-as 65001 neighbor 172.16.255.6 update-source Loopback0 ! </pre>	<pre> Spine-02# show running-config hostname Spine-02 ! ip routing ! ip multicast-routing ! system mtu 9198 ! 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 ! interface GigabitEthernet1/0/4 no switchport ip address 172.16.26.2 255.255.255.0 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 neighbor 172.16.255.3 remote-as 65001 neighbor 172.16.255.3 update-source Loopback0 neighbor 172.16.255.4 remote-as 65001 neighbor 172.16.255.4 update-source Loopback0 neighbor 172.16.255.6 remote-as 65001 neighbor 172.16.255.6 update-source Loopback0 ! </pre>

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

Spine Switch 1	Spine Switch 2
<pre> address-family ipv4 exit-address-family ! address-family ipv4 mvpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family l2vpn evpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client 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 ! end ! Spine-01# </pre>	<pre> address-family ipv4 exit-address-family ! address-family ipv4 mvpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family l2vpn evpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client 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 ! end ! Spine-02# </pre>

Table 11: Configuring Router 1, Router 2, and Router 3 to Configure TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

Router 1	Router 2	Router 3
<pre> R1# show running-config hostname R1 ! ip multicast-routing distributed ! interface Loopback0 ip address 10.2.255.1 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface TenGigabitEthernet0/0/0 ip address 10.2.12.1 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet0/0/1 ip address 10.2.13.1 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface GigabitEthernet0/0/1.2001 encapsulation dot1Q 2001 ip address 10.2.1.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 router ospf 1 router-id 10.2.255.1 ! ip pim rp-address 10.2.255.255 ! end ! R1#                     </pre>	<pre> R2# show running-config hostname R2 ! ip multicast-routing distributed ! interface Loopback0 ip address 10.2.255.2 255.255.255.255 ip pim sparse-mode ip igmp join-group 226.1.1.1 ip ospf 1 area 0 ! interface TenGigabitEthernet0/0/0 ip address 10.2.12.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet0/0/1 ip address 10.2.23.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! router ospf 1 router-id 10.2.255.2 ! ip pim rp-address 10.2.255.255 ! end ! R2#                     </pre>	<pre> R3# show running-config hostname R3 ! ip multicast-routing distributed ! interface Loopback0 ip address 10.2.255.3 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface Loopback255 ip address 10.2.255.255 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface TenGigabitEthernet0/0/0 ip address 10.2.13.3 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet0/0/1 ip address 10.2.23.3 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! router ospf 1 router-id 10.2.255.3 ! ip pim rp-address 10.2.255.255 ! end ! R3#                     </pre>

**Verifying TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric**

The following sections provide sample outputs for **show** commands to verify TRM with PIM-SM on the devices in the topology configured above:

- [Outputs to Verify the Configuration on VTEP 1, on page 142](#)
- [Outputs to Verify the Configuration on VTEP 2, on page 147](#)
- [Outputs to Verify the Configuration on Border VTEP, on page 152](#)
- [Outputs to Verify the Configuration on Spine Switch 1, on page 158](#)
- [Outputs to Verify the Configuration on Spine Switch 2, on page 161](#)
- [Outputs to Verify the Configuration on Router 3 \(RP Outside the BGP EVPN VXLAN Fabric\), on page 165](#)

## Outputs to Verify the Configuration on VTEP 1

The following example shows the output for the **show nve peers** command on VTEP 1:

```
Leaf-01# show nve peers
Interface VNI      Type Peer-IP          RMAC/Num_RTs  eVNI      state flags UP time
nve1     50901    L3CP 172.16.254.6    0c75.bd67.ef48 50901     UP  A/-/4 16:44:02
nve1     50901    L3CP 172.16.254.4     7c21.0dbd.9548 50901     UP  A/-/4 16:41:00
nve1     50901    L3CP 172.16.254.6     0c75.bd67.ef48 50901     UP  A/M/6 16:44:02
nve1     50901    L3CP 172.16.254.4     7c21.0dbd.9548 50901     UP  A/M/6 16:41:00
nve1     10102    L2CP 172.16.254.4     7                10102     UP  N/A   16:23:05
nve1     10102    L2CP 172.16.254.6     5                10102     UP  N/A   16:44:02
Leaf-01#
```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on VTEP 1:

```
Leaf-01# show l2vpn evpn peers vxlan
Interface VNI      Peer-IP          Num routes eVNI      UP time
-----
nve1     10102    172.16.254.4    7         10102    16:23:06
nve1     10102    172.16.254.6    5         10102    16:44:02
Leaf-01#
```

The following example shows the output for the **show bgp ipv4 mvpn all summary** command on VTEP 1:

```
Leaf-01# show bgp ipv4 mvpn all summary
BGP router identifier 172.16.255.3, local AS number 65001
BGP table version is 58, main routing table version 58
6 network entries using 1824 bytes of memory
8 path entries using 1088 bytes of memory
3/3 BGP path/bestpath attribute entries using 936 bytes of memory
4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
17 BGP extended community entries using 2372 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 6404 total bytes of memory
BGP activity 117/25 prefixes, 240/113 paths, scan interval 60 secs
6 networks peaked at 12:17:52 Aug 6 2020 UTC (16:27:28.286 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001   1217   1126    58    0    0 16:44:58      2
172.16.255.2  4      65001   1213   1121    58    0    0 16:44:53      2
Leaf-01#
```

The following example shows the output for the **show ip pim vrf vrf-name rp mapping** command on VTEP 1:

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

Group(s): 224.0.0.0/4, Static
          RP: 10.2.255.255 (?)
Leaf-01#
```

The following example shows the output for the **show ip routing vrf** command on VTEP 1:

```
Leaf-01# show ip routing vrf green 10.2.255.255
Routing Table: green
Routing entry for 10.2.255.255/32
  Known via "bgp 65001", distance 200, metric 3, type internal
  Last update from 172.16.254.6 on Vlan901, 16:17:01 ago
Routing Descriptor Blocks:
  * 172.16.254.6 (default), from 172.16.255.1, 16:17:01 ago, via Vlan901
    opaque_ptr 0x7FBB8620D990
    Route metric is 3, traffic share count is 1
    AS Hops 0
    MPLS label: none
Leaf-01#
```

The following example shows the output for the **show ip igmp vrf vrf-name groups** command on VTEP 1:

```
Leaf-01# show ip igmp vrf green groups
IGMP Connected Group Membership
Group Address      Interface          Uptime    Expires    Last Reporter  Group Accounted
226.1.1.1          Vlan101           13:03:08  00:02:13  10.1.101.11
224.0.1.40         Loopback901       16:45:17  00:02:50  10.1.255.1
Leaf-01#
```

The following example shows the output for the **show ip mroute vrf vrf-name** command on VTEP 1:

```
Leaf-01# show ip mroute vrf green
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,
       e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 226.1.1.1), 13:03:08/stopped, RP 10.2.255.255, flags: SJCg
  Incoming interface: Vlan901, RPF nbr 172.16.254.6
  Outgoing interface list:
    Vlan101, Forward/Sparse, 13:03:08/00:02:13

(10.2.255.1, 226.1.1.1), 00:08:23/00:02:54, flags: TgQ
  Incoming interface: Vlan901, RPF nbr 172.16.254.6
  Outgoing interface list:
    Vlan101, Forward/Sparse, 00:08:23/00:02:13

(10.1.102.12, 226.1.1.1), 00:08:48/00:02:24, flags: TgQ
  Incoming interface: Vlan901, RPF nbr 172.16.254.4
  Outgoing interface list:
    Vlan101, Forward/Sparse, 00:08:48/00:02:13

(*, 224.0.1.40), 16:45:17/00:02:50, RP 10.2.255.255, flags: SJCLg
```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

```
Incoming interface: Vlan901, RPF nbr 172.16.254.6
Leaf-01#
```

The following example shows the output for the **show ip mfib vrf vrf-name** command on VTEP 1:

```
Leaf-01# show ip mfib vrf green
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
              ET - Data Rate Exceeds Threshold, K - Keepalive
              DDE - Data Driven Event, HW - Hardware Installed
              ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
              MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
              MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
              e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,
                A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                MA - MFIB Accept, A2 - Accept backup,
                RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:   HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
VRF green
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 2/2/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A NS
  Loopback901 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,226.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A NS
  Vlan101 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(10.1.102.12,226.1.1.1) Flags: HW
  SW Forwarding: 5/0/100/0, Other: 0/0/0
  HW Forwarding: 523/0/126/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A
Leaf-01#
```

The following example shows the output for the **show bgp ipv4 mvpn all** command on VTEP 1:

```
Leaf-01# show bgp ipv4 mvpn all
BGP table version is 60, local router ID is 172.16.255.6
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
              x best-external, a additional-path, c RIB-compressed,
              t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
*>i  [5][1:1][10.1.102.12][226.1.1.1]/18
              172.16.255.4          0    100    0 ?
* i          172.16.255.4          0    100    0 ?
*>  [5][1:1][10.2.255.1][226.1.1.1]/18
              0.0.0.0                  32768 ?
```



```

* i [6][1:1][65001][10.2.255.255/32][224.0.1.40/32]/22
      172.16.255.3          0 100 0 ?
*>i      172.16.255.3          0 100 0 ?
* i [6][1:1][65001][10.2.255.255/32][226.1.1.1/32]/22
      172.16.255.3          0 100 0 ?
*>i      172.16.255.3          0 100 0 ?
*>i [7][1:1][65001][10.2.255.1/32][226.1.1.1/32]/22
      172.16.255.3          0 100 0 ?
* i      172.16.255.3          0 100 0 ?
Route Distinguisher: 172.16.254.4:102
*> [7][172.16.254.4:102][65001][10.1.102.12/32][226.1.1.1/32]/22
      0.0.0.0                32768 ?
Leaf-01#

```

The following example shows the output for the **show ip mroute** command on VTEP 1:

```

Leaf-01# show ip mroute
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,
      e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 239.1.1.1), 16:45:08/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 16:45:08/00:00:45

(172.16.254.4, 239.1.1.1), 00:08:47/00:01:59, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 00:08:47/00:00:12

(172.16.254.6, 239.1.1.1), 00:08:49/00:02:00, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 00:08:49/00:00:10

(*, 224.0.1.40), 16:45:17/00:02:46, RP 172.16.255.255, flags: SJCL
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
Leaf-01#

```

The following example shows the output for the **show ip mfib** command on VTEP 1:

```

Leaf-01# show ip mfib
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
            ET - Data Rate Exceeds Threshold, K - Keepalive
            DDE - Data Driven Event, HW - Hardware Installed

```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

```

ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
NS - Negate Signalling, SP - Signal Present,
A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
MA - MFIB Accept, A2 - Accept backup,
RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Loopback0 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 1/0/114/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 13/0/127/0, Other: 2/2/0
  HW Forwarding: 7870/0/164/0, Other: 0/0/0
  Null0 Flags: A
  GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 2/0/172/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/154/0, Other: 0/0/0
  HW Forwarding: 5222/0/176/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/154/0, Other: 0/0/0
  HW Forwarding: 2137/0/163/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 11/0/168/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
  SW Forwarding: 4/0/150/0, Other: 0/0/0

```

```

HW Forwarding: 518/0/168/1, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
Pkts: 0/0/4 Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
SW Forwarding: 1/0/150/0, Other: 0/0/0
HW Forwarding: 498/1/168/1, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
Pkts: 0/0/1 Rate: 0 pps
Leaf-01#

```

Return to [Verifying TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric](#), on page 141

### Outputs to Verify the Configuration on VTEP 2

The following example shows the output for the **show nve peers** command on VTEP 2:

```

Leaf-02# show nve peers
Interface VNI Type Peer-IP RMAC/Num_RTs eVNI state flags UP time
nve1 50901 L3CP 172.16.254.6 0c75.bd67.ef48 50901 UP A/-/4 16:56:53
nve1 50901 L3CP 172.16.254.3 10b3.d56a.8fc8 50901 UP A/-/4 16:56:53
nve1 50901 L3CP 172.16.254.6 0c75.bd67.ef48 50901 UP A/M/6 16:56:53
nve1 50901 L3CP 172.16.254.3 10b3.d56a.8fc8 50901 UP A/M/6 16:56:53
nve1 10101 L2CP 172.16.254.3 6 10101 UP N/A 16:56:53
nve1 10102 L2CP 172.16.254.6 5 10102 UP N/A 16:56:53
Leaf-02#

```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on VTEP 2:

```

Leaf-02# show l2vpn evpn peers vxlan
Interface VNI Peer-IP Num routes eVNI UP time
-----
nve1 10101 172.16.254.3 6 10101 16:56:54
nve1 10102 172.16.254.6 5 10102 16:56:54
Leaf-02#

```

The following example shows the output for the **show bgp ipv4 mvpn all summary** command on VTEP 2:

```

Leaf-02# show bgp ipv4 mvpn all summary
BGP router identifier 172.16.255.4, local AS number 65001
BGP table version is 62, main routing table version 62
7 network entries using 2128 bytes of memory
9 path entries using 1224 bytes of memory
4/4 BGP path/bestpath attribute entries using 1248 bytes of memory
4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
17 BGP extended community entries using 2372 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 7156 total bytes of memory
BGP activity 121/28 prefixes, 202/77 paths, scan interval 60 secs
9 networks peaked at 12:22:24 Aug 6 2020 UTC (16:43:21.423 ago)

Neighbor V AS MsgRcvd MsgSent TblVer InQ OutQ Up/Down State/PfxRcd
172.16.255.1 4 65001 1229 1151 62 0 0 16:57:50 2

```

```
172.16.255.2    4      65001    1227    1152      62     0     0 16:57:51      2
Leaf-02#
```

The following example shows the output for the **show ip pim vrf vrf-name rp mapping** command on VTEP 2:

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

Group(s): 224.0.0.0/4, Static
          RP: 10.2.255.255 (?)
Leaf-02#
```

The following example shows the output for the **show ip routing vrf** command on VTEP 2:

```
Leaf-02# show ip routing vrf green 10.2.255.255
Routing Table: green
Routing entry for 10.2.255.255/32
  Known via "bgp 65001", distance 200, metric 3, type internal
  Last update from 172.16.254.6 on Vlan901, 16:56:55 ago
  Routing Descriptor Blocks:
    * 172.16.254.6 (default), from 172.16.255.1, 16:56:55 ago, via Vlan901
      opaque_ptr 0x7F65B8B9E4B0
      Route metric is 3, traffic share count is 1
      AS Hops 0
      MPLS label: none
Leaf-02#
```

The following example shows the output for the **show ip igmp vrf vrf-name groups** command on VTEP 2:

```
Leaf-02# show ip igmp vrf green groups
IGMP Connected Group Membership
Group Address    Interface    Uptime    Expires    Last Reporter    Group Accounted
226.1.1.1        Vlan102     16:58:00  00:02:11  10.1.102.12
224.0.1.40       Vlan901     16:58:37  00:02:33  172.16.254.4
Leaf-02#
```

The following example shows the output for the **show ip mroute vrf vrf-name** command on VTEP 2:

```
Leaf-02# show ip mroute vrf green
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,
e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
```

```

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

(*, 226.1.1.1), 16:58:00/stopped, RP 10.2.255.255, flags: SJCFg
  Incoming interface: Vlan901, RPF nbr 172.16.254.6
  Outgoing interface list:
    Vlan102, Forward/Sparse, 16:58:00/00:02:11

(10.2.255.1, 226.1.1.1), 00:24:16/00:02:40, flags: JTgQ
  Incoming interface: Vlan901, RPF nbr 172.16.254.6
  Outgoing interface list:
    Vlan102, Forward/Sparse, 00:24:16/00:02:11

(10.1.102.12, 226.1.1.1), 00:24:41/00:02:09, flags: FTGqx
  Incoming interface: Vlan102, RPF nbr 0.0.0.0, Registering
  Outgoing interface list:
    Vlan901, Forward/Sparse, 00:24:41/stopped

(*, 224.0.1.40), 16:58:37/00:02:33, RP 10.2.255.255, flags: SJPLGx
  Incoming interface: Vlan901, RPF nbr 172.16.254.6
  Outgoing interface list: Null
Leaf-02#

```

The following example shows the output for the **show ip mfib vrf vrf-name** command on VTEP 2:

```

Leaf-02# show ip mfib vrf green
Entry Flags:   C - Directly Connected, S - Signal, IA - Inherit A flag,
               ET - Data Rate Exceeds Threshold, K - Keepalive
               DDE - Data Driven Event, HW - Hardware Installed
               ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
               MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
               MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
               e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,
                A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                MA - MFIB Accept, A2 - Accept backup,
                RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
VRF green
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A IC NS
(*,226.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 3/0/126/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A NS
  Vlan102 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(10.1.102.12,226.1.1.1) Flags: HW
  SW Forwarding: 739/0/100/0, Other: 2/2/0
  HW Forwarding: 736/0/118/0, Other: 0/0/0
  Vlan102 Flags: A
  Tunnel5 Flags: F
    Pkts: 0/0/739   Rate: 0 pps
  Vlan901, VXLAN v4 Encap (50901, 239.1.1.1) Flags: F

```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

```
Pkts: 0/0/739   Rate: 0 pps
Leaf-02#
```

The following example shows the output for the **show bgp ipv4 mvpn all** command on VTEP 2:

```
Leaf-02# show bgp ipv4 mvpn all
BGP table version is 62, local router ID is 172.16.255.4
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
*> [5][1:1][10.1.102.12][226.1.1.1]/18
      0.0.0.0                      32768 ?
*>i [5][1:1][10.2.255.1][226.1.1.1]/18
      172.16.255.6                  0   100   0 ?
* i [5][1:1][10.2.255.1][226.1.1.1]/18
      172.16.255.6                  0   100   0 ?
*> [6][1:1][65001][10.2.255.255/32][224.0.1.40/32]/22
      0.0.0.0                      32768 ?
*> [6][1:1][65001][10.2.255.255/32][226.1.1.1/32]/22
      0.0.0.0                      32768 ?
*>i [7][1:1][65001][10.1.102.12/32][226.1.1.1/32]/22
      172.16.255.3                  0   100   0 ?
*> [7][1:1][65001][10.2.255.1/32][226.1.1.1/32]/22
      0.0.0.0                      32768 ?
Route Distinguisher: 172.16.254.4:102
*>i [7][172.16.254.4:102][65001][10.1.102.12/32][226.1.1.1/32]/22
      172.16.255.3                  0   100   0 ?
* i [7][172.16.254.4:102][65001][10.1.102.12/32][226.1.1.1/32]/22
      172.16.255.3                  0   100   0 ?
Leaf-02#
```

The following example shows the output for the **show ip mroute** command on VTEP 2:

```
Leaf-02# show ip mroute
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-stargy configured on rpf intf,
       e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 239.1.1.1), 16:58:28/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, 16:58:28/00:02:25
```

```
(172.16.254.6, 239.1.1.1), 00:24:42/00:00:58, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 00:24:42/00:02:17

(172.16.254.4, 239.1.1.1), 00:24:42/00:03:28, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 00:24:42/00:03:23, A

(*, 224.0.1.40), 16:58:37/00:02:26, RP 172.16.255.255, flags: SJCL
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Loopback0, Forward/Sparse, 16:58:36/00:02:26
Leaf-02#
```

The following example shows the output for the **show ip mfib** command on VTEP 2:

```
Leaf-02# show ip mfib
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             ET - Data Rate Exceeds Threshold, K - Keepalive
             DDE - Data Driven Event, HW - Hardware Installed
             ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
             MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
             MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
             e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
               NS - Negate Signalling, SP - Signal Present,
               A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
               MA - MFIB Accept, A2 - Accept backup,
               RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Loopback0 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 2/0/170/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 1/0/150/0, Other: 0/0/0
  HW Forwarding: 7870/0/176/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 1/0/224/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

```

Pkts: 0/0/0    Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
SW Forwarding: 2/0/163/0, Other: 3/1/2
HW Forwarding: 5353/0/164/0, Other: 0/0/0
Null0 Flags: A
GigabitEthernet1/0/2 Flags: F NS
Pkts: 0/0/1    Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
SW Forwarding: 1/0/206/0, Other: 0/0/0
HW Forwarding: 2165/0/163/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
Pkts: 0/0/1    Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 5/0/168/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
Pkts: 0/0/0    Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
SW Forwarding: 1/0/150/0, Other: 1495/1491/4
HW Forwarding: 742/0/156/0, Other: 0/0/0
Null0 Flags: A NS
GigabitEthernet1/0/2 Flags: F
Pkts: 0/0/1    Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
SW Forwarding: 1/0/150/0, Other: 0/0/0
HW Forwarding: 1460/1/168/1, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
Pkts: 0/0/1    Rate: 0 pps
Leaf-02#

```

Return to [Verifying TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric, on page 141](#)

### Outputs to Verify the Configuration on Border VTEP

The following example shows the output for the **show nve peers** command on Border VTEP:

```

Border# show nve peers
Interface VNI      Type Peer-IP          RMAC/Num RTs  eVNI      state flags UP time
nve1     50901    L3CP 172.16.254.3    10b3.d56a.8fc8 50901     UP  A/-/4 17:09:20
nve1     50901    L3CP 172.16.254.4    7c21.0dbd.9548 50901     UP  A/-/4 17:06:19
nve1     50901    L3CP 172.16.254.3    10b3.d56a.8fc8 50901     UP  A/M/6 17:09:20
nve1     50901    L3CP 172.16.254.4    7c21.0dbd.9548 50901     UP  A/M/6 17:06:19
nve1     10101    L2CP 172.16.254.3     6             10101     UP  N/A   17:09:20
nve1     10102    L2CP 172.16.254.4     7             10102     UP  N/A   16:48:24
Border#

```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on Border VTEP:

### Border VTEP

```

Border# show l2vpn evpn peers vxlan
Interface VNI      Peer-IP          Num routes eVNI      UP time

```



```

-----
nve1      10101    172.16.254.3          6          10101    17:09:21
nve1      10102    172.16.254.4          7          10102    16:48:24
Border#

```

The following example shows the output for the **show bgp ipv4 mvpn all summary** command on Border VTEP:

```

Border# show bgp ipv4 mvpn all summary
BGP router identifier 172.16.255.6, local AS number 65001
BGP table version is 60, main routing table version 60
6 network entries using 1824 bytes of memory
10 path entries using 1360 bytes of memory
4/4 BGP path/bestpath attribute entries using 1248 bytes of memory
4 BGP rinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
19 BGP extended community entries using 2682 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 7298 total bytes of memory
BGP activity 116/24 prefixes, 232/112 paths, scan interval 60 secs
8 networks peaked at 12:14:22 Aug 6 2020 UTC (16:52:46.174 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ OutQ Up/Down  State/PfxRcd
172.16.255.1  4      65001  1246   1165    60     0   0 17:13:17      4
172.16.255.2  4      65001  1247   1161    60     0   0 17:13:14      4
Border#

```

The following example shows the output for the **show ip pim vrf vrf-name rp mapping** command on Border VTEP:

```

Border# show ip pim vrf green rp mapping
PIM Group-to-RP Mappings

Group(s): 224.0.0.0/4, Static
          RP: 10.2.255.255 (?)
Border#

```

The following example shows the output for the **show ip routing vrf vrf-name** command on Border VTEP:

```

Border# show ip routing vrf green 10.2.255.255
Routing Table: green
Routing entry for 10.2.255.255/32
  Known via "ospf 2", distance 110, metric 3, type intra area
  Redistributing via bgp 65001
  Advertised by bgp 65001 match internal external 1 & 2
  Last update from 10.2.1.2 on Vlan2001, 17:12:42 ago
  Routing Descriptor Blocks:
  * 10.2.1.2, from 10.2.255.3, 17:12:42 ago, via Vlan2001
    Route metric is 3, traffic share count is 1
Border#

```

The following example shows the output for the **show ip igmp vrf vrf-name groups** command on Border VTEP:

```

Border# show ip igmp vrf green groups
IGMP Connected Group Membership
Group Address      Interface      Uptime      Expires      Last Reporter      Group Accounted

```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

```
224.0.1.40      Vlan901          17:14:13  00:02:51  172.16.254.6
Border#
```

The following example shows the output for the **show ip mroute vrf vrf-name** command on Border VTEP:

```
Border# show ip mroute vrf green
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,
       e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 226.1.1.1), 17:06:19/stopped, RP 10.2.255.255, flags: SJGx
  Incoming interface: Vlan2001, RPF nbr 10.2.1.2
  Outgoing interface list:
    Vlan901, Forward/Sparse, 17:06:19/stopped

(10.2.255.1, 226.1.1.1), 00:33:41/00:01:22, flags: TGqx
  Incoming interface: Vlan2001, RPF nbr 10.2.1.2
  Outgoing interface list:
    Vlan901, Forward/Sparse, 00:33:41/stopped

(10.1.102.12, 226.1.1.1), 00:34:06/00:03:14, flags: Tgx
  Incoming interface: Vlan901, RPF nbr 172.16.254.4
  Outgoing interface list:
    Vlan2001, Forward/Sparse, 00:34:06/00:02:52, A

(*, 224.0.1.40), 17:14:13/00:02:51, RP 10.2.255.255, flags: SJCLGx
  Incoming interface: Vlan2001, RPF nbr 10.2.1.2
  Outgoing interface list:
    Vlan901, Forward/Sparse, 17:14:12/00:02:51
Border#
```

The following example shows the output for the **show ip mfib vrf vrf-name** command on Border VTEP:

```
Border# show ip mfib vrf green
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
            ET - Data Rate Exceeds Threshold, K - Keepalive
            DDE - Data Driven Event, HW - Hardware Installed
            ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
            MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
            MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
            e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
              NS - Negate Signalling, SP - Signal Present,
              A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
              MA - MFIB Accept, A2 - Accept backup,
```

```

RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
VRF green
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
Vlan2001 Flags: A NS
Vlan901, VXLAN Decap Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,226.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 6/0/122/0, Other: 0/0/0
Vlan2001 Flags: A NS
Vlan901, VXLAN v4 Encap (50901, 239.1.1.1) Flags: F
  Pkts: 0/0/0   Rate: 0 pps
(10.1.102.12,226.1.1.1) Flags: HW
  SW Forwarding: 4/0/100/0, Other: 1/1/0
  HW Forwarding: 2096/1/126/0, Other: 0/0/0
Vlan901, VXLAN Decap Flags: A
Vlan2001 Flags: F
  Pkts: 0/0/4   Rate: 0 pps
(10.2.255.1,226.1.1.1) Flags: HW
  SW Forwarding: 1/0/100/0, Other: 0/0/0
  HW Forwarding: 2072/1/122/0, Other: 0/0/0
Vlan2001 Flags: A
Vlan901, VXLAN v4 Encap (50901, 239.1.1.1) Flags: F
  Pkts: 0/0/1   Rate: 0 pps
Border#

```

The following example shows the output for the **show bgp ipv4 mvpn all** command on Border VTEP:

```

Border# show bgp ipv4 mvpn all
BGP table version is 60, local router ID is 172.16.255.6
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
*>i  [5] [1:1] [10.1.102.12] [226.1.1.1] /18
      172.16.255.4          0      100      0 ?
* i   [5] [1:1] [10.1.102.12] [226.1.1.1] /18
      172.16.255.4          0      100      0 ?
*>   [5] [1:1] [10.2.255.1] [226.1.1.1] /18
      0.0.0.0                32768 ?
* i   [6] [1:1] [65001] [10.2.255.255/32] [224.0.1.40/32] /22
      172.16.255.3          0      100      0 ?
*>i   [6] [1:1] [65001] [10.2.255.255/32] [224.0.1.40/32] /22
      172.16.255.3          0      100      0 ?
* i   [6] [1:1] [65001] [10.2.255.255/32] [226.1.1.1/32] /22
      172.16.255.3          0      100      0 ?
*>i   [6] [1:1] [65001] [10.2.255.255/32] [226.1.1.1/32] /22
      172.16.255.3          0      100      0 ?
*>i   [7] [1:1] [65001] [10.2.255.1/32] [226.1.1.1/32] /22
      172.16.255.3          0      100      0 ?

```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

```

* i          172.16.255.3          0    100    0 ?
Route Distinguisher: 172.16.254.4:102
*>  [7][172.16.254.4:102][65001][10.1.102.12/32][226.1.1.1/32]/22
      0.0.0.0                      32768 ?
Border#

```

The following example shows the output for the **show ip mroute** command on Border VTEP:

```

Border# show ip mroute
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,
       e - encap-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 239.1.1.1), 17:14:04/stopped, RP 172.16.255.255, flags: SJCFx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 17:14:04/00:01:48

(172.16.254.4, 239.1.1.1), 00:34:05/00:02:44, flags: JTx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 00:34:05/00:01:54

(172.16.254.6, 239.1.1.1), 00:34:07/00:03:12, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    TenGigabitEthernet1/0/2, Forward/Sparse, 00:34:07/00:02:52, A

(*, 224.0.1.40), 17:14:13/00:02:47, RP 172.16.255.255, flags: SJCL
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Loopback0, Forward/Sparse, 17:14:12/00:02:47
Border#

```

The following example shows the output for the **show ip mfib** command on Border VTEP:

```

Border# show ip mfib
Entry Flags:  C - Directly Connected, S - Signal, IA - Inherit A flag,
              ET - Data Rate Exceeds Threshold, K - Keepalive
              DDE - Data Driven Event, HW - Hardware Installed
              ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
              MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
              MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
              e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,

```

A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,  
 MA - MFIB Accept, A2 - Accept backup,  
 RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

```

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Loopback0 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  8/0/146/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 7/0/125/0, Other: 0/0/0
  HW Forwarding: 8010/0/176/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/7   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  1/0/172/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/154/0, Other: 0/0/0
  HW Forwarding: 5353/0/176/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 11/0/167/0, Other: 7/6/1
  HW Forwarding: 2207/0/151/0, Other: 0/0/0
  Null0 Flags: A
  TenGigabitEthernet1/0/2 Flags: F
  Pkts: 0/0/10  Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  8/0/168/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
  SW Forwarding: 4/0/150/0, Other: 0/0/0
  HW Forwarding: 2032/1/168/1, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/4   Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
  SW Forwarding: 2/0/150/0, Other: 4/4/0

```

```

HW Forwarding: 2015/1/156/1, Other: 0/0/0
Null0 Flags: A
TenGigabitEthernet1/0/2 Flags: F
Pkts: 0/0/1 Rate: 0 pps
Border#

```

Return to [Verifying TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric, on page 141](#)

### Outputs to Verify the Configuration on Spine Switch 1

The following example shows the output for the **show bgp ipv4 mvpn all summary** command on Spine Switch 1:

```

Spine-01# show bgp ipv4 mvpn all summary
BGP router identifier 172.16.255.1, local AS number 65001
BGP table version is 169, main routing table version 169
6 network entries using 1824 bytes of memory
16 path entries using 2176 bytes of memory
3/3 BGP path/bestpath attribute entries using 912 bytes of memory
3 BGP rrinfo entries using 120 bytes of memory
1 BGP community entries using 24 bytes of memory
16 BGP extended community entries using 2332 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 7388 total bytes of memory
BGP activity 250/203 prefixes, 2984/2883 paths, scan interval 60 secs
8 networks peaked at 12:20:11 Aug 6 2020 UTC (16:59:40.011 ago)

```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
172.16.255.3	4	65001	1161	1252	169	0	0	17:17:09	4
172.16.255.4	4	65001	1169	1247	169	0	0	17:14:09	4
172.16.255.6	4	65001	1172	1253	169	0	0	17:20:10	2

```

Spine-01#

```

The following example shows the output for the **show ip pim rp mapping** command on Spine Switch 1:

```

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 (?)
Spine-01#

```

The following example shows the output for the **show bgp ipv4 mvpn all** command on Spine Switch 1:

```

Spine-01# show bgp ipv4 mvpn all
BGP table version is 169, local router ID is 172.16.255.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

```

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

```

* i [5][1:1][10.1.102.12][226.1.1.1]/18
    172.16.255.4 0 100 0 ?
*>i 172.16.255.4 0 100 0 ?
* i [5][1:1][10.2.255.1][226.1.1.1]/18
    172.16.255.6 0 100 0 ?
*>i 172.16.255.6 0 100 0 ?
* i [6][1:1][65001][10.2.255.255/32][224.0.1.40/32]/22
    172.16.255.4 0 100 0 ?
*>i 172.16.255.3 0 100 0 ?
* i 172.16.255.3 0 100 0 ?
*>i [6][1:1][65001][10.2.255.255/32][226.1.1.1/32]/22
    172.16.255.3 0 100 0 ?
* i 172.16.255.3 0 100 0 ?
* i 172.16.255.4 0 100 0 ?
*>i [7][1:1][65001][10.2.255.1/32][226.1.1.1/32]/22
    172.16.255.3 0 100 0 ?
* i 172.16.255.3 0 100 0 ?
* i 172.16.255.4 0 100 0 ?
Route Distinguisher: 172.16.254.4:102
*>i [7][172.16.254.4:102][65001][10.1.102.12/32][226.1.1.1/32]/22
    172.16.255.3 0 100 0 ?
* i 172.16.255.3 0 100 0 ?
* i 172.16.255.6 0 100 0 ?
Spine-01#

```

The following example shows the output for the **show ip mroute** command on Spine Switch 1:

```

Spine-01# show ip mroute
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

(*, 239.1.1.1), 00:42:45/stopped, RP 172.16.255.255, flags: SP
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list: Null

(172.16.254.6, 239.1.1.1), 00:42:22/00:02:37, flags: PTA
  Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.16.6
  Outgoing interface list: Null

(172.16.254.4, 239.1.1.1), 00:42:45/00:02:28, flags: PTA
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.14.4
  Outgoing interface list: Null

(*, 224.0.1.40), 1w0d/00:02:18, RP 172.16.255.255, flags: SJCL
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    Loopback2, Forward/Sparse, 1w0d/00:02:18

```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

```

(*, 225.0.0.102), 6d19h/stopped, RP 172.16.255.255, flags: SP
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list: Null

(172.16.254.6, 225.0.0.102), 05:29:52/00:02:22, flags: PA
  Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.16.6
  Outgoing interface list: Null

(172.16.254.4, 225.0.0.102), 17:12:35/00:02:03, flags: PA
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.14.4
  Outgoing interface list: Null
Spine-01#

```

The following example shows the output for the **show ip mfib** command on Spine Switch 1:

```

Spine-01# show ip mfib
Entry Flags:      C - Directly Connected, S - Signal, IA - Inherit A flag,
                  ET - Data Rate Exceeds Threshold, K - Keepalive
                  DDE - Data Driven Event, HW - Hardware Installed
                  ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
                  MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
                  MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client.
I/O Item Flags:  IC - Internal Copy, NP - Not platform switched,
                  NS - Negate Signalling, SP - Signal Present,
                  A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                  MA - MFIB Accept, A2 - Accept backup,
                  RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:   HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 82/82/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
  Loopback2 Flags: F IC NS
    Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 1/0/206/0, Other: 279/0/279
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
  GigabitEthernet1/0/2 Flags: NS
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
  GigabitEthernet1/0/4 Flags: NS
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 1/0/1
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnell Flags: A

```



```
(172.16.254.4,239.1.1.1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 1224/0/168/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
(172.16.254.6,239.1.1.1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  GigabitEthernet1/0/4 Flags: A NS
Spine-01#
```

Return to [Verifying TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric](#), on page 141

## Outputs to Verify the Configuration on Spine Switch 2

The following example shows the output for the **show bgp ipv4 mvpn all summary** command on Spine Switch 2:

```
Spine-02# show bgp ipv4 mvpn all summary
BGP router identifier 172.16.255.2, local AS number 65001
BGP table version is 131, main routing table version 131
6 network entries using 1824 bytes of memory
16 path entries using 2176 bytes of memory
3/3 BGP path/bestpath attribute entries using 912 bytes of memory
3 BGP rrinfo entries using 120 bytes of memory
1 BGP community entries using 24 bytes of memory
16 BGP extended community entries using 2332 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 7388 total bytes of memory
BGP activity 283/236 prefixes, 3089/2988 paths, scan interval 60 secs
8 networks peaked at 12:20:59 Aug 6 2020 UTC (17:02:43.558 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.3  4      65001   1160   1252    131   0    0  17:20:09      4
172.16.255.4  4      65001   1173   1249    131   0    0  17:17:14      4
172.16.255.6  4      65001   1172   1258    131   0    0  17:23:12      2
Spine-02#
```

The following example shows the output for the **show ip pim rp mapping** command on Spine Switch 2:

```
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 (?)
Spine-02#
```

The following example shows the output for the **show bgp ipv4 mvpn all** command on Spine Switch 2:

```
Spine-02# show bgp ipv4 mvpn all
BGP table version is 131, local router ID is 172.16.255.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

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

```

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1
* i [5][1:1][10.1.102.12][226.1.1.1]/18
      172.16.255.4          0 100 0 ?
*>i 172.16.255.4          0 100 0 ?
* i [5][1:1][10.2.255.1][226.1.1.1]/18
      172.16.255.6          0 100 0 ?
*>i 172.16.255.6          0 100 0 ?
* i [6][1:1][65001][10.2.255.255/32][224.0.1.40/32]/22
      172.16.255.4          0 100 0 ?
*>i 172.16.255.3          0 100 0 ?
* i 172.16.255.3          0 100 0 ?
*>i [6][1:1][65001][10.2.255.255/32][226.1.1.1/32]/22
      172.16.255.3          0 100 0 ?
* i 172.16.255.3          0 100 0 ?
* i 172.16.255.4          0 100 0 ?
*>i [7][1:1][65001][10.2.255.1/32][226.1.1.1/32]/22
      172.16.255.3          0 100 0 ?
* i 172.16.255.3          0 100 0 ?
* i 172.16.255.4          0 100 0 ?
Route Distinguisher: 172.16.254.4:102
*>i [7][172.16.254.4:102][65001][10.1.102.12/32][226.1.1.1/32]/22
      172.16.255.3          0 100 0 ?
* i 172.16.255.3          0 100 0 ?
* i 172.16.255.6          0 100 0 ?
Spine-02#

```

The following example shows the output for the **show ip mroute** command on Spine Switch 2:

```

Spine-02# show ip mroute
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

(*, 239.1.1.1), 3d00h/00:03:23, RP 172.16.255.255, flags: S
Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list:
  GigabitEthernet1/0/2, Forward/Sparse, 17:17:14/00:03:23
  GigabitEthernet1/0/1, Forward/Sparse, 17:20:16/00:03:17
  GigabitEthernet1/0/4, Forward/Sparse, 17:23:12/00:02:52

(172.16.254.4, 239.1.1.1), 00:44:04/00:01:34, flags: T
Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.4
Outgoing interface list:
  GigabitEthernet1/0/4, Forward/Sparse, 00:44:04/00:02:52
  GigabitEthernet1/0/1, Forward/Sparse, 00:44:04/00:03:17

```

```

(172.16.254.6, 239.1.1.1), 00:44:04/00:01:32, flags: T
  Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.26.6
  Outgoing interface list:
    GigabitEthernet1/0/1, Forward/Sparse, 00:44:04/00:03:17
    GigabitEthernet1/0/2, Forward/Sparse, 00:44:04/00:03:23

(*, 224.0.1.40), 1w0d/00:03:22, RP 172.16.255.255, flags: SJCL
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 17:17:14/00:02:46
    GigabitEthernet1/0/1, Forward/Sparse, 17:20:16/00:03:22
    GigabitEthernet1/0/4, Forward/Sparse, 17:23:12/00:03:13
    Loopback2, Forward/Sparse, 1w0d/00:02:33

(*, 225.0.0.102), 1w0d/00:03:29, RP 172.16.255.255, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 17:17:14/00:03:04
    GigabitEthernet1/0/1, Forward/Sparse, 17:20:16/00:03:29
    GigabitEthernet1/0/4, Forward/Sparse, 17:23:12/00:02:36

(172.16.254.4, 225.0.0.102), 17:17:08/00:02:44, flags: MT
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.4
  Outgoing interface list:
    GigabitEthernet1/0/4, Forward/Sparse, 17:17:08/00:02:37
    GigabitEthernet1/0/1, Forward/Sparse, 17:17:08/00:03:29

(172.16.254.6, 225.0.0.102), 17:23:14/00:03:21, flags: MT
  Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.26.6
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 17:17:14/00:03:04
    GigabitEthernet1/0/1, Forward/Sparse, 17:20:16/00:03:29

(*, 225.0.0.101), 3d00h/00:03:10, RP 172.16.255.255, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 17:17:14/00:03:01
    GigabitEthernet1/0/1, Forward/Sparse, 17:20:16/00:03:10
    GigabitEthernet1/0/4, Forward/Sparse, 17:23:12/00:02:40

(172.16.254.3, 225.0.0.101), 17:19:56/00:02:53, flags: TA
  Incoming interface: GigabitEthernet1/0/1, RPF nbr 172.16.23.3
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 17:17:14/00:03:01
    GigabitEthernet1/0/4, Forward/Sparse, 17:19:56/00:03:02
Spine-02#

```

The following example shows the output for the **show ip mfib** command on Spine Switch 2:

```

Spine-02# show ip mfib
Entry Flags:   C - Directly Connected, S - Signal, IA - Inherit A flag,
               ET - Data Rate Exceeds Threshold, K - Keepalive
               DDE - Data Driven Event, HW - Hardware Installed
               ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
               MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
               MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,
                A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                MA - MFIB Accept, A2 - Accept backup,
                RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

```

## Example: Configuring TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

```

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
  GigabitEthernet1/0/1 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  GigabitEthernet1/0/2 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  GigabitEthernet1/0/4 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  Loopback2 Flags: F IC NS
    Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 9/0/112/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
  GigabitEthernet1/0/1 Flags: F NS
    Pkts: 0/0/2   Rate: 0 pps
  GigabitEthernet1/0/2 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  GigabitEthernet1/0/4 Flags: F NS
    Pkts: 0/0/2   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 4/0/132/0, Other: 0/0/0
  HW Forwarding: 8067/0/176/0, Other: 0/0/0
  GigabitEthernet1/0/1 Flags: A
  GigabitEthernet1/0/2 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  GigabitEthernet1/0/4 Flags: F NS
    Pkts: 0/0/4   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 27/0/101/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
  GigabitEthernet1/0/1 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  GigabitEthernet1/0/2 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  GigabitEthernet1/0/4 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 5404/0/176/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  GigabitEthernet1/0/1 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  GigabitEthernet1/0/4 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 2214/0/163/0, Other: 0/0/0
  GigabitEthernet1/0/4 Flags: A NS
  GigabitEthernet1/0/1 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
  GigabitEthernet1/0/2 Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(*,232.0.0.0/8) Flags: HW

```

```

SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
SW Forwarding: 9/0/150/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/1 Flags: F NS
Pkts: 0/0/3 Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
Pkts: 0/0/3 Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
Pkts: 0/0/3 Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 2629/1/168/1, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
GigabitEthernet1/0/1 Flags: F NS
Pkts: 0/0/0 Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
Pkts: 0/0/0 Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 2607/1/168/1, Other: 0/0/0
GigabitEthernet1/0/4 Flags: A
GigabitEthernet1/0/1 Flags: F NS
Pkts: 0/0/0 Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
Pkts: 0/0/0 Rate: 0 pps
Spine-02#

```

Return to [Verifying TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric](#), on page 141

### Outputs to Verify the Configuration on Router 3 (RP Outside the BGP EVPN VXLAN Fabric)

The following example shows the output for the **show ip pim rp mapping** command on Router 3:

```

R3# show ip pim rp mapping
PIM Group-to-RP Mappings

Group(s): 224.0.0.0/4, Static
RP: 10.2.255.255 (?)
R3#

```

The following example shows the output for the **show ip mroute** command on Router 3:

```

R3# show ip mroute
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

(*, 226.1.1.1), 2d19h/00:03:17, RP 10.2.255.255, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    TenGigabitEthernet0/0/0, Forward/Sparse, 17:10:20/00:03:17
    TenGigabitEthernet0/0/1, Forward/Sparse, 2d16h/00:03:11

(10.2.255.1, 226.1.1.1), 00:37:40/00:02:14, flags: PJT
  Incoming interface: TenGigabitEthernet0/0/0, RPF nbr 10.2.13.1
  Outgoing interface list: Null

(10.1.102.12, 226.1.1.1), 00:38:05/00:02:58, flags: P
  Incoming interface: TenGigabitEthernet0/0/0, RPF nbr 10.2.13.1
  Outgoing interface list: Null

(*, 224.0.1.40), 2d23h/00:03:27, RP 10.2.255.255, flags: SJCL
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    Loopback0, Forward/Sparse, 2d23h/00:02:11
    TenGigabitEthernet0/0/1, Forward/Sparse, 2d19h/00:03:26
    TenGigabitEthernet0/0/0, Forward/Sparse, 2d19h/00:03:27
R3#

```

Return to [Verifying TRM with PIM-SM for IPv4 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric, on page 141](#)

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

This example shows how to configure and verify Layer 3 TRM with PIM-SM for IPv4 and IPv6 multicast traffic when the RP is outside the BGP EVPN VXLAN fabric. The example uses the topology in the [Figure 13: TRM with PIM-SM when the RP is Outside the BGP EVPN VXLAN Fabric](#) figure.

The topology shows an EVPN VXLAN network, with two spine switches and three VTEPs, connected to an external network with three routers. Router 3 in the external network acts as the RP in this topology and Border VTEP connects the fabric to the external network through Router 1. The IPv4 multicast group is 226.1.1.1 and the IPv6 multicast group is FF06:1::1 in this topology. The following tables provide sample configurations for the devices in this topology:

**Table 12: Configuring VTEP 1, Border VTEP, and VTEP 2 to Configure TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric**

VTEP 1	Border VTEP	VTEP 2
<pre>Leaf-01# show running-config hostname Leaf-01 ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 ip multicast-routing vrf green ! ipv6 unicast-routing ipv6 multicast-routing vrf green ! 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 ! system mtu 9198 ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901</pre>	<pre>Border# show running-config hostname Border ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 ip multicast-routing vrf green ! ipv6 unicast-routing ipv6 multicast-routing vrf green ! 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 ! system mtu 9198 ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 !</pre>	<pre>Leaf-02# show running-config hostname Leaf-02 ! vrf definition green rd 1:1 ! address-family ipv4 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 mdt auto-discovery vxlan mdt default vxlan 239.1.1.1 mdt overlay use-bgp 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 ip multicast-routing vrf green ! ipv6 unicast-routing ipv6 multicast-routing vrf green ! 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 ! system mtu 9198 ! vlan configuration 101 member evpn-instance 101 vni 10101 vlan configuration 102 member evpn-instance 102 vni 10102 vlan configuration 901 member vni 50901 !</pre>

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

VTEP 1	Border VTEP	VTEP 2
<pre> ! interface Loopback0 ip address 172.16.255.3 255.255.255.255 ip pim sparse-mode 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 Loopback901 vrf forwarding green ip address 10.1.255.1 255.255.255.255 ip pim sparse-mode ipv6 address FC00:1:255::1/128 ipv6 enable ! 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 ! 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 access vlan 101 switchport mode access ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:101::1/64 ipv6 enable ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:102::1/64 ipv6 enable ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode ipv6 enable no autostate ! </pre>	<pre> vlan 2001 ! interface Loopback0 ip address 172.16.255.6 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface Loopback1 ip address 172.16.254.6 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ! interface Loopback901 vrf forwarding green ip address 10.1.255.4 255.255.255.255 ip pim sparse-mode ipv6 address FC00:1:255::4/128 ipv6 enable ! interface TenGigabitEthernet1/0/1 no switchport ip address 172.16.16.6 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet1/0/2 no switchport ip address 172.16.26.6 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ! interface TenGigabitEthernet1/0/5 switchport trunk allowed vlan 2001 switchport mode trunk ! interface TenGigabitEthernet1/0/10 switchport access vlan 102 switchport mode access ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:101::1/64 ipv6 enable ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:102::1/64 ipv6 enable ! </pre>	<pre> interface Loopback0 ip address 172.16.255.4 255.255.255.255 ip pim sparse-mode 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 Loopback901 vrf forwarding green ip address 10.1.255.2 255.255.255.255 ip pim sparse-mode ipv6 address FC00:1:255::2/128 ipv6 enable ! 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 ! 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 access vlan 101 switchport mode access ! interface Vlan101 vrf forwarding green ip address 10.1.101.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:101::1/64 ipv6 enable ! interface Vlan102 vrf forwarding green ip address 10.1.102.1 255.255.255.0 ip pim sparse-mode ipv6 address FC00:1:102::1/64 ipv6 enable ! interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode ipv6 enable no autostate ! </pre>



VTEP 1	Border VTEP	VTEP 2
<pre> 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 mcast-group 225.0.0.102 ! 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 redistribute connected redistribute static exit-address-family ! address-family ipv4 mvpn 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 ipv6 mvpn 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 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 ! </pre>	<pre> interface Vlan901 vrf forwarding green ip unnumbered Loopback1 ip pim sparse-mode ipv6 enable no autostate ! interface Vlan2001 vrf forwarding green ip address 10.2.1.1 255.255.255.0 ip mtu 1500 ip pim sparse-mode ip ospf network point-to-point ip ospf 2 area 0 ipv6 address FC00:2::1:1/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! 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 mcast-group 225.0.0.102 ! router ospfv3 1 ! address-family ipv6 unicast vrf green redistribute bgp 65001 exit-address-family ! router ospf 2 vrf green redistribute bgp 65001 ! router ospf 1 router-id 172.16.255.6 ! 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 </pre>	<pre> 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 mcast-group 225.0.0.102 ! 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 redistribute connected redistribute static exit-address-family ! address-family ipv4 mvpn 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 ipv6 mvpn 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 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 ! </pre>

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

VTEP 1	Border VTEP	VTEP 2
<pre> address-family ipv4 vrf green advertise l2vpn evpn redistribute connected redistribute static exit-address-family ! 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 ip pim vrf green rp-address 10.2.255.255 ! ipv6 pim vrf green rp-address FC00:2:255::255 ipv6 pim vrf green register-source Loopback901 ! end ! Leaf-01# </pre>	<pre> ! address-family ipv4 exit-address-family ! address-family ipv4 mvpn 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 ipv6 mvpn 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 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 redistribute ospf 2 match internal external 1 external 2 exit-address-family ! address-family ipv6 vrf green redistribute connected redistribute ospf 1 include-connected redistribute static advertise l2vpn evpn exit-address-family ! ip pim rp-address 172.16.255.255 ip pim ssm default ip pim vrf green rp-address 10.2.255.255 ! ipv6 pim vrf green rp-address FC00:2:255::255 ! end ! Border# </pre>	<pre> address-family ipv4 vrf green advertise l2vpn evpn redistribute connected redistribute static exit-address-family ! 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 ip pim vrf green rp-address 10.2.255.255 ! ipv6 pim vrf green rp-address FC00:2:255::255 ipv6 pim vrf green register-source Loopback901 ! end ! Leaf-02# </pre>

*Table 13: Configuring Spine Switch 1 and Spine Switch 2 to Configure TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric*

Spine Switch 1	Spine Switch 2
----------------	----------------

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

Spine Switch 1	Spine Switch 2
<pre> Spine-01# show running-config hostname Spine-01 ! ip routing ! ip multicast-routing ! system mtu 9198 ! 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 ! interface GigabitEthernet1/0/4 no switchport ip address 172.16.16.1 255.255.255.0 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 neighbor 172.16.255.3 remote-as 65001 neighbor 172.16.255.3 update-source Loopback0 neighbor 172.16.255.4 remote-as 65001 neighbor 172.16.255.4 update-source Loopback0 neighbor 172.16.255.6 remote-as 65001 neighbor 172.16.255.6 update-source Loopback0 ! address-family ipv4 exit-address-family ! </pre>	<pre> Spine-02# show running-config hostname Spine-02 ! ip routing ! ip multicast-routing ! system mtu 9198 ! 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 ! interface GigabitEthernet1/0/4 no switchport ip address 172.16.26.2 255.255.255.0 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 neighbor 172.16.255.3 remote-as 65001 neighbor 172.16.255.3 update-source Loopback0 neighbor 172.16.255.4 remote-as 65001 neighbor 172.16.255.4 update-source Loopback0 neighbor 172.16.255.6 remote-as 65001 neighbor 172.16.255.6 update-source Loopback0 ! address-family ipv4 exit-address-family ! </pre>

Spine Switch 1	Spine Switch 2
<pre> address-family ipv4 mvpn neighbor 172.16.255.2 route-reflector-client neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family ipv6 mvpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family l2vpn evpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client 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 ! end ! Spine-01# </pre>	<pre> address-family ipv4 mvpn neighbor 172.16.255.1 route-reflector-client neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family ipv6 mvpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client exit-address-family ! address-family l2vpn evpn neighbor 172.16.255.3 activate neighbor 172.16.255.3 send-community both neighbor 172.16.255.3 route-reflector-client neighbor 172.16.255.4 activate neighbor 172.16.255.4 send-community both neighbor 172.16.255.4 route-reflector-client neighbor 172.16.255.6 activate neighbor 172.16.255.6 send-community both neighbor 172.16.255.6 route-reflector-client 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 ! end ! Spine-02# </pre>

Table 14: Configuring Router 1, Router 2, and Router 3 to Configure TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

Router 1	Router 2	Router 3
<pre> R1# show running-config hostname R1 ! ip multicast-routing distributed ! ipv6 unicast-routing ipv6 multicast-routing ! interface Loopback0 ip address 10.2.255.1 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ipv6 address FC00:2:255::1/128 ipv6 enable ospfv3 1 ipv6 area 0 ! interface TenGigabitEthernet0/0/0 ip address 10.2.12.1 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 cdp enable ipv6 address FC00:2:12::1/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! interface TenGigabitEthernet0/0/1 ip address 10.2.13.1 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 cdp enable ipv6 address FC00:2:13::1/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! interface GigabitEthernet0/0/1.2001 encapsulation dot1Q 2001 ip address 10.2.1.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 ipv6 address FC00:2:1::2/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 </pre>	<pre> R2# show running-config hostname R2 ! ip multicast-routing distributed ! ipv6 unicast-routing ipv6 multicast-routing ! interface Loopback0 ip address 10.2.255.2 255.255.255.255 ip pim sparse-mode ip igmp join-group 226.1.1.1 ip ospf 1 area 0 ipv6 address FC00:2:255::2/128 ipv6 enable ipv6 mld join-group FF06:1::1 ospfv3 1 ipv6 area 0 ! interface TenGigabitEthernet0/0/0 ip address 10.2.12.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 cdp enable ipv6 address FC00:2:12::2/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! interface TenGigabitEthernet0/0/1 ip address 10.2.23.2 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 cdp enable ipv6 address FC00:2:23::2/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! router ospfv3 1 ! address-family ipv6 unicast exit-address-family ! router ospf 1 router-id 10.2.255.2 </pre>	<pre> R3# show running-config hostname R3 ! ip multicast-routing distributed ! ipv6 unicast-routing ipv6 multicast-routing ! interface Loopback0 ip address 10.2.255.3 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ipv6 address FC00:2:255::3/128 ipv6 enable ospfv3 1 ipv6 area 0 ! interface Loopback255 ip address 10.2.255.255 255.255.255.255 ip pim sparse-mode ip ospf 1 area 0 ipv6 address FC00:2:255::255/128 ipv6 enable ospfv3 1 ipv6 area 0 ! interface TenGigabitEthernet0/0/0 ip address 10.2.13.3 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 cdp enable ipv6 address FC00:2:13::3/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! interface TenGigabitEthernet0/0/1 ip address 10.2.23.3 255.255.255.0 ip pim sparse-mode ip ospf network point-to-point ip ospf 1 area 0 cdp enable ipv6 address FC00:2:23::3/64 ipv6 enable ospfv3 network point-to-point ospfv3 1 ipv6 area 0 ! router ospfv3 1 ! </pre>

Router 1	Router 2	Router 3
<pre>! router ospfv3 1 ! address-family ipv6 unicast exit-address-family ! router ospf 1 router-id 10.2.255.1 ! ip pim rp-address 10.2.255.255 ! ipv6 pim rp-address FC00:2:255::255 ! end ! R1#</pre>	<pre>! ip pim rp-address 10.2.255.255 ! ipv6 pim rp-address FC00:2:255::255 ! end ! R2#</pre>	<pre>address-family ipv6 unicast exit-address-family ! router ospf 1 router-id 10.2.255.3 ! ip pim rp-address 10.2.255.255 ! ipv6 pim rp-address FC00:2:255::255 ! end ! R3#</pre>

### Verifying TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric

The following sections provide sample outputs for **show** commands to verify TRM with PIM-SM on the devices in the topology configured above:

- [Outputs to Verify the Configuration on VTEP 1, on page 175](#)
- [Outputs to Verify the Configuration on VTEP 2, on page 183](#)
- [Outputs to Verify the Configuration on Border VTEP, on page 190](#)
- [Outputs to Verify the Configuration on Spine Switch 1, on page 198](#)
- [Outputs to Verify the Configuration on Spine Switch 2, on page 201](#)
- [Outputs to Verify the Configuration on Router 3 \(RP Outside the BGP EVPN VXLAN Fabric\), on page 205](#)

#### Outputs to Verify the Configuration on VTEP 1

The following example shows the output for the **show nve peers** command on VTEP 1:

```
Leaf-01# show nve peers
Interface VNI Type Peer-IP RMAC/Num_RTs eVNI state flags UP time
nve1 50901 L3CP 172.16.254.6 0c75.bd67.ef48 50901 UP A/-/4 1d01h
nve1 50901 L3CP 172.16.254.4 7c21.0dbd.9548 50901 UP A/-/4 1d01h
nve1 50901 L3CP 172.16.254.6 0c75.bd67.ef48 50901 UP A/M/6 1d01h
nve1 50901 L3CP 172.16.254.4 7c21.0dbd.9548 50901 UP A/M/6 1d01h
nve1 10102 L2CP 172.16.254.4 7 10102 UP N/A 1d00h
nve1 10102 L2CP 172.16.254.6 5 10102 UP N/A 1d01h
Leaf-01#
```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on VTEP 1:

```
Leaf-01# show l2vpn evpn peers vxlan
Interface VNI Peer-IP Num routes eVNI UP time
```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

```

-----
nve1      10102      172.16.254.4          7          10102      1d00h
nve1      10102      172.16.254.6          5          10102      1d01h
Leaf-01#

```

The following example shows the output for the **show bgp ipv6 mvpn all summary** command on VTEP 1:

```

Leaf-01# show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.3, local AS number 65001
BGP table version is 43, main routing table version 43
5 network entries using 1960 bytes of memory
7 path entries using 1120 bytes of memory
3/3 BGP path/bestpath attribute entries using 936 bytes of memory
4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
17 BGP extended community entries using 2372 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 6572 total bytes of memory
BGP activity 124/30 prefixes, 253/123 paths, scan interval 60 secs
5 networks peaked at 15:46:09 Aug 6 2020 UTC (21:27:07.275 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001   1796   1688    43    0    0  1d01h    2
172.16.255.2  4      65001   1795   1685    43    0    0  1d01h    2
Leaf-01#

```

The following example shows the output for the **show ipv6 pim vrf vrf-name group-map** command on VTEP 1:

```

Leaf-01# show ip pim vrf green group-map ff06:::1
IP PIM Group Mapping Table
(* indicates group mappings being used)

FF00::/8*
  SM, RP: FC00:2:255::255
  RPF: V1901,::FFFF:172.16.254.6
  Info source: Static
  Uptime: 21:43:02, Groups: 1
Leaf-01#

```

The following example shows the output for the **show ipv6 routing vrf** command on VTEP 1:

```

Leaf-01# show ipv6 routing vrf green FC00:2:255::255
Routing entry for FC00:2:255::255/128
  Known via "bgp 65001", distance 200, metric 2, type internal
  Route count is 1/1, share count 0
  Routing paths:
    172.16.254.6%default, Vlan901%default
      From AC10:FF01::
      opaque_ptr 0x7FBB863DE268
      Last updated 1d00h ago
Leaf-01#

```

The following example shows the output for the **show ipv6 mld vrf vrf-name groups** command on VTEP 1:



```
Leaf-01# show ipv6 mld vrf green groups
MLD Connected Group Membership
Group Address                               Interface
      Uptime    Expires
FF06:1::1                                   Vlan101
      21:30:55  00:03:57
Leaf-01#
```

The following example shows the output for the **show ipv6 mroute vrf vrf-name** command on VTEP 1:

```
Leaf-01# show ipv6 mroute vrf green
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
      C - Connected, L - Local, I - Received Source Specific Host Report,
      P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
      J - Join SPT, Y - Joined MDT-data group,
      y - Sending to MDT-data group
      g - BGP signal originated, G - BGP Signal received,
      N - BGP Shared-Tree Prune received, n - BGP C-Mroute suppressed,
      q - BGP Src-Active originated, Q - BGP Src-Active received
      E - Extranet
Timers: Uptime/Expires
Interface state: Interface, State

(*, FF06:1::1), 21:30:55/00:03:08, RP FC00:2:255::255, flags: SCJg
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.6
  Immediate Outgoing interface list:
    Vlan101, Forward, 21:30:55/00:03:08

(FC00:1:102::12, FF06:1::1), 00:01:55/00:01:34, flags: SJTgQ
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.4
  Immediate Outgoing interface list:
    Vlan101, Forward, 00:01:55/00:02:38

(FC00:2:255::1, FF06:1::1), 00:01:14/00:02:15, flags: SJTgQ
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.6
  Immediate Outgoing interface list:
    Vlan101, Forward, 00:01:14/00:03:18
Leaf-01#
```

The following example shows the output for the **show ipv6 mfib vrf vrf-name** command on VTEP 1:

```
Leaf-01# show ipv6 mfib vrf green
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
            ET - Data Rate Exceeds Threshold, K - Keepalive
            DDE - Data Driven Event, HW - Hardware Installed
            ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
            MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
            MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
            e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
              NS - Negate Signalling, SP - Signal Present,
              A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
              MA - MFIB Accept, A2 - Accept backup,
              RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

```

Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
VRF green
(*,FF00::/8) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 412/412/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,FF00::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,FF02::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF06:1::1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  4/0/126/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A NS
  Vlan101 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(FC00:1:102::12,FF06:1::1) Flags: HW
  SW Forwarding: 3/0/100/0, Other: 0/0/0
  HW Forwarding:  58/0/125/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A
  Vlan101 Flags: F NS
  Pkts: 0/0/3   Rate: 0 pps
(FC00:2:255::1,FF06:1::1) Flags: HW
  SW Forwarding: 1/0/100/0, Other: 0/0/0
  HW Forwarding:  36/0/126/0, Other: 0/0/0
  Vlan901, VXLAN Decap Flags: A
  Vlan101 Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(*,FF10::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,FF12::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF20::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,FF22::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF30::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,FF32::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF33::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,FF34::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,FF35::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,FF36::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,FF37::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,FF38::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,FF39::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0

```

```
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3A::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3B::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3C::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3D::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3E::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3F::/32) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF40::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF42::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF50::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF52::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF60::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF62::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF70::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF72::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF80::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF82::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF90::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF92::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFA0::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFA2::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFB0::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFB2::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFC0::/15) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFC2::/16) Flags:
SW Forwarding: 0/0/0/0, Other: 0/0/0
```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

```

(*,FFD0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFD2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFE0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFE2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFF0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFF2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
Leaf-01#

```

The following example shows the output for the **show bgp ipv6 mvpn all** command on VTEP 1:

```

Leaf-01# show bgp ipv6 mvpn all
BGP table version is 43, local router ID is 172.16.255.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
*>i  [5][1:1][FC00:1:102::12][FF06:1::1]/42
      172.16.255.4          0      100      0 ?
* i      172.16.255.4          0      100      0 ?
*>i  [5][1:1][FC00:2:255::1][FF06:1::1]/42
      172.16.255.6          0      100      0 ?
* i      172.16.255.6          0      100      0 ?
*>  [6][1:1][65001][FC00:2:255::255][FF06:1::1]/46
      ::                      32768 ?
*>  [7][1:1][65001][FC00:2:255::1][FF06:1::1]/46
      ::                      32768 ?
Route Distinguisher: 172.16.254.4:102
*>  [7][172.16.254.4:102][65001][FC00:1:102::12][FF06:1::1]/46
      ::                      32768 ?
Leaf-01#

```

The following example shows the output for the **show ip mroute** command on VTEP 1:

```

Leaf-01# show ip mroute
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-stargy configured on rpf intf,

```

```

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

(*, 239.1.1.1), 1d01h/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d01h/00:02:49

(172.16.254.4, 239.1.1.1), 00:01:54/00:01:05, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 00:01:54/00:01:05

(172.16.254.6, 239.1.1.1), 00:01:56/00:01:03, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 00:01:56/00:01:03

(*, 224.0.1.40), 1d01h/00:02:53, RP 172.16.255.255, flags: SJCL
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Loopback0, Forward/Sparse, 1d01h/00:02:53

(*, 225.0.0.102), 1d01h/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d01h/00:02:49

(172.16.254.4, 225.0.0.102), 1d01h/00:02:01, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d01h/00:02:10

(172.16.254.6, 225.0.0.102), 1d01h/00:02:20, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.23.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d01h/00:02:49

(*, 225.0.0.101), 1d01h/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, 1d01h/00:02:49

(172.16.254.3, 225.0.0.101), 1d01h/00:01:58, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 1d01h/00:03:08
Leaf-01#

```

The following example shows the output for the **show ip mfib** command on VTEP 1:

```

Leaf-01# show ip mfib
Entry Flags:  C - Directly Connected, S - Signal, IA - Inherit A flag,
              ET - Data Rate Exceeds Threshold, K - Keepalive
              DDE - Data Driven Event, HW - Hardware Installed
              ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
              MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
              MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
              e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,

```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,  
 MA - MFIB Accept, A2 - Accept backup,  
 RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

```

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Loopback0 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  1/0/114/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 13/0/127/0, Other: 2/2/0
  HW Forwarding:  7870/0/164/0, Other: 0/0/0
  Null0 Flags: A
  GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  2/0/172/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/154/0, Other: 0/0/0
  HW Forwarding:  5222/0/176/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/154/0, Other: 0/0/0
  HW Forwarding:  2137/0/163/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  11/0/168/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
  SW Forwarding: 4/0/150/0, Other: 0/0/0
  HW Forwarding:  518/0/168/1, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/4   Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
  SW Forwarding: 1/0/150/0, Other: 0/0/0

```

```

HW Forwarding: 498/1/168/1, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
Pkts: 0/0/1 Rate: 0 pps
Leaf-01#

```

Return to [Verifying TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric, on page 175](#)

## Outputs to Verify the Configuration on VTEP 2

The following example shows the output for the **show nve peers** command on VTEP 2:

```

Leaf-02# show nve peers
Interface VNI Type Peer-IP RMAC/Num_RTs eVNI state flags UP time
nve1 50901 L3CP 172.16.254.6 0c75.bd67.ef48 50901 UP A/-/4 1d01h
nve1 50901 L3CP 172.16.254.3 10b3.d56a.8fc8 50901 UP A/-/4 1d01h
nve1 50901 L3CP 172.16.254.6 0c75.bd67.ef48 50901 UP A/M/6 1d01h
nve1 50901 L3CP 172.16.254.3 10b3.d56a.8fc8 50901 UP A/M/6 1d01h
nve1 10101 L2CP 172.16.254.3 6 10101 UP N/A 1d01h
nve1 10102 L2CP 172.16.254.6 5 10102 UP N/A 1d01h
Leaf-02#

```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on VTEP 2:

```

Leaf-02# show l2vpn evpn peers vxlan
Interface VNI Peer-IP Num routes eVNI UP time
-----
nve1 10101 172.16.254.3 6 10101 1d01h
nve1 10102 172.16.254.6 5 10102 1d01h
Leaf-02#

```

The following example shows the output for the **show bgp ipv6 mvpn all summary** command on VTEP 2:

```

Leaf-02# show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.4, local AS number 65001
BGP table version is 63, main routing table version 63
6 network entries using 2352 bytes of memory
8 path entries using 1280 bytes of memory
4/4 BGP path/bestpath attribute entries using 1248 bytes of memory
4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
17 BGP extended community entries using 2372 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 7436 total bytes of memory
BGP activity 128/33 prefixes, 221/93 paths, scan interval 60 secs
6 networks peaked at 15:50:41 Aug 6 2020 UTC (21:30:56.871 ago)

Neighbor V AS MsgRcvd MsgSent TblVer InQ OutQ Up/Down State/PfxRcd
172.16.255.1 4 65001 1797 1698 63 0 0 1d01h 2
172.16.255.2 4 65001 1792 1701 63 0 0 1d01h 2
Leaf-02#

```

The following example shows the output for the **show ip pim vrf vrf-name group-map** command on VTEP 2:

```
Leaf-02# show ip pim vrf green group-map ff06:1::1
IP PIM Group Mapping Table
(* indicates group mappings being used)

FF06:1::/8*
  SM, RP: FC00:2:255::255
  RPF: V1901,::FFFF:172.16.254.6
  Info source: Static
  Uptime: 1d01h, Groups: 1
Leaf-02#
```

The following example shows the output for the **show ip routing vrf** command on VTEP 2:

```
Leaf-02# show ip routing vrf green FC00:2:255::255
Routing entry for FC00:2:255::255/128
  Known via "bgp 65001", distance 200, metric 2, type internal
  Route count is 1/1, share count 0
  Routing paths:
    172.16.254.6%default, Vlan901%default
    From AC10:FF01::
      opaque_ptr 0x7F65BA333AD0
    Last updated 1d01h ago
Leaf-02#
```

The following example shows the output for the **show ipv6 mld vrf vrf-name groups** command on VTEP 2:

```
Leaf-02# show ipv6 mld vrf green groups
MLD Connected Group Membership
Group Address                               Interface
  Uptime    Expires
FF06:1::1                                Vlan102
  1d00h     00:02:25
Leaf-02#
```

The following example shows the output for the **show ipv6 mroute vrf vrf-name** command on VTEP 2:

```
Leaf-02# show ipv6 mroute vrf green
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, I - Received Source Specific Host Report,
       P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
       J - Join SPT, Y - Joined MDT-data group,
       y - Sending to MDT-data group
       g - BGP signal originated, G - BGP Signal received,
       n - BGP Shared-Tree Prune received, N - BGP C-Mroute suppressed,
       q - BGP Src-Active originated, Q - BGP Src-Active received
       E - Extranet
Timers: Uptime/Expires
Interface state: Interface, State

(*, FF06:1::1), 1d00h/never, RP FC00:2:255::255, flags: SCJg
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.6
  Immediate Outgoing interface list:
    Vlan102, Forward, 1d00h/never

(FC00:1:102::12, FF06:1::1), 00:05:45/00:01:27, flags: SFJTGq
  Incoming interface: Vlan102
  RPF nbr: FE80::46D3:CAFF:FE28:6CC5
```



```

Immediate Outgoing interface list:
  Vlan901, Forward, 00:05:45/never

(FC00:2:255::1, FF06:1::1), 00:05:04/00:02:07, flags: SJTgQ
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.6
  Inherited Outgoing interface list:
    Vlan102, Forward, 1d00h/never
Leaf-02#

```

The following example shows the output for the **show ipv6 mfib vrf vrf-name** command on VTEP 2:

```

Leaf-02# show ipv6 mfib vrf green
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             ET - Data Rate Exceeds Threshold, K - Keepalive
             DDE - Data Driven Event, HW - Hardware Installed
             ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
             MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
             MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
             e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
               NS - Negate Signalling, SP - Signal Present,
               A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
               MA - MFIB Accept, A2 - Accept backup,
               RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
VRF green
(*,FF00::/8) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF00::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF02::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 9/9/0
(*,FF06:1::1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 3/0/126/0, Other: 0/0/0
Vlan901, VXLAN Decap Flags: A NS
Vlan102 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(FC00:1:102::12,FF06:1::1) Flags: HW
  SW Forwarding: 3/0/100/0, Other: 2/2/0
  HW Forwarding: 168/0/118/0, Other: 0/0/0
Vlan102 Flags: A F
  Pkts: 0/0/0   Rate: 0 pps
Vlan901, VXLAN v4 Encap (50901, 239.1.1.1) Flags: F
  Pkts: 0/0/2   Rate: 0 pps
(FC00:2:255::1,FF06:1::1) Flags: HW
  SW Forwarding: 1/0/100/0, Other: 0/0/0
  HW Forwarding: 148/0/126/0, Other: 0/0/0
Vlan901, VXLAN Decap Flags: A
Vlan102 Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(*,FF10::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF12::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0

```

```

(*,FF20::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF22::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF30::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF32::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF33::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF34::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF35::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF36::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF37::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF38::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF39::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3A::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3B::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3C::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3D::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3E::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3F::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF40::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF42::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF50::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF52::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF60::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF62::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0

```

```

(*,FF70::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF72::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF80::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF82::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF90::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF92::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFA0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFA2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFB0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFB2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFC0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFC2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFD0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFD2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFE0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFE2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFF0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFF2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
Leaf-02#

```

The following example shows the output for the **show bgp ipv6 mvpn all** command on VTEP 2:

```

Leaf-02# show bgp ipv6 mvpn all
BGP table version is 63, local router ID is 172.16.255.4
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
*>  [5] [1:1] [FC00:1:102::12] [FF06:1::1]/42
      ::
* i  [5] [1:1] [FC00:2:255::1] [FF06:1::1]/42

```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

```

          172.16.255.6          0    100    0 ?
*>i          172.16.255.6          0    100    0 ?
*>  [6][1:1][65001][FC00:2:255::255][FF06:1::1]/46
      ::                          32768 ?
*>i  [7][1:1][65001][FC00:1:102::12][FF06:1::1]/46
          172.16.255.3          0    100    0 ?
*>  [7][1:1][65001][FC00:2:255::1][FF06:1::1]/46
      ::                          32768 ?
Route Distinguisher: 172.16.254.4:102
* i  [7][172.16.254.4:102][65001][FC00:1:102::12][FF06:1::1]/46
          172.16.255.3          0    100    0 ?
*>i          172.16.255.3          0    100    0 ?
Leaf-02#

```

The following example shows the output for the **show ip mroute** command on VTEP 2:

```

Leaf-02# show ip mroute
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,
       e - encaps-helper tunnel flag
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 239.1.1.1), 1d01h/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, 1d01h/00:01:32

(172.16.254.4, 239.1.1.1), 00:05:43/00:01:46, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 00:05:43/00:02:43

(172.16.254.6, 239.1.1.1), 00:05:45/00:01:06, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 00:05:45/00:00:14

(*, 224.0.1.40), 1d01h/00:02:31, RP 172.16.255.255, flags: SJCL
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Loopback0, Forward/Sparse, 1d01h/00:02:31

(*, 225.0.0.102), 1d01h/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, 1d01h/00:01:32

(172.16.254.6, 225.0.0.102), 1d01h/00:00:55, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2

```

```

Outgoing interface list:
  Tunnel0, Forward/Sparse, 1d01h/00:01:32

(172.16.254.4, 225.0.0.102), 1d01h/00:01:49, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 1d01h/00:03:26

(*, 225.0.0.101), 1d01h/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d01h/00:01:32

(172.16.254.3, 225.0.0.101), 1d01h/00:01:46, flags: JTx
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d01h/00:01:32
Leaf-02#

```

The following example shows the output for the **show ip mfib** command on VTEP 2:

```

Leaf-02# show ip mfib
Entry Flags:   C - Directly Connected, S - Signal, IA - Inherit A flag,
               ET - Data Rate Exceeds Threshold, K - Keepalive
               DDE - Data Driven Event, HW - Hardware Installed
               ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
               MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
               MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
               e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,
                A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                MA - MFIB Accept, A2 - Accept backup,
                RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A NS
Loopback0 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 2/0/170/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 1/0/150/0, Other: 0/0/0
  HW Forwarding: 7870/0/176/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/1   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0

```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

```

HW Forwarding: 1/0/224/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A NS
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 2/0/163/0, Other: 3/1/2
  HW Forwarding: 5353/0/164/0, Other: 0/0/0
  Null0 Flags: A
  GigabitEthernet1/0/2 Flags: F NS
    Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/206/0, Other: 0/0/0
  HW Forwarding: 2165/0/163/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/1   Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 5/0/168/0, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
  SW Forwarding: 1/0/150/0, Other: 1495/1491/4
  HW Forwarding: 742/0/156/0, Other: 0/0/0
  Null0 Flags: A NS
  GigabitEthernet1/0/2 Flags: F
    Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
  SW Forwarding: 1/0/150/0, Other: 0/0/0
  HW Forwarding: 1460/1/168/1, Other: 0/0/0
  GigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/1   Rate: 0 pps
Leaf-02#

```

Return to [Verifying TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric](#), on page 175

### Outputs to Verify the Configuration on Border VTEP

The following example shows the output for the **show nve peers** command on Border VTEP:

```

Border# show nve peers
Interface VNI      Type Peer-IP          RMAC/Num_RTs  eVNI      state flags UP time
nve1     50901    L3CP 172.16.254.3    10b3.d56a.8fc8 50901      UP  A/-/4 1d01h
nve1     50901    L3CP 172.16.254.4    7c21.0dbd.9548 50901      UP  A/-/4 1d01h
nve1     50901    L3CP 172.16.254.3    10b3.d56a.8fc8 50901      UP  A/M/6 1d01h
nve1     50901    L3CP 172.16.254.4    7c21.0dbd.9548 50901      UP  A/M/6 1d01h
nve1     10101    L2CP 172.16.254.3      6              10101      UP  N/A   1d01h
nve1     10102    L2CP 172.16.254.4      7              10102      UP  N/A   1d00h
Border#

```

The following example shows the output for the **show l2vpn evpn peers vxlan** command on Border VTEP:

```

Border# show l2vpn evpn peers vxlan
Interface VNI      Peer-IP          Num routes eVNI      UP time

```

```

-----
nve1      10101    172.16.254.3          6           10101    1d01h
nve1      10102    172.16.254.4          7           10102    1d00h
Border#

```

The following example shows the output for the **show bgp ipv6 mvpn all summary** command on Border VTEP:

```

Border# show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.6, local AS number 65001
BGP table version is 62, main routing table version 62
5 network entries using 1960 bytes of memory
8 path entries using 1280 bytes of memory
4/4 BGP path/bestpath attribute entries using 1248 bytes of memory
4 BGP rrinfo entries using 160 bytes of memory
1 BGP community entries using 24 bytes of memory
19 BGP extended community entries using 2682 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 7354 total bytes of memory
BGP activity 122/28 prefixes, 244/122 paths, scan interval 60 secs
5 networks peaked at 15:42:39 Aug 6 2020 UTC (21:35:36.535 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.1  4      65001  1810   1710    62    0    0  1d01h    3
172.16.255.2  4      65001  1810   1704    62    0    0  1d01h    3
Border#

```

The following example shows the output for the **show ip pim vrf vrf-name group-map** command on Border VTEP:

```

Border# show ip pim vrf green group-map ff06:1::1
IP PIM Group Mapping Table
(* indicates group mappings being used)

FF00::/8*
  SM, RP: FC00:2:255::255
  RPF: V12001, FE80::A2B4:39FF:FE21:9183
  Info source: Static
  Uptime: 1d01h, Groups: 1
Border#

```

The following example shows the output for the **show ip routing vrf vrf-name** command on Border VTEP:

```

Border# show ip routing vrf green FC00:2:255::255
Routing entry for FC00:2:255::255/128
  Known via "ospf 1", distance 110, metric 2, type intra area
  Redistributing via bgp 65001
  Route count is 1/1, share count 0
  Routing paths:
    FE80::A2B4:39FF:FE21:9183, Vlan2001
      From FE80::A2B4:39FF:FE21:9183
      Last updated 1d01h ago
Border#

```

The following example shows the output for the **show ipv6 mld vrf vrf-name groups** command on Border VTEP:

```
Border# show ipv6 mld vrf green groups
MLD Connected Group Membership
Group Address                               Interface
  Uptime    Expires
FF06:1::1                                Vlan102
  1d00h     00:04:02
Border#
```

The following example shows the output for the **show ipv6 mroute vrf vrf-name** command on Border VTEP:

```
Border# show ipv6 mroute vrf green
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, I - Received Source Specific Host Report,
       P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
       J - Join SPT, Y - Joined MDT-data group,
       y - Sending to MDT-data group
       g - BGP signal originated, G - BGP Signal received,
       N - BGP Shared-Tree Prune received, n - BGP C-Mroute suppressed,
       q - BGP Src-Active originated, Q - BGP Src-Active received
       E - Extranet
Timers: Uptime/Expires
Interface state: Interface, State

(*, FF06:1::1), 1d00h/never, RP FC00:2:255::255, flags: SCG
  Incoming interface: Vlan2001
  RPF nbr: FE80::A2B4:39FF:FE21:9183
  Immediate Outgoing interface list:
    Vlan102, Null, 1d00h/never
    Vlan901, Forward, 1d00h/never

(FC00:1:102::12, FF06:1::1), 00:10:24/now, flags: STG
  Incoming interface: Vlan901
  RPF nbr: ::FFFF:172.16.254.4
  Immediate Outgoing interface list:
    Vlan2001, Forward, 00:10:24/00:03:05
  Inherited Outgoing interface list:
    Vlan102, Null, 1d00h/never

(FC00:2:255::1, FF06:1::1), 00:09:43/never, flags: STGq
  Incoming interface: Vlan2001
  RPF nbr: FE80::A2B4:39FF:FE21:9183
  Immediate Outgoing interface list:
    Vlan901, Forward, 00:09:43/never
  Inherited Outgoing interface list:
    Vlan102, Null, 1d00h/never
Border#
```

The following example shows the output for the **show ipv6 mfib vrf vrf-name** command on Border VTEP:

```
Border# show ipv6 mfib vrf green
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             ET - Data Rate Exceeds Threshold, K - Keepalive
             DDE - Data Driven Event, HW - Hardware Installed
             ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
             MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
             MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
             e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
               NS - Negate Signalling, SP - Signal Present,
```



A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,  
 MA - MFIB Accept, A2 - Accept backup,  
 RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second  
 Other counts: Total/RPF failed/Other drops  
 I/O Item Counts: HW Pkt Count/FS Pkt Count/PS Pkt Count Egress Rate in pps  
 VRF green

```
(*,FF00::/8) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF00::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF02::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 9/9/0
(*,FF06:1::1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 3/3/0
  HW Forwarding: 7/0/122/0, Other: 0/0/0
Vlan2001 Flags: A
Vlan901, VXLAN v4 Encap (50901, 239.1.1.1) Flags: F
  Pkts: 0/0/0 Rate: 0 pps
(FC00:1:102::12,FF06:1::1) Flags: HW
  SW Forwarding: 2/0/100/0, Other: 1/0/1
  HW Forwarding: 311/0/125/0, Other: 0/0/0
Vlan901, VXLAN Decap Flags: A
Vlan2001 Flags: F NS
  Pkts: 0/0/2 Rate: 0 pps
(FC00:2:255::1,FF06:1::1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 291/0/122/0, Other: 0/0/0
Vlan2001 Flags: A
Vlan901, VXLAN v4 Encap (50901, 239.1.1.1) Flags: F
  Pkts: 0/0/0 Rate: 0 pps
(*,FF10::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF12::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF20::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF22::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF30::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF32::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF33::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF34::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF35::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF36::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF37::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
```

```

(*,FF38::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF39::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3A::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3B::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3C::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3D::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3E::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF3F::/32) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF40::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF42::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF50::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF52::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF60::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF62::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF70::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF72::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF80::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF82::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF90::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FF92::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFA0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFA2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFB0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFB2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0

```

```

(*,FFC0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFC2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFD0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFD2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFE0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFE2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFF0::/15) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,FFF2::/16) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
Border#

```

The following example shows the output for the **show bgp ipv6 mvpn all** command on Border VTEP:

```

Border# show bgp ipv4 mvpn all
BGP table version is 62, local router ID is 172.16.255.6
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
Route Distinguisher: 1:1 (default for vrf green)
*>i  [5][1:1][FC00:1:102::12][FF06:1::1]/42
      172.16.255.4          0    100    0 ?
* i   [5][1:1][FC00:2:255::1][FF06:1::1]/42
      172.16.255.4          0    100    0 ?
*>   [5][1:1][FC00:2:255::1][FF06:1::1]/42
      ::                    32768 ?
* i   [6][1:1][65001][FC00:2:255::255][FF06:1::1]/46
      172.16.255.3          0    100    0 ?
*>i   [6][1:1][65001][FC00:2:255::1][FF06:1::1]/46
      172.16.255.3          0    100    0 ?
* i   [7][1:1][65001][FC00:2:255::1][FF06:1::1]/46
      172.16.255.3          0    100    0 ?
*>i   [7][1:1][65001][FC00:2:255::1][FF06:1::1]/46
      172.16.255.3          0    100    0 ?
Route Distinguisher: 172.16.254.4:102
*>   [7][172.16.254.4:102][65001][FC00:1:102::12][FF06:1::1]/46
      ::                    32768 ?
Border#

```

The following example shows the output for the **show ip mroute** command on Border VTEP:

```

Border# show ip mroute
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,

```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

```

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

(*, 239.1.1.1), 1d01h/stopped, RP 172.16.255.255, flags: SJCFx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d01h/00:02:41

(172.16.254.4, 239.1.1.1), 00:10:23/00:02:45, flags: JTx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 00:10:23/00:01:36

(172.16.254.6, 239.1.1.1), 00:10:25/00:03:25, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    TenGigabitEthernet1/0/2, Forward/Sparse, 00:10:25/00:02:56

(*, 224.0.1.40), 1d01h/00:02:45, RP 172.16.255.255, flags: SJCL
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Loopback0, Forward/Sparse, 1d01h/00:02:45

(*, 225.0.0.102), 1d01h/stopped, RP 172.16.255.255, flags: SJCFx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d01h/00:02:41

(172.16.254.4, 225.0.0.102), 1d01h/00:02:35, flags: JTx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d01h/00:02:41

(172.16.254.6, 225.0.0.102), 1d01h/00:03:27, flags: FTx
  Incoming interface: Loopback1, RPF nbr 0.0.0.0
  Outgoing interface list:
    TenGigabitEthernet1/0/2, Forward/Sparse, 1d01h/00:02:49, A

(*, 225.0.0.101), 1d01h/stopped, RP 172.16.255.255, flags: SJCx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d01h/00:02:41

(172.16.254.3, 225.0.0.101), 1d01h/00:01:12, flags: JTx
  Incoming interface: TenGigabitEthernet1/0/2, RPF nbr 172.16.26.2
  Outgoing interface list:
    Tunnel0, Forward/Sparse, 1d01h/00:02:53
Border#

```

The following example shows the output for the **show ip mfib** command on Border VTEP:

```

Border# show ip mfib
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             ET - Data Rate Exceeds Threshold, K - Keepalive

```

```

DDE - Data Driven Event, HW - Hardware Installed
ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
NS - Negate Signalling, SP - Signal Present,
A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
MA - MFIB Accept, A2 - Accept backup,
RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Loopback0 Flags: F IC NS
    Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 8/0/146/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 7/0/125/0, Other: 0/0/0
  HW Forwarding: 8010/0/176/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/7   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 1/0/172/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 1/0/154/0, Other: 0/0/0
  HW Forwarding: 5353/0/176/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/1   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 11/0/167/0, Other: 7/6/1
  HW Forwarding: 2207/0/151/0, Other: 0/0/0
  Null0 Flags: A
  TenGigabitEthernet1/0/2 Flags: F
    Pkts: 0/0/10  Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 8/0/168/0, Other: 0/0/0
  TenGigabitEthernet1/0/2 Flags: A NS
  Tunnel0, VXLAN Decap Flags: F NS
    Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW

```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

```

SW Forwarding: 4/0/150/0, Other: 0/0/0
HW Forwarding: 2032/1/168/1, Other: 0/0/0
TenGigabitEthernet1/0/2 Flags: A
Tunnel0, VXLAN Decap Flags: F NS
  Pkts: 0/0/4   Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
SW Forwarding: 2/0/150/0, Other: 4/4/0
HW Forwarding: 2015/1/156/1, Other: 0/0/0
Null0 Flags: A
TenGigabitEthernet1/0/2 Flags: F
  Pkts: 0/0/1   Rate: 0 pps
Border#

```

Return to [Verifying TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric](#), on page 175

### Outputs to Verify the Configuration on Spine Switch 1

The following example shows the output for the **show bgp ipv6 mvpn all summary** command on Spine Switch 1:

```

Spine-01# show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.1, local AS number 65001
BGP table version is 61, main routing table version 61
5 network entries using 1960 bytes of memory
13 path entries using 2080 bytes of memory
3/3 BGP path/bestpath attribute entries using 912 bytes of memory
3 BGP rrinfo entries using 120 bytes of memory
1 BGP community entries using 24 bytes of memory
16 BGP extended community entries using 2332 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 7428 total bytes of memory
BGP activity 257/209 prefixes, 3003/2900 paths, scan interval 60 secs
5 networks peaked at 15:48:28 Aug 6 2020 UTC (21:38:24.468 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.3  4      65001  1700   1808     61   0    0 1d01h    3
172.16.255.4  4      65001  1706   1805     61   0    0 1d01h    3
172.16.255.6  4      65001  1713   1813     61   0    0 1d01h    2
Spine-01#

```

The following example shows the output for the **show bgp ipv6 mvpn all** command on Spine Switch 1:

```

Spine-01# show bgp ipv6 mvpn all
BGP table version is 61, local router ID is 172.16.255.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop           Metric LocPrf Weight Path
Route Distinguisher: 1:1
* i   [5] [1:1] [FC00:1:102::12] [FF06:1::1] /42
      172.16.255.4           0    100     0 ?
*>i   172.16.255.4           0    100     0 ?
* i   [5] [1:1] [FC00:2:255::1] [FF06:1::1] /42

```

```

172.16.255.6          0 100 0 ?
*>i 172.16.255.6          0 100 0 ?
*>i [6][1:1][65001][FC00:2:255::255][FF06:1::1]/46
172.16.255.3          0 100 0 ?
* i 172.16.255.3          0 100 0 ?
* i 172.16.255.4          0 100 0 ?
* i [7][1:1][65001][FC00:2:255::1][FF06:1::1]/46
172.16.255.4          0 100 0 ?
* i 172.16.255.3          0 100 0 ?
*>i 172.16.255.3          0 100 0 ?
Route Distinguisher: 172.16.254.4:102
*>i [7][172.16.254.4:102][65001][FC00:1:102::12][FF06:1::1]/46
172.16.255.3          0 100 0 ?
* i 172.16.255.3          0 100 0 ?
* i 172.16.255.6          0 100 0 ?
Spine-01#

```

The following example shows the output for the **show ip pim rp mapping** command on Spine Switch 1:

```

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 (?)
Spine-01#

```

The following example shows the output for the **show ip mroute** command on Spine Switch 1:

```

Spine-01# show ip mroute
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

(*, 239.1.1.1), 00:13:12/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, 239.1.1.1), 00:11:10/00:01:49, flags: PA
Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.14.4
Outgoing interface list: Null

(172.16.254.6, 239.1.1.1), 00:13:12/00:02:08, flags: PA
Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.16.6
Outgoing interface list: Null

(*, 224.0.1.40), 1w0d/00:02:04, RP 172.16.255.255, flags: SJCL
Incoming interface: Null, RPF nbr 0.0.0.0

```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

```

Outgoing interface list:
  Loopback2, Forward/Sparse, 1w0d/00:02:04

(*, 225.0.0.102), 1w0d/stopped, RP 172.16.255.255, flags: SP
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list: Null

(172.16.254.6, 225.0.0.102), 00:19:31/00:02:22, flags: PA
  Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.16.6
  Outgoing interface list: Null

(172.16.254.4, 225.0.0.102), 1d01h/00:01:52, flags: PA
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.14.4
  Outgoing interface list: Null
Spine-01#

```

The following example shows the output for the **show ip mfib** command on Spine Switch 1:

```

Spine-01# show ip mfib
Entry Flags:      C - Directly Connected, S - Signal, IA - Inherit A flag,
                  ET - Data Rate Exceeds Threshold, K - Keepalive
                  DDE - Data Driven Event, HW - Hardware Installed
                  ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
                  MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
                  MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client.
I/O Item Flags:  IC - Internal Copy, NP - Not platform switched,
                  NS - Negate Signalling, SP - Signal Present,
                  A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                  MA - MFIB Accept, A2 - Accept backup,
                  RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:   HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 82/82/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
  Loopback2 Flags: F IC NS
    Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 1/0/206/0, Other: 279/0/279
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
  GigabitEthernet1/0/2 Flags: NS
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
  Tunnell Flags: A
  GigabitEthernet1/0/4 Flags: NS
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW

```



```

SW Forwarding: 0/0/0/0, Other: 1/0/1
HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
(172.16.254.4,239.1.1.1) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 1224/0/168/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
(172.16.254.6,239.1.1.1) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
GigabitEthernet1/0/4 Flags: A NS
Spine-01#

```

Return to [Verifying TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric](#), on page 175

## Outputs to Verify the Configuration on Spine Switch 2

The following example shows the output for the **show bgp ipv6 mvpn all summary** command on Spine Switch 2:

```

Spine-02# show bgp ipv6 mvpn all summary
BGP router identifier 172.16.255.2, local AS number 65001
BGP table version is 61, main routing table version 61
5 network entries using 1960 bytes of memory
13 path entries using 2080 bytes of memory
3/3 BGP path/bestpath attribute entries using 912 bytes of memory
3 BGP rinfo entries using 120 bytes of memory
1 BGP community entries using 24 bytes of memory
16 BGP extended community entries using 2332 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 7428 total bytes of memory
BGP activity 288/240 prefixes, 3108/3005 paths, scan interval 60 secs
5 networks peaked at 15:49:16 Aug 6 2020 UTC (21:40:40.843 ago)

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ  OutQ  Up/Down  State/PfxRcd
172.16.255.3  4      65001  1700    1810    61     0     0 1d01h    3
172.16.255.4  4      65001  1711    1803    61     0     0 1d01h    3
172.16.255.5  4      65001    0        0       1     0     0 08:41:01 Idle
172.16.255.6  4      65001  1710    1815    61     0     0 1d01h    2
172.16.255.7  4      65001    0        0       1     0     0 08:40:29 Idle
Spine-02#

```

The following example shows the output for the **show bgp ipv6 mvpn all** command on Spine Switch 2:

```

Spine-02# show bgp ipv6 mvpn all
BGP table version is 61, local router ID is 172.16.255.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path, L long-lived-stale,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

Network      Next Hop      Metric LocPrf Weight Path
Route Distinguisher: 1:1
* i  [5] [1:1] [FC00:1:102::12] [FF06:1::1] /42
      172.16.255.4      0      100      0 ?

```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

```

*>i          172.16.255.4          0 100 0 ?
* i [5][1:1][FC00:2:255::1][FF06:1::1]/42
          172.16.255.6          0 100 0 ?
*>i          172.16.255.6          0 100 0 ?
*>i [6][1:1][65001][FC00:2:255::255][FF06:1::1]/46
          172.16.255.3          0 100 0 ?
* i          172.16.255.3          0 100 0 ?
* i          172.16.255.4          0 100 0 ?
* i [7][1:1][65001][FC00:2:255::1][FF06:1::1]/46
          172.16.255.4          0 100 0 ?
* i          172.16.255.3          0 100 0 ?
*>i          172.16.255.3          0 100 0 ?
Route Distinguisher: 172.16.254.4:102
*>i [7][172.16.254.4:102][65001][FC00:1:102::12][FF06:1::1]/46
          172.16.255.3          0 100 0 ?
* i          172.16.255.3          0 100 0 ?
* i          172.16.255.6          0 100 0 ?
Spine-02#

```

The following example shows the output for the **show ip pim rp mapping** command on Spine Switch 2:

```

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 (?)
Spine-02#

```

The following example shows the output for the **show ip mroute** command on Spine Switch 2:

```

Spine-02# show ip mroute
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

(*, 239.1.1.1), 3d08h/00:03:24, RP 172.16.255.255, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0/2, Forward/Sparse, 1d01h/00:03:24
    GigabitEthernet1/0/1, Forward/Sparse, 1d01h/00:03:06
    GigabitEthernet1/0/4, Forward/Sparse, 1d01h/00:03:02

(172.16.254.4, 239.1.1.1), 00:15:27/00:02:45, flags: T
  Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.4
  Outgoing interface list:
    GigabitEthernet1/0/4, Forward/Sparse, 00:15:27/00:03:02

```

```

GigabitEthernet1/0/1, Forward/Sparse, 00:15:27/00:03:06
(172.16.254.6, 239.1.1.1), 00:15:29/00:02:38, flags: MT
Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.26.6
Outgoing interface list:
  GigabitEthernet1/0/1, Forward/Sparse, 00:15:29/00:03:06
  GigabitEthernet1/0/2, Forward/Sparse, 00:15:29/00:03:24
(*, 224.0.1.40), 1w0d/00:03:27, RP 172.16.255.255, flags: SJCL
Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list:
  GigabitEthernet1/0/2, Forward/Sparse, 1d01h/00:02:31
  GigabitEthernet1/0/1, Forward/Sparse, 1d01h/00:03:27
  GigabitEthernet1/0/4, Forward/Sparse, 1d01h/00:03:08
  Loopback2, Forward/Sparse, 1w0d/00:02:17
(*, 225.0.0.102), 1w0d/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, 1d01h/00:03:02
  GigabitEthernet1/0/1, Forward/Sparse, 1d01h/00:02:50
  GigabitEthernet1/0/4, Forward/Sparse, 1d01h/00:03:21
(172.16.254.4, 225.0.0.102), 1d01h/00:01:55, flags: MT
Incoming interface: GigabitEthernet1/0/2, RPF nbr 172.16.24.4
Outgoing interface list:
  GigabitEthernet1/0/4, Forward/Sparse, 1d01h/00:03:21
  GigabitEthernet1/0/1, Forward/Sparse, 1d01h/00:03:02
(172.16.254.6, 225.0.0.102), 1d01h/00:02:03, flags: MT
Incoming interface: GigabitEthernet1/0/4, RPF nbr 172.16.26.6
Outgoing interface list:
  GigabitEthernet1/0/2, Forward/Sparse, 1d01h/00:03:02
  GigabitEthernet1/0/1, Forward/Sparse, 1d01h/00:03:13
(*, 225.0.0.101), 3d08h/00:03:29, RP 172.16.255.255, flags: S
Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list:
  GigabitEthernet1/0/2, Forward/Sparse, 1d01h/00:03:05
  GigabitEthernet1/0/1, Forward/Sparse, 1d01h/00:03:07
  GigabitEthernet1/0/4, Forward/Sparse, 1d01h/00:03:29
(172.16.254.3, 225.0.0.101), 1d01h/00:02:39, flags: TA
Incoming interface: GigabitEthernet1/0/1, RPF nbr 172.16.23.3
Outgoing interface list:
  GigabitEthernet1/0/2, Forward/Sparse, 1d01h/00:03:05
  GigabitEthernet1/0/4, Forward/Sparse, 1d01h/00:03:29
Spine-02#

```

The following example shows the output for the **show ip mfib** command on Spine Switch 2:

```

Spine-02# show ip mfib
Entry Flags:   C - Directly Connected, S - Signal, IA - Inherit A flag,
               ET - Data Rate Exceeds Threshold, K - Keepalive
               DDE - Data Driven Event, HW - Hardware Installed
               ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
               MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
               MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                NS - Negate Signalling, SP - Signal Present,
                A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                MA - MFIB Accept, A2 - Accept backup,

```

## Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric

RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

```

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:      Total/RPF failed/Other drops
I/O Item Counts:  HW Pkt Count/FS Pkt Count/PS Pkt Count   Egress Rate in pps
Default
(*,224.0.0.0/4) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: C HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
Loopback2 Flags: F IC NS
  Pkts: 0/0/0   Rate: 0 pps
(*,225.0.0.101) Flags: C HW
  SW Forwarding: 9/0/112/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/2   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/2   Rate: 0 pps
(172.16.254.3,225.0.0.101) Flags: HW
  SW Forwarding: 4/0/132/0, Other: 0/0/0
  HW Forwarding: 8067/0/176/0, Other: 0/0/0
GigabitEthernet1/0/1 Flags: A
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/4   Rate: 0 pps
(*,225.0.0.102) Flags: C HW
  SW Forwarding: 27/0/101/0, Other: 0/0/0
  HW Forwarding: 0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.4,225.0.0.102) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 5404/0/176/0, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
(172.16.254.6,225.0.0.102) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 2214/0/163/0, Other: 0/0/0
GigabitEthernet1/0/4 Flags: A NS
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0   Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS

```

```

    Pkts: 0/0/0    Rate: 0 pps
(*,232.0.0.0/8) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
(*,239.1.1.1) Flags: C HW
  SW Forwarding: 9/0/150/0, Other: 0/0/0
  HW Forwarding:  0/0/0/0, Other: 0/0/0
Tunnell Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/3    Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/3    Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/3    Rate: 0 pps
(172.16.254.4,239.1.1.1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 2629/1/168/1, Other: 0/0/0
GigabitEthernet1/0/2 Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0    Rate: 0 pps
GigabitEthernet1/0/4 Flags: F NS
  Pkts: 0/0/0    Rate: 0 pps
(172.16.254.6,239.1.1.1) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 2607/1/168/1, Other: 0/0/0
GigabitEthernet1/0/4 Flags: A
GigabitEthernet1/0/1 Flags: F NS
  Pkts: 0/0/0    Rate: 0 pps
GigabitEthernet1/0/2 Flags: F NS
  Pkts: 0/0/0    Rate: 0 pps
Spine-02#

```

Return to [Verifying TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric, on page 175](#)

### Outputs to Verify the Configuration on Router 3 (RP Outside the BGP EVPN VXLAN Fabric)

The following example shows the output for the **show ip pim group-map** command on Router 3:

```

R3# show ipv6 pim group-map ff06:1::1
IP PIM Group Mapping Table
(* indicates group mappings being used)

FF00::/8*
  SM, RP: FC00:2:255::255
  RPF: Tu4,FC00:2:255::255 (us)
  Info source: Static
  Uptime: 1d04h, Groups: 1
R3#

```

The following example shows the output for the **show ipv6 mroute** command on Router 3:

```

R3# show ipv6 mroute
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, I - Received Source Specific Host Report,
       P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
       J - Join SPT, Y - Joined MDT-data group,
       y - Sending to MDT-data group
       g - BGP signal originated, G - BGP Signal received,
       N - BGP Shared-Tree Prune received, n - BGP C-Mroute suppressed,

```

**Example: Configuring TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when RP is Outside the BGP EVPN VXLAN Fabric**

```

        q - BGP Src-Active originated, Q - BGP Src-Active received
        E - Extranet
Timers: Uptime/Expires
Interface state: Interface, State

(*, FF06:1::1), 1d04h/00:03:12, RP FC00:2:255::255, flags: S
  Incoming interface: Tunnel4
  RPF nbr: FC00:2:255::255
  Immediate Outgoing interface list:
    TenGigabitEthernet0/0/1, Forward, 1d04h/00:03:12
    TenGigabitEthernet0/0/0, Forward, 1d01h/00:02:45

(FC00:1:102::12, FF06:1::1), 00:18:43/00:03:12, RP FC00:2:255::255, flags: SPR
  Incoming interface: Tunnel4
  RPF nbr: FC00:2:255::255
  Immediate Outgoing interface list:
    TenGigabitEthernet0/0/0, Null, 00:18:43/00:02:45
    TenGigabitEthernet0/0/1, Null, 00:18:43/00:03:12

(FC00:1:102::12, FF06:1::1), 00:18:45/00:03:12, flags: S
  Incoming interface: TenGigabitEthernet0/0/0
  RPF nbr: FE80::A2B4:39FF:FE21:9181
  Inherited Outgoing interface list:
    TenGigabitEthernet0/0/1, Forward, 1d04h/00:03:12

(FC00:2:255::1, FF06:1::1), 00:18:08/00:02:55, RP FC00:2:255::255, flags: SPR
  Incoming interface: Tunnel4
  RPF nbr: FC00:2:255::255
  Immediate Outgoing interface list:
    TenGigabitEthernet0/0/0, Null, 00:18:08/00:02:45
    TenGigabitEthernet0/0/1, Null, 00:18:04/00:03:12

(FC00:2:255::1, FF06:1::1), 00:18:06/00:02:55, flags: S
  Incoming interface: TenGigabitEthernet0/0/0
  RPF nbr: FE80::A2B4:39FF:FE21:9181
  Inherited Outgoing interface list:
    TenGigabitEthernet0/0/1, Forward, 1d04h/00:03:12
R3#

```

Return to [Verifying TRM with PIM-SM for IPv4 and IPv6 Multicast Traffic when the RP is Outside the BGP EVPN VXLAN Fabric](#), on page 175