



Configuring Tenant Routed Multicast

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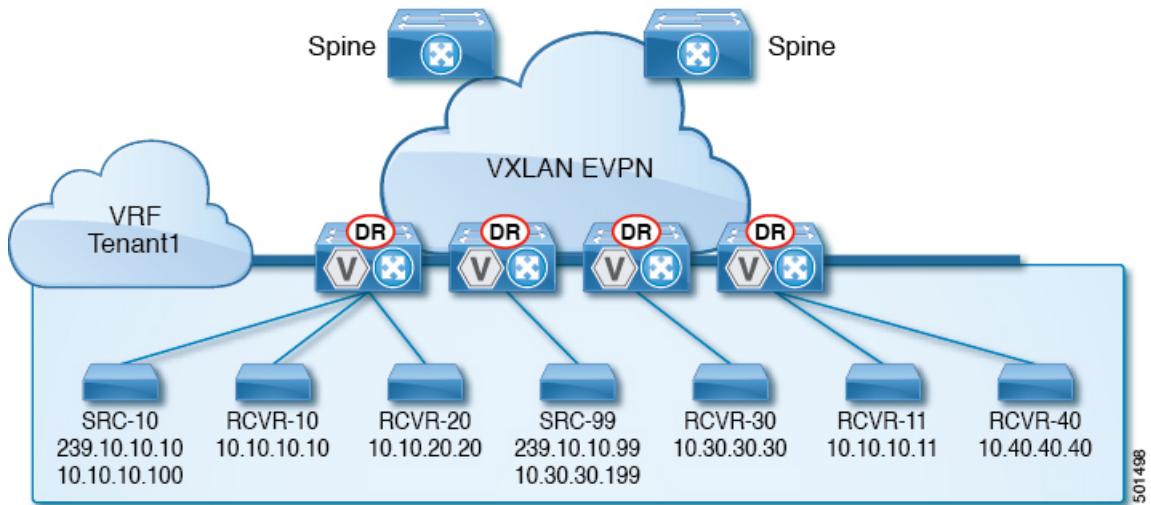
About Tenant Routed Multicast

Tenant Routed Multicast (TRM) enables multicast forwarding on the 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 subnet local or across VTEPs.

This feature brings the efficiency of multicast delivery to VXLAN overlays. It is based on the standards-based next generation control plane (ngMVPN) described in IETF RFC 6513, 6514. TRM enables the delivery of customer IP multicast traffic in a multitenant fabric, and thus in an efficient and resilient manner. The delivery of TRM improves Layer-3 overlay multicast functionality in our networks.

While BGP EVPN provides the control plane for unicast routing, ngMVPN provides scalable multicast routing functionality. It follows an “always route” approach where every edge device (VTEP) with distributed IP Anycast Gateway for unicast becomes a Designated Router (DR) for Multicast. Bridged multicast forwarding is only present on the edge-devices (VTEP) where IGMP snooping optimizes the multicast forwarding to interested receivers. Every other multicast traffic beyond local delivery is efficiently routed.

Figure 1: VXLAN EVPN TRM

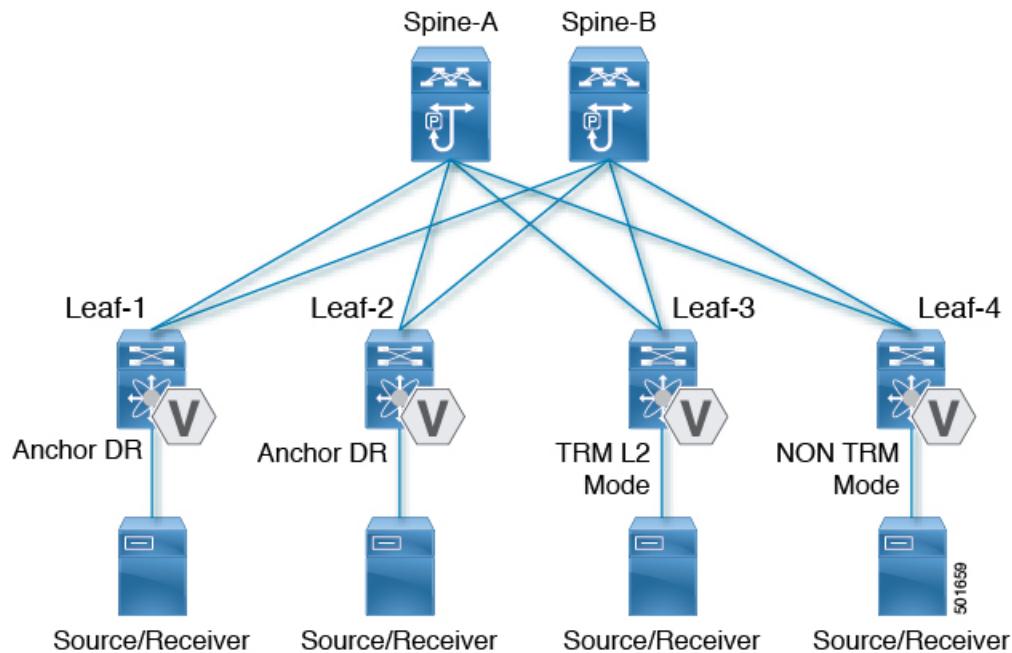


With TRM enabled, multicast forwarding in the underlay is leveraged to replicate VXLAN encapsulated routed multicast traffic. A Default Multicast Distribution Tree (Default-MDT) is built per-VRF. This is an addition to the existing multicast groups for Layer-2 VNI Broadcast, Unknown Unicast, and Layer-2 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 allows the VXLAN BGP EVPN fabric with TRM to operate as fully distributed Overlay Rendezvous-Point (RP), with the RP presence on every edge-device (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. TRM allows a seamless integration with existing multicast networks. It can leverage multicast rendezvous points external to the fabric. Furthermore, TRM allows for tenant-aware external connectivity using Layer-3 physical interfaces or subinterfaces.

About Tenant Routed Multicast Mixed Mode

Figure 2: TRM Layer 2/Layer 3 Mixed Mode



Guidelines and Limitations for Tenant Routed Multicast

Tenant Routed Multicast (TRM) has the following guidelines and limitations:

- Tenant Routed Multicast is not supported on Cisco Nexus 9500 platform switches with -R line cards.
- The [Guidelines and Limitations for VXLAN](#) also apply to TRM
- With TRM enabled, SVI as a core link is not supported.
- With TRM enabled, Multicast Source/Receiver behind FEX is not supported.
- If TRM is configured, ISSU is disruptive.
- TRM supports IPv4 multicast only.
- TRM requires an IPv4 multicast-based underlay using PIM Any Source Multicast (ASM) which is also known as sparse mode.
- TRM supports overlay PIM ASM and PIM SSM only. PIM BiDir is not supported in the overlay.
- RP has to be configured either internal or external to the fabric.
- The internal RP must be configured on all TRM-enabled VTEPs including the border nodes.
- The external RP must be external to the border nodes.

- The RP must be configured within the VRF pointing to the external RP IP address (static RP). This ensures that unicast and multicast routing is enabled to reach the external RP in the given VRF.
- TRM supports multiple border nodes. Beginning with Cisco NX-OS Release 9.2(3), reachability to an external RP via multiple border leaf switches is supported (ECMP). In prior releases, the external RP could only be reachable via a single border leaf (non-ECMP).
- Within EVPN Multi-Site, TRM enabled East-West multicast traffic is not supported. In case the same external RP is used for multiple sites, overlapping multicast groups between sites must be avoided.

Guidelines and Limitations for Layer 3 Tenant Routed Multicast

Layer 3 Tenant Routed Multicast (TRM) has the following configuration guidelines and limitations:

- Layer 3 TRM is supported for Cisco Nexus 9200, 9300-EX, and 9300-FX/FX2/FX3/FXP and 9300-GX platform switches.
- When configuring TRM VXLAN BGP EVPN, the following platforms are supported:
 - Cisco Nexus 9200, 9332C, 9364C, 9300-EX, and 9300-FX/FX2/FX3/FXP platform switches.
 - Cisco Nexus 9500 platform switches with 9700-EX line cards, 9700-FX line cards, or a combination of both line cards.
- Layer 3 TRM and VXLAN EVPN Multi-Site are supported on the same physical switch. For more information, see [Configuring Multi-Site](#).
- TRM with vPC border leafs is supported only for Cisco Nexus 9200, 9300-EX, and 9300-FX/FX2 platform switches and Cisco Nexus 9500 platform switches with -EX/FX line cards. The **advertise-pip** and **advertise virtual-rmac** commands must be enabled on the border leafs to support this functionality. For configuration information, see the "Configuring VIP/PIP" section.
- Well-known local scope multicast (224.0.0.0/24) is excluded from TRM and is bridged.
- When an interface NVE is brought down on the border leaf, the internal overlay RP per VRF must be brought down.

Guidelines and Limitations for Layer 2/Layer 3 Tenant Routed Multicast (Mixed Mode)

Layer 2/Layer 3 Tenant Routed Multicast (TRM) has the following configuration guidelines and limitations:

- All TRM Layer 2/Layer 3 configured switches must be Anchor DR. This is because in TRM Layer 2/Layer 3, you can have switches configured with TRM Layer 2 mode that co-exist in the same topology. This mode is necessary if non-TRM and Layer 2 TRM mode edge devices (VTEPs) are present in the same topology.
- Anchor DR is required to be an RP in the overlay.
- An extra loopback is required for anchor DRs.

- Non-TRM and Layer 2 TRM mode edge devices (VTEPs) require an IGMP snooping querier configured per multicast-enabled VLAN. Every non-TRM and Layer 2 TRM mode edge device (VTEP) requires this IGMP snooping querier configuration because in TRM multicast control-packets are not forwarded over VXLAN.
- The IP address for the IGMP snooping querier can be re-used on non-TRM and Layer 2 TRM mode edge devices (VTEPs).
- The IP address of the IGMP snooping querier in a VPC domain must be different on each VPC member device.
- When interface NVE is brought down on the border leaf, the internal overlay RP per VRF should be brought down.
- The NVE interface must be shut and unshut while configuring the **ip multicast overlay-distributed-dr** command.
- Beginning with Cisco NX-OS Release 9.2(1), TRM with vPC border leafs is supported. Advertise-PIP and Advertise Virtual-Rmac need to be enabled on border leafs to support with functionality. For configuring advertise-pip and advertise virtual-rmac, see the "Configuring VIP/PIP" section.
- Anchor DR is supported only on the following hardware platforms:
 - Cisco Nexus 9200, 9300-EX, and 9300-FX/FX2 platform switches
 - Cisco Nexus 9500 platform switches with 9700-EX line cards, 9700-FX line cards, or a combination of both line cards

Rendezvous Point for Tenant Routed Multicast

With TRM enabled Internal and External RP is supported. The following table displays the first release in which RP positioning is or is not supported.

	RP Internal	RP External	PIM-Based RP Everywhere
TRM L2 Mode	N/A	N/A	N/A
TRM L3 Mode	7.0(3)I7(1), 9.2(x)	7.0(3)I7(4), 9.2(3)	Supported in 7.0(3)I7(x) releases starting from 7.0(3)I7(5) Not supported in 9.2(x)
TRM L2L3 Mode	7.0(3)I7(1), 9.2(x)	N/A	N/A

Configuring a Rendezvous Point for Tenant Routed Multicast

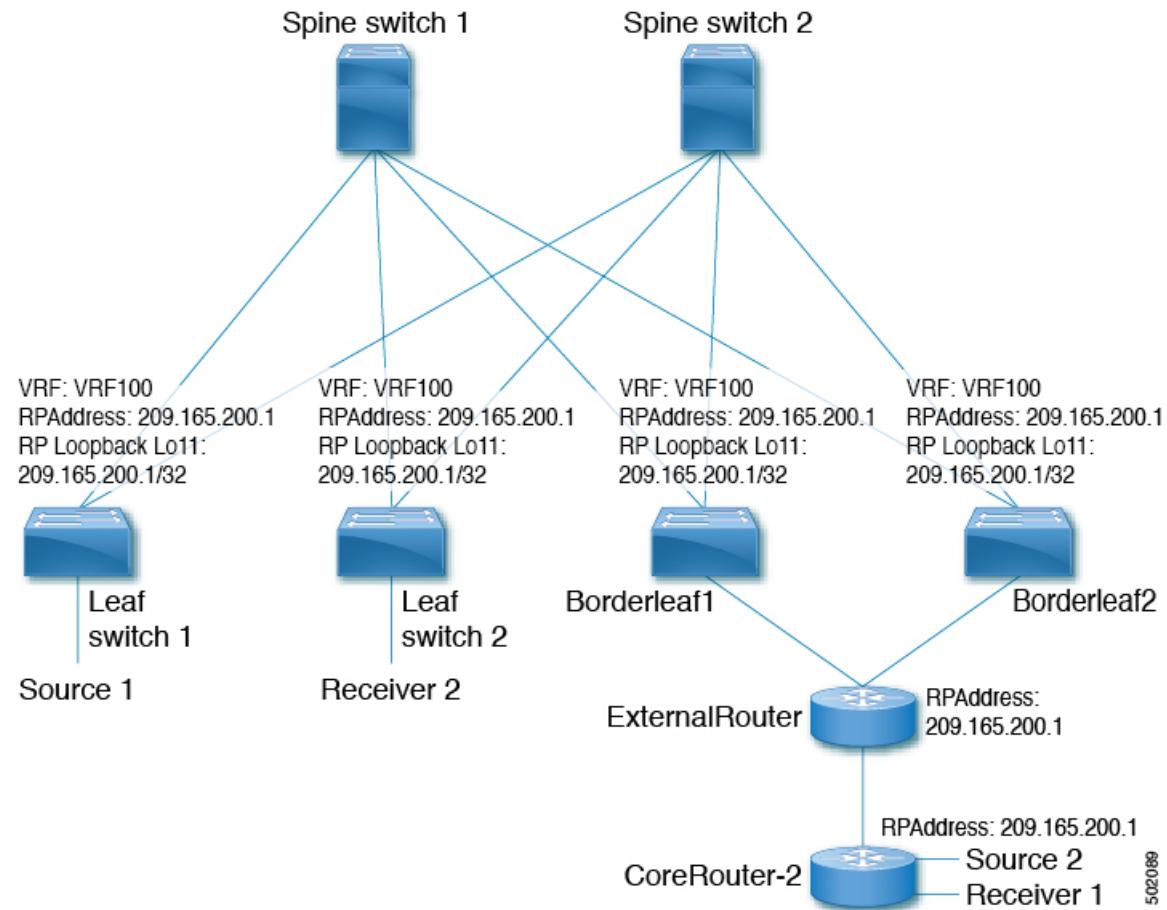
For Tenant Routed Multicast, the following rendezvous point options are supported:

- [Configuring a Rendezvous Point Inside the VXLAN Fabric, on page 6](#)

- Configuring an External Rendezvous Point, on page 7

Configuring a Rendezvous Point Inside the VXLAN Fabric

Configure the loopback for the TRM VRFs with the following commands on all devices (VTEP). Ensure it is reachable within EVPN (advertise/redistribute).



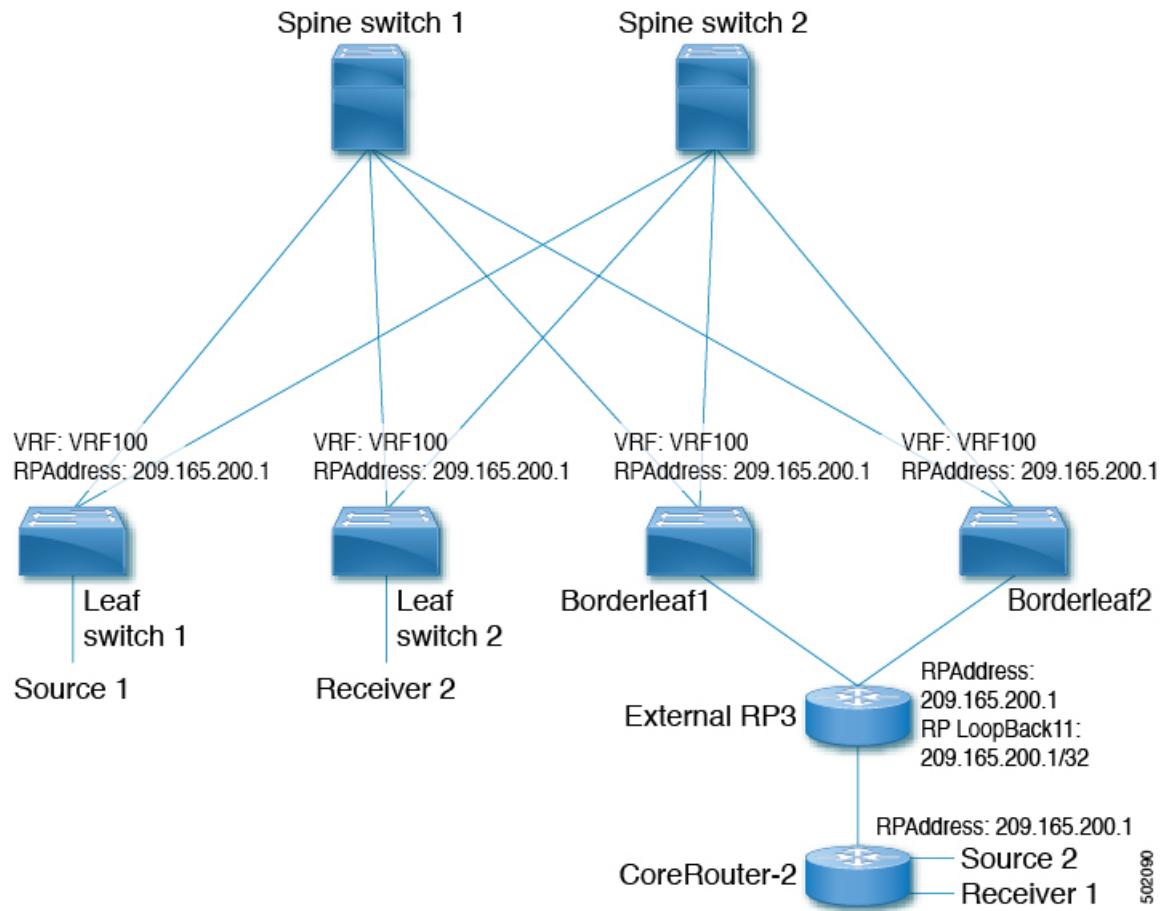
Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal	Enters global configuration mode.
Step 2	interface loopback <i>loopback_number</i> Example: switch(config)# interface loopback 11	Configure the loopback interface on all TRM-enabled nodes. This enables the rendezvous point inside the fabric.

	Command or Action	Purpose
Step 3	vrf member vxlan-number Example: switch(config-if)# vrf member vrf100	Configure VRF name.
Step 4	ip address ip-address Example: switch(config-if)# ip address 209.165.200.1/32	Specify IP address.
Step 5	ip pim sparse-mode Example: switch(config-if)# ip pim sparse-mode	Configure sparse-mode PIM on an interface.
Step 6	vrf context vrf-name Example: switch(config-if)# vrf context vrf100	Create a VXLAN tenant VRF.
Step 7	ip pim rp-address ip-address-of-router group-list group-range-prefix Example: switch(config-vrf)# ip pim rp-address 209.165.200.1 group-list 224.0.0.0/4	The value of the <i>ip-address-of-router</i> parameter is that of the RP. The same IP address must be on all the edge devices (VTEPs) for a fully distributed RP.

Configuring an External Rendezvous Point

Configure the external rendezvous point (RP) IP address within the TRM VRFs on all devices (VTEP). In addition, ensure reachability of the external RP within the VRF via the border node.



Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: <code>switch# configure terminal</code>	Enter configuration mode.
Step 2	vrf context vrf100 Example: <code>switch(config)# vrf context vrf100</code>	Enter configuration mode.
Step 3	ip pim rp-address ip-address-of-router group-list group-range-prefix Example: <code>switch(config-vrf)# ip pim rp-address 209.165.200.1 group-list 224.0.0.0/4</code>	The value of the <i>ip-address-of-router</i> parameter is that of the RP. The same IP address must be on all of the edge devices (VTEPs) for a fully distributed RP.

Configuring Layer 3 Tenant Routed Multicast

This procedure enables the Tenant Routed Multicast (TRM) feature. TRM operates primarily in the Layer 3 forwarding mode for IP multicast by using BGP MVPN signaling. TRM in Layer 3 mode is the main feature and the only requirement for TRM enabled VXLAN BGP EVPN fabrics. If non-TRM capable edge devices (VTEPs) are present, the Layer 2/Layer 3 mode and Layer 2 mode have to be considered for interop.

To forward multicast between senders and receivers on the Layer 3 cloud and the VXLAN fabric on TRM vPC border leafs, the VIP/PIP configuration must be enabled. For more information, see Configuring VIP/PIP.



Note TRM follows an always-route approach and hence decrements the Time to Live (TTL) of the transported IP multicast traffic.

Before you begin

VXLAN EVPN feature **nv overlay** and **nv overlay evpn** must be configured.

The rendezvous point (RP) must be configured.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal	Enter configuration mode.
Step 2	feature ngmvpn Example: switch(config)# feature ngmvpn	Enables the Next-Generation Multicast VPN (ngMVPN) control plane. New address family commands become available in BGP.
Step 3	ip igmp snooping vxlan Example: switch(config)# ip igmp snooping vxlan	Configure IGMP snooping for VXLAN VLANs.
Step 4	interface nve1 Example: switch(config)# interface nve 1	Configure the NVE interface.
Step 5	member vni vni-range associate-vrf Example: switch(config-if-nve)# member vni 200100 associate-vrf	Configure the Layer 3 virtual network identifier. The range of <i>vni-range</i> is from 1 to 16,777,214.
Step 6	mcast-group ip-prefix Example:	Builds the default multicast distribution tree for the VRF VNI (Layer 3 VNI).

	Command or Action	Purpose
	<pre>switch(config-if-nve-vni)# mcast-group 225.3.3.3</pre>	<p>The multicast group is used in the underlay (core) for all multicast routing within the associated Layer 3 VNI (VRF).</p> <p>Note We recommend that underlay multicast groups for Layer 2 VNI, default MDT, and data MDT not be shared. Use separate, non-overlapping groups.</p>
Step 7	exit Example: <pre>switch(config-if-nve-vni)# exit</pre>	Exits command mode.
Step 8	exit Example: <pre>switch(config-if)# exit</pre>	Exits command mode.
Step 9	router bgp <as-number> Example: <pre>switch(config)# router bgp 100</pre>	Set autonomous system number.
Step 10	neighbor ip-addr Example: <pre>switch(config-router)# neighbor 1.1.1.1</pre>	Configure IP address of the neighbor.
Step 11	address-family ipv4 mvpn Example: <pre>switch(config-router-neighbor)# address-family ipv4 mvpn</pre>	Configure multicast VPN.
Step 12	send-community extended Example: <pre>switch(config-router-neighbor-af)# send-community extended</pre>	Enables ngMVPN for address family signalization. The send community extended command ensures that extended communities are exchanged for this address family.
Step 13	exit Example: <pre>switch(config-router-neighbor-af)# exit</pre>	Exits command mode.
Step 14	exit Example: <pre>switch(config-router)# exit</pre>	Exits command mode.

	Command or Action	Purpose
Step 15	vrf context vrf_name Example: switch(config-router)# vrf context vrf100	Configures VRF name.
Step 16	ip pim rp-address ip-address-of-router group-list group-range-prefix Example: switch(config-vrf)# ip pim rp-address 209.165.201.1 group-list 226.0.0.0/8	The value of the <i>ip-address-of-router</i> parameter is that of the RP. The same IP address must be on all of the edge devices (VTEPs) for a fully distributed RP. For overlay RP placement options, see the Configuring a Rendezvous Point for Tenant Routed Multicast, on page 5 section.
Step 17	address-family ipv4 unicast Example: switch(config-vrf)# address-family ipv4 unicast	Configure unicast address family.
Step 18	route-target both auto mvpn Example: switch(config-vrf-af-ipv4)# route-target both auto mvpn	Defines the BGP route target that is added as an extended community attribute to the customer multicast (C_Multicast) routes (ngMVPN route type 6 and 7). Auto route targets are constructed by the 2-byte Autonomous System Number (ASN) and Layer 3 VNI.
Step 19	ip multicast overlay-spt-only Example: switch(config)# ip multicast overlay-spt-only	Gratuitously originate (S,A) route when the source is locally connected. The ip multicast overlay-spt-only command is enabled by default on all MVPN-enabled Cisco Nexus 9000 Series switches (typically leaf node).
Step 20	interfacevlan_id Example: switch(config)# interface vlan11	Configures the first-hop gateway (distributed anycast gateway for the Layer 2 VNI. No router PIM peering must ever happen with this interface.
Step 21	no shutdown Example: switch(config-if)# no shutdown	Disables an interface.
Step 22	vrf member vrf-num Example: switch(config-if)# vrf member vrf100	Configure VRF name.
Step 23	ipv6 address ipv6_address Example:	Configure IP address.

	Command or Action	Purpose
	switch(config-if)# ip address 11.1.1.1/24	
Step 24	ipv6 pim sparse-mode Example: switch(config-if)# ip pim sparse-mode	Enables IGMP and PIM on the SVI. This is required if multicast sources and/or receivers exist in this VLAN.
Step 25	fabric forwarding mode anycast-gateway Example: switch(config-if)# fabric forwarding mode anycast-gateway	Configure Anycast Gateway Forwarding Mode.
Step 26	ip pim neighbor-policy NONE* Example: switch(config-if)# ip pim neighbor-policy NONE*	Creates an IP PIM neighbor policy to avoid PIM neighborship with PIM routers within the VLAN. The none keyword is a configured route map to deny any ipv4 addresses to avoid establishing PIM neighborship policy using anycast IP. Note Do not use Distributed Anycast Gateway for PIM Peerings.
Step 27	exit Example: switch(config-if)# exit	Exits command mode.
Step 28	interface vlan_id Example: switch(config)# interface vlan100	Configure Layer 3 VNI.
Step 29	no shutdown Example: switch(config-if)# no shutdown	Disable an interface.
Step 30	vrf member vrf100 Example: switch(config-if)# vrf member vrf100	Configure VRF name.
Step 31	ip forward Example: switch(config-if)# ip forward	Enable IP forwarding on interface.
Step 32	ip pim sparse-mode Example: switch(config-if)# ip pim sparse-mode	Configure sparse-mode PIM on interface. There is no PIM peering happening in the Layer-3 VNI, but this command must be present for forwarding.

Configuring TRM on the VXLAN EVPN Spine

This procedure enables Tenant Routed Multicast (TRM) on a VXLAN EVPN spine switch.

Before you begin

The VXLAN BGP EVPN spine must be configured. See [Configuring iBGP for EVPN on the Spine](#).

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal	Enter configuration mode.
Step 2	route-map permitall permit 10 Example: switch(config)# route-map permitall permit 10	Configure the route-map. Note The route-map keeps the next-hop unchanged for EVPN routes <ul style="list-style-type: none"> • Required for eBGP • Options for iBGP
Step 3	set ip next-hop unchanged Example: switch(config-route-map)# set ip next-hop unchanged	Set next hop address. Note The route-map keeps the next-hop unchanged for EVPN routes <ul style="list-style-type: none"> • Required for eBGP • Options for iBGP
Step 4	exit Example: switch(config-route-map)# exit	Return to exec mode.
Step 5	router bgp [autonomous system] number Example: switch(config)# router bgp 65002	Specify BGP.
Step 6	address-family ipv4 mvpn Example: switch(config-router)# address-family ipv4 mvpn	Configure the address family IPv4 MVPN under the BGP.

	Command or Action	Purpose
Step 7	retain route-target all Example: switch(config-router-af) # retain route-target all	Configure retain route-target all under address-family IPv4 MVPN [global]. Note Required for eBGP. Allows the spine to retain and advertise all MVPN routes when there are no local VNIs configured with matching import route targets.
Step 8	neighbor ip-address [remote-as number] Example: switch(config-router-af) # neighbor 100.100.100.1	Define neighbor.
Step 9	address-family ipv4 mvpn Example: switch(config-router-neighbor) # address-family ipv4 mvpn	Configure address family IPv4 MVPN under the BGP neighbor.
Step 10	disable-peer-as-check Example: switch(config-router-neighbor-af) # disable-peer-as-check	Disables checking the peer AS number during route advertisement. Configure this parameter on the spine for eBGP when all leafs are using the same AS but the spines have a different AS than leafs. Note Required for eBGP.
Step 11	rewrite-rt-asn Example: switch(config-router-neighbor-af) # rewrite-rt-asn	Normalizes the outgoing route target's AS number to match the remote AS number. Uses the BGP configured neighbors remote AS. The rewrite-rt-asn command is required if the route target auto feature is being used to configure EVPN route targets.
Step 12	send-community extended Example: switch(config-router-neighbor-af) # send-community extended	Configures community for BGP neighbors.
Step 13	route-reflector-client Example: switch(config-router-neighbor-af) # route-reflector-client	Configure route reflector. Note Required for iBGP with route-reflector.
Step 14	route-map permitall out Example: switch(config-router-neighbor-af) # route-map permitall out	Applies route-map to keep the next-hop unchanged. Note Required for eBGP.

Configuring Tenant Routed Multicast in Layer 2/Layer 3 Mixed Mode

This procedure enables the Tenant Routed Multicast (TRM) feature. This enables both Layer 2 and Layer 3 multicast BGP signaling. This mode is only necessary if non-TRM edge devices (VTEPs) are present in the Cisco Nexus 9000 Series switches (1st generation). Only the Cisco Nexus 9000-EX and 9000-FX switches can do Layer 2/Layer 3 mode (Anchor-DR).

To forward multicast between senders and receivers on the Layer 3 cloud and the VXLAN fabric on TRM vPC border leafs, the VIP/PIP configuration must be enabled. For more information, see Configuring VIP/PIP.

All Cisco Nexus 9300-EX and 9300-FX platform switches must be in Layer 2/Layer 3 mode.

Before you begin

VXLAN EVPN must be configured.

The rendezvous point (RP) must be configured.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal	Enter configuration mode.
Step 2	feature ngmvpn Example: switch(config)# feature ngmvpn	Enables the Next-Generation Multicast VPN (ngMVPN) control plane. New address family commands become available in BGP.
Step 3	advertise evpn multicast Example: switch(config)# advertise evpn multicast	Advertises IMET and SMET routes into BGP EVPN towards non-TRM capable switches.
Step 4	ip igmp snooping vxlan Example: switch(config)# ip igmp snooping vxlan	Configure IGMP snooping for VXLAN VLANs.
Step 5	ip multicast overlay-spt-only Example: switch(config)# ip multicast overlay-spt-only	Gratuitously originate (S,A) route when source is locally connected. The ip multicast overlay-spt-only command is enabled by default on all MVPN-enabled Cisco Nexus 9000 Series switches (typically leaf nodes).
Step 6	ip multicast overlay-distributed-dr Example:	Enables distributed anchor DR function on this VTEP.

	Command or Action	Purpose
	<code>switch(config)# ip multicast overlay-distributed-dr</code>	Note The NVE interface must be shut and unshut while configuring this command.
Step 7	interface nve1 Example: <code>switch(config)# interface nve 1</code>	Configure the NVE interface.
Step 8	[no] shutdown Example: <code>switch(config-if-nve)# shutdown</code>	Shuts down the NVE interface. The no shutdown command brings up the interface.
Step 9	member vni <i>vni-range</i> associate-vrf Example: <code>switch(config-if-nve)# member vni 200100 associate-vrf</code>	Configure the Layer 3 virtual network identifier. The range of <i>vni-range</i> is from 1 to 16,777,214.
Step 10	mcast-group <i>ip-prefix</i> Example: <code>switch(config-if-nve-vni)# mcast-group 225.3.3.3</code>	Configures the multicast group on distributed anchor DR.
Step 11	exit Example: <code>switch(config-if-nve-vni)# exit</code>	Exits command mode.
Step 12	interface loopback <i>loopback_number</i> Example: <code>switch(config-if-nve)# interface loopback 10</code>	Configure the loopback interface on all distributed anchor DR devices.
Step 13	ip address <i>ip_address</i> Example: <code>switch(config-if)# ip address 100.100.1.1/32</code>	Configure IP address. This IP address is the same on all distributed anchor DR.
Step 14	ip router ospf <i>process-tag</i> area <i>ospf-id</i> Example: <code>switch(config-if)# ip router ospf 100 area 0.0.0.0</code>	OSPF area ID in IP address format.
Step 15	ip pim sparse-mode Example: <code>switch(config-if)# ip pim sparse-mode</code>	Configure sparse-mode PIM on interface.

	Command or Action	Purpose
Step 16	interface nve1 Example: switch(config-if) # interface nve1	Configure NVE interface.
Step 17	shutdown Example: switch(config-if-nve) # shutdown	Disable the interface.
Step 18	mcast-routing override source-interface loopback int-num Example: switch(config-if-nve) # mcast-routing override source-interface loopback 10	Enables that TRM is using a different loopback interface than the VTEPs default source-interface. The <i>loopback10</i> variable must be configured on every TRM-enabled VTEP (Anchor DR) in the underlay with the same IP address. This loopback and the respective override command are needed to serve TRM VTEPs in co-existence with non-TRM VTEPs.
Step 19	exit Example: switch(config-if-nve) # exit	Exits command mode.
Step 20	router bgp 100 Example: switch(config) # router bgp 100	Set autonomous system number.
Step 21	neighbor ip-addr Example: switch(config-router) # neighbor 1.1.1.1	Configure IP address of the neighbor.
Step 22	address-family ipv4 mvpn Example: switch(config-router-neighbor) # address-family ipv4 mvpn	Configure multicast VPN.
Step 23	send-community extended Example: switch(config-router-neighbor-af) # send-community extended	Send community attribute.
Step 24	exit Example: switch(config-router-neighbor-af) # exit	Exits command mode.

	Command or Action	Purpose
Step 25	exit Example: switch(config-router) # exit	Exits command mode.
Step 26	vrf vrf_name vrf100 Example: switch(config) # vrf context vrf100	Configure VRF name.
Step 27	ip pim rp-address ip-address-of-router group-list group-range-prefix Example: switch(config-vrf) # ip pim rp-address 209.165.201.1 group-list 226.0.0.0/8	The value of the <i>ip-address-of-router</i> parameter is that of the RP. The same IP address must be on all of the edge devices (VTEPs) for a fully distributed RP. For overlay RP placement options, see the Configuring a Rendezvous Point for Tenant Routed Multicast, on page 5 - Internal RP section.
Step 28	address-family ipv4 unicast Example: switch(config-vrf) # address-family ipv4 unicast	Configure unicast address family.
Step 29	route-target both auto mvpn Example: switch(config-vrf-af-ipv4) # route-target both auto mvpn	Specify target for mvpn routes.
Step 30	exit Example: switch(config-vrf-af-ipv4) # exit	Exits command mode.
Step 31	exit Example: switch(config-vrf) # exit	Exits command mode.
Step 32	interface vlan_id Example: switch(config) # interface vlan11	Configure Layer 2 VNI.
Step 33	no shutdown Example: switch(config-if) # no shutdown	Disable an interface.
Step 34	vrf member vrf100 Example:	Configure VRF name.

	Command or Action	Purpose
	switch(config-if)# vrf member vrf100	
Step 35	ip address ip_address Example: switch(config-if)# ip address 11.1.1.1/24	Configure IP address.
Step 36	ip pim sparse-mode Example: e switch(config-if)# ip pim sparse-mode	Configure sparse-mode PIM on the interface.
Step 37	fabric forwarding mode anycast-gateway Example: switch(config-if)# fabric forwarding mode anycast-gateway	Configure Anycast Gateway Forwarding Mode.
Step 38	ip pim neighbor-policy NONE* Example: switch(config-if)# ip pim neighbor-policy NONE*	The none keyword is a configured route map to deny any IPv4 addresses to avoid establishing a PIM neighborship policy using anycase IP.
Step 39	exit Example: switch(config-if)# exit	Exits command mode.
Step 40	interface vlan_id Example: switch(config)# interface vlan100	Configure Layer 3 VNI.
Step 41	no shutdown Example: switch(config-if)# no shutdown	Disable an interface.
Step 42	vrf member vrf100 Example: switch(config-if)# vrf member vrf100	Configure VRF name.
Step 43	ip forward Example: switch(config-if)# ip forward	Enable IP forwarding on interface.
Step 44	ip pim sparse-mode Example: switch(config-if)# ip pim sparse-mode	Configure sparse-mode PIM on the interface.

Configuring Layer 2 Tenant Routed Multicast

This procedure enables the Tenant Routed Multicast (TRM) feature. This enables Layer 2 multicast BGP signaling.

IGMP Snooping Querier must be configured per multicast-enabled VXLAN VLAN on all Layer-2 TRM leaf switches.

Before you begin

VXLAN EVPN must be configured.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal	Enter configuration mode.
Step 2	feature ngmvpn Example: switch(config)# feature ngmvpn	Enables EVPN/MVPN feature.
Step 3	advertise evpn multicast Example: switch(config)# advertise evpn multicast	Advertise L2 multicast capability.
Step 4	ip igmp snooping vxlan Example: switch(config)# ip igmp snooping vxlan	Configure IGMP snooping for VXLANs.
Step 5	vlan configuration vlan-id Example: switch(config)# vlan configuration 101	Enter configuration mode for VLAN 101.
Step 6	ip igmp snooping querier querier-ip-address Example: switch(config-vlan-config)# ip igmp snooping querier 2.2.2.2	Configure IGMP snooping querier for each multicast-enabled VXLAN VLAN.

Configuring TRM with vPC Support

This section provides steps to configure TRM with vPC support. Beginning with Cisco NX-OS Release 10.1(2), TRM Multisite with vPC BGW is supported.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal	Enter global configuration mode.
Step 2	feature vpc Example: switch(config)# feature vpc	Enables vPCs on the device.
Step 3	feature interface-vlan Example: switch(config)# feature interface-vlan	Enables the interface VLAN feature on the device.
Step 4	feature lacp Example: switch(config)# feature lacp	Enables the LACP feature on the device.
Step 5	feature pim Example: switch(config)# feature pim	Enables the PIM feature on the device.
Step 6	feature ospf Example: switch(config)# feature ospf	Enables the OSPF feature on the device.
Step 7	ip pim rp-address address group-list range Example: switch(config)# ip pim rp-address 100.100.100.1 group-list 224.0.0/4	Defines a PIM RP address for the underlay multicast group range.
Step 8	vpc domain domain-id Example: switch(config)# vpc domain 1	Creates a vPC domain on the device and enters vpn-domain configuration mode for configuration purposes. There is no default. The range is from 1 to 1000.
Step 9	peer switch Example: switch(config-vpc-domain)# peer switch	Defines the peer switch.
Step 10	peer gateway Example: switch(config-vpc-domain)# peer gateway	To enable Layer 3 forwarding for packets destined to the gateway MAC address of the virtual port channel (vPC), use the peer-gateway command.

	Command or Action	Purpose
Step 11	peer-keepalive destination <i>ipaddress</i> Example: <pre>switch(config-vpc-domain)# peer-keepalive destination 172.28.230.85</pre>	Configures the IPv4 address for the remote end of the vPC peer-keepalive link. Note The system does not form the vPC peer link until you configure a vPC peer-keepalive link. The management ports and VRF are the defaults. Note We recommend that you configure a separate VRF and use a Layer 3 port from each vPC peer device in that VRF for the vPC peer-keepalive link. For more information about creating and configuring VRFs, see the Cisco Nexus 9000 NX-OS Series Unicast Routing Config Guide, 9.3(x) .
Step 12	ip arp synchronize Example: <pre>switch(config-vpc-domain)# ip arp synchronize</pre>	Enables IP ARP synchronize under the vPC Domain to facilitate faster ARP table population following device reload.
Step 13	ipv6 nd synchronize Example: <pre>switch(config-vpc-domain)# ipv6 nd synchronize</pre>	Enables IPv6 nd synchronization under the vPC domain to facilitate faster nd table population following device reload.
Step 14	Create vPC peer-link. Example: <pre>switch(config)# interface port-channel 1 switch(config)# switchport switch(config)# switchport mode trunk switch(config)# switchport trunk allowed vlan 1,10,100-200 switch(config)# mtu 9216 switch(config)# vpc peer-link switch(config)# no shut switch(config)# interface Ethernet 1/1, 1/21 switch(config)# switchport switch(config)# mtu 9216 switch(config)# channel-group 1 mode active switch(config)# no shutdown</pre>	Creates the vPC peer-link port-channel interface and adds two member interfaces to it.

	Command or Action	Purpose
Step 15	system nve infra-vlans range Example: switch(config)# system nve infra-vlans 10	Defines a non-VXLAN enabled VLAN as a backup routed path.
Step 16	vlan number Example: switch(config)# vlan 10	Creates the VLAN to be used as an infra-VLAN.
Step 17	Create the SVI. Example: switch(config)# interface vlan 10 switch(config)# ip address 10.10.10.1/30 switch(config)# ip router ospf process UNDERLAY area 0 switch(config)# ip pim sparse-mode switch(config)# no ip redirects switch(config)# mtu 9216 switch(config)# no shutdown	Creates the SVI used for the backup routed path over the vPC peer-link.
Step 18	(Optional) delay restore interface-vlan seconds Example: switch(config-vpc-domain)# delay restore interface-vlan 45	Enables the delay restore timer for SVIs. We recommend tuning this value when the SVI/VNI scale is high. For example, when the SCI count is 1000, we recommend that you set the delay restore for interface-vlan to 45 seconds.

