



Rendezvous Point Selection Process by a PIM BSR

- [Feature history for RP selection process by a PIM BSR, on page 1](#)
- [RP selection process by a PIM BSR, on page 1](#)
- [Configure a PIM BSR, on page 3](#)
- [Verify VRRP-Aware PIM Using the CLI, on page 7](#)

Feature history for RP selection process by a PIM BSR

This table describes the developments of this feature, by release.

Table 1: Feature History Table

Feature Name	Release Information	Description
Dynamic Rendezvous Point (RP) Selection by a PIM Boot Strap Router (BSR)	Cisco IOS XE Catalyst SD-WAN Release 17.5.1a Cisco SD-WAN Release 20.5.1	This feature adds support for automatic selection of an RP candidate using a PIM BSR in an IPv4 multicast overlay. There is no single point of failure because every site has a local RP. A Cisco IOS XE Catalyst SD-WAN device is selected as the RP, not a service-side device.

RP selection process by a PIM BSR

Summary

PIM uses a BSR to discover and announce RP-set information for each group prefix to all the routers in a PIM domain. This is the same function performed by Auto-RP, but a BSR is part of the PIM version 2 specification.

Cisco Auto-RP cannot co-exist with PIM BSR. Cisco Auto-RP mode must be disabled with spt-only mode.

Workflow

To avoid a single point of failure, you can configure several candidate BSRs in a PIM domain. A BSR is automatically selected from among the candidate BSRs. Bootstrap messages are used to determine which BSR has the highest priority. The router with the highest priority announces to all PIM routers in the domain that it is the BSR. Any router in the network can serve as a BSR candidate.

The elected BSR receives candidate-RP messages from all the candidate RPs in the domain. The bootstrap message sent by a BSR includes information about all of the candidate RPs.

An RP acts as the meeting place for sources and receivers of multicast data. In a PIM-SM network, sources must send their traffic to the RP. This traffic is then forwarded to receivers down a shared distribution tree. By default, when the receiver's first hop router learns about the source, it sends a join message directly to the source and creates a source-based distribution tree between the source and receiver. This source tree includes an RP only if the RP is within the shortest path between the source and receiver.

For a BSR to work for any multicast stream that spans across Cisco Catalyst SD-WAN sites, SPT-only mode is mandatory. For a BSR within a local-site multicast stream within a Cisco Catalyst SD-WAN site, it is not necessary to enable SPT-only mode.

If you have two Cisco IOS XE Catalyst SD-WAN devices in the same site, every Cisco IOS XE Catalyst SD-WAN device needs to be configured as a replicator for traffic to flow.

Benefits of PIM BSR

- IPv4 support.
- Dynamic rather than static selection of an RP.
- Automatic failover if one RP is not available.
- RP discovery is handled by a BSR.
- Configuration of multiple RP candidates for the same group range.
- Selection of a Cisco IOS XE Catalyst SD-WAN device as the RP.

Restrictions for PIM BSR

- IPv6 is not supported.
- Bidirectional PIM is not supported for IPv4.
- BSR is not supported in a hub-and-spoke topology on Cisco IOS XE Catalyst SD-WAN devices.

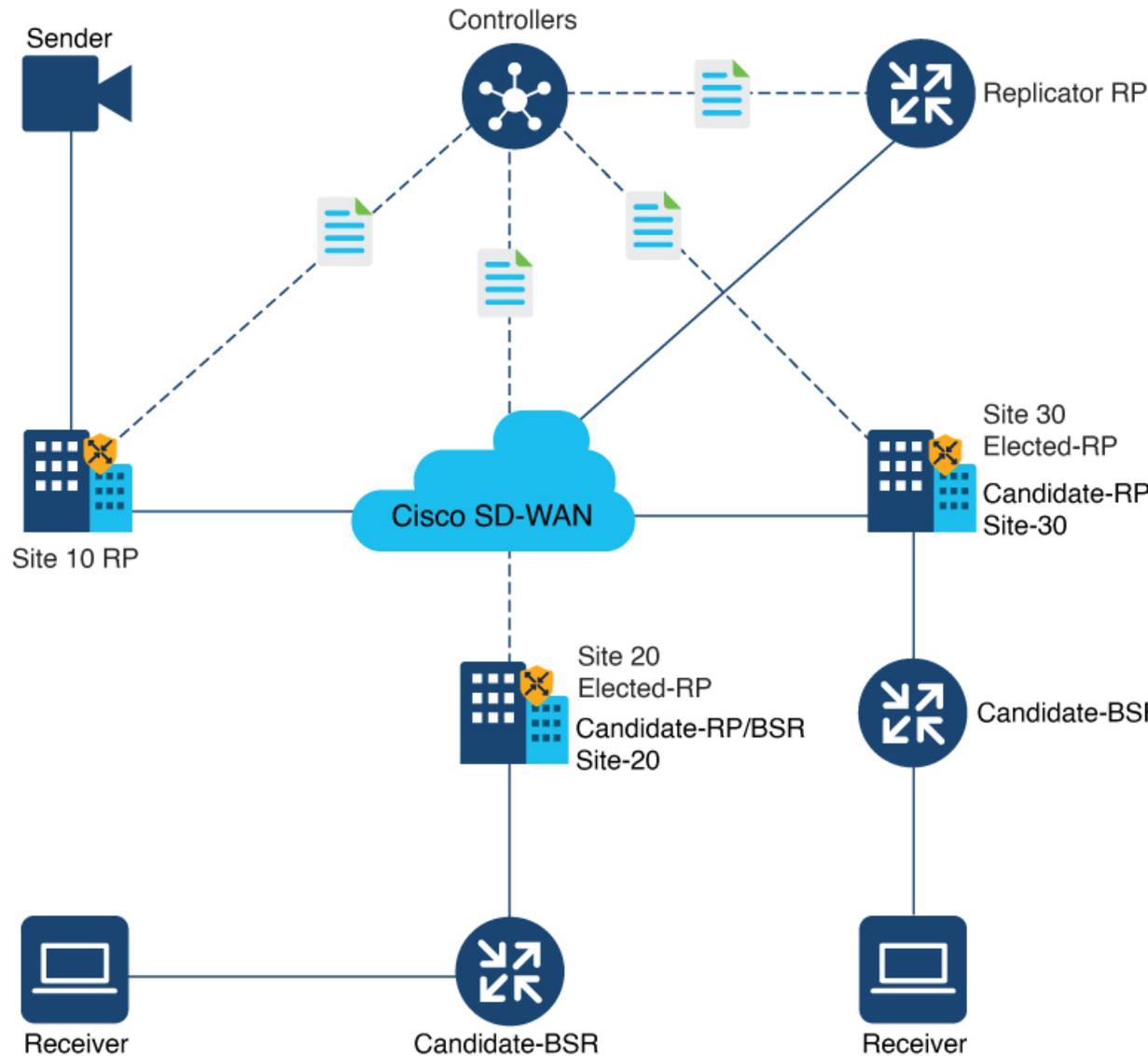
Topology for RP selection by a PIM BSR

Summary

The following is a sample topology for RP selection by a PIM BSR on Cisco IOS XE Catalyst SD-WAN devices:

Workflow

Figure 1: Topology for PIM BSR Selection



Configure a PIM BSR

Before you begin

Every Cisco Catalyst SD-WAN site must have its own RP.

SPT-only mode must be enabled on all Cisco Catalyst SD-WAN sites.

For a BSR to work for any multicast stream that spans across Cisco Catalyst SD-WAN sites, SPT-only mode is mandatory. For a BSR within a local-site multicast stream within a Cisco Catalyst SD-WAN site, it is not necessary to enable SPT-only mode.

For a PIM BSR to elect the RP, configure the following in Cisco SD-WAN Manager:

Procedure

- Step 1** Multicast feature template with **SPT Only** set to **On** for the selected Cisco IOS XE Catalyst SD-WAN device.
 - Step 2** PIM feature template with an interface.
 - Step 3** RP candidate.
 - Step 4** BSR candidate.
-

Configure Shortest-Path Tree mode for a multicast feature template

Before you begin

In Cisco SD-WAN Manager, configure **SPT Only** mode to ensure that the RPs can communicate with each other using the shortest-path tree.

When configuring a BSR, configuration of **SPT Only** mode is mandatory.

Procedure

- Step 1** From the Cisco SD-WAN Manager menu, choose **Configuration > Templates**.
 - Step 2** Click **Feature Templates**.
In Cisco SD-WAN Release 20.7.x and earlier releases, **Feature Templates** is titled **Feature**.
 - Step 3** Click **Add Template**.
 - Step 4** From the **Select Devices** drop-down list, choose a Cisco IOS XE Catalyst SD-WAN device.
 - Step 5** In the **Template Name** field, enter a name containing up to 128 alphanumeric characters. In the **Description** field, enter a description containing up to 2048 alphanumeric characters.
 - Step 6** Under the **Basic Configuration** section for **SPT Only**, choose **On**.
 - Step 7** To enable the **Local Replicator** on the device, choose **On** (otherwise keep it set to **Off**).
 - Step 8** To configure a replicator, choose **Threshold**, and specify a value. (Optional, keep it set to the default value if you are not configuring a replicator).
 - Step 9** Click **Save**.
-

Configure a Cisco IOS XE Catalyst SD-WAN device as SPT-only using a CLI template

Procedure

Step 1 Configure a Cisco IOS XE Catalyst SD-WAN device as spt-only

```
Device(config)# sdwan multicast address-family ipv4 vrf 1  
spt-only
```

Step 2 Use the **show platform software sdwan multicast remote-nodes vrf** command to verify that system IP addresses are configured with spt-only mode:

```
Device# show platform software sdwan multicast remote-nodes vrf 1
```

```
Multicast SDWAN Overlay Remote Nodes (* - Replicator):
```

System IP	SPT-Only Mode	Label	Received		Sent	
			(X,G) Join/Prune	(S,G) Join/Prune	(X,G) Join/Prune	(S,G) Join/Prune
172.16.255.11	Yes	1003	0/0	0/0	0/0	0/0
172.16.255.14	Yes	1003	0/0	0/0	1/0	10/10
172.16.255.16	Yes	1003	0/0	0/0	0/0	0/0
172.16.255.21	Yes	1003	0/0	0/0	0/0	0/0

Example:

Sample Multicast Configuration With SPT-Only

```
Device(config)# sdwan  
Device(config)# multicast  
Device(config)# address-family ipv4 vrf 1  
Device(config)# spt-only  
!
```

Configure a PIM feature template and add an interface

Configure a PIM feature template and add an interface for an RP and the BSR candidate.

Procedure

Step 1 From the Cisco SD-WAN Manager menu, choose **Configuration > Templates**.

Step 2 Click **Feature Templates**.

In Cisco SD-WAN Release 20.7.x and earlier releases, **Feature Templates** is titled **Feature**.

Step 3 Click **Add Template**.

Step 4 From the **Select Devices** drop-down list, choose a Cisco IOS XE Catalyst SD-WAN device.

Step 5 Under **Other Templates**, choose **Cisco PIM**.

- Step 6** In the **Template Name** field, enter a name containing up to 128 alphanumeric characters. In the **Description** field, enter a description containing up to 2048 alphanumeric characters.
- Step 7** Click **Interface > New Interface**. In the **Interface Name** field, specify an interface with a value.
- Step 8** In the **Query Interval (seconds)** field, the field auto-populates. In the **Join/Prune Interval (seconds) field**, the field auto-populates.
- Step 9** Click **Add** and then click **Save**.

Configure the RP candidate

Configure the same Cisco IOS XE Catalyst SD-WAN device as the candidate RP for all multicast groups or selective groups.

Procedure

- Step 1** From the Cisco SD-WAN Manager menu, choose **Configuration > Templates**.
- Step 2** Click **Feature Templates**.
In Cisco SD-WAN Release 20.7.x and earlier releases, **Feature Templates** is titled **Feature**.
- Step 3** Edit the PIM feature template that you created by clicking **...** and then clicking **Edit**.
- Step 4** Click **Basic Configuration**.
- Step 5** Click **RP Candidate > New RP Candidate**.
- Step 6** From the **Interface** drop-down list, choose the interface that you used for configuring the PIM feature template.
- a. (Optional) In the **Access List** field, if you have configured the access list with a value, add the same value.
 - b. (Optional) In the **Interval** field, if you have configured the interval with a value, add the same interval value.
- Step 7** In the **Priority** field, specify a higher priority on the Cisco IOS XE Catalyst SD-WAN device than on the service-side device.
- Step 8** Click **Add**.
- Step 9** Click **Update** to save your configuration changes.

Configure the BSR candidate

Procedure

- Step 1** Repeat Step 1 through Step 4 from the [Configure the RP candidate](#) section.
- Step 2** Click **BSR Candidate**.
- Step 3** In the **BSR Candidate** field, choose the same interface from the drop-down list that you used for configuring the PIM feature template.

- Step 4** (Optional) In the **Hash Mask Length** field, specify the hash mask length. Valid values for hash mask length range from 0 – 32.
- Step 5** In the **Priority** field, specify a higher priority on the Cisco IOS XE Catalyst SD-WAN device device than on the service-side device.
- Step 6** (Optional) In the **RP Candidate Access List** field, if you have configured the RP candidate access list with a value, add the same value. An RP candidate uses a standard access control list (ACL) where you can enter the name for the access list.
- Step 7** Click **Update** to save your configuration changes.
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Verify VRRP-Aware PIM Using the CLI

Sample VRRP-aware PIM configuration on router 1:

```
interface Vlan13
no shutdown
arp timeout 1200
vrf forwarding 1
ip address 10.0.0.1 255.255.255.0
ip pim sparse-mode
ip pim redundancy 1 vrrp dr-priority 200
ip tcp adjust-mss 1350
ip mtu 1500
ip igmp version 3
vrrp 1 address-family ipv4
vrrpv2
address 10.0.0.3
priority 200
timers advertise 100
track omp shutdown
vrrs leader 1
exit
```

Sample VRRP-aware PIM configuration on router 2:

```
interface Vlan13
no shutdown
arp timeout 1200
vrf forwarding 1
ip address 10.0.0.2 255.255.255.0
ip pim sparse-mode
ip pim redundancy 1 vrrp dr-priority 200
ip tcp adjust-mss 1350
ip mtu 1500
ip igmp version 3
vrrp 1 address-family ipv4
vrrpv2
address 10.0.0.3
priority 200
timers advertise 100
track omp shutdown
vrrs leader 1
exit
```

