



Configuring PIM

This chapter describes how to configure the Protocol Independent Multicast (PIM) features on Cisco NX-OS devices in your IPv4 networks.

- [About PIM, on page 1](#)
- [Prerequisites for PIM, on page 5](#)
- [Guidelines and Limitations for PIM, on page 5](#)
- [Default Settings, on page 6](#)
- [Configuring PIM, on page 7](#)
- [Verifying the PIM Configuration, on page 17](#)
- [Displaying Statistics, on page 18](#)
- [Related Documents, on page 19](#)
- [MIBs, on page 19](#)

About PIM

PIM, which is used between multicast-capable routers, advertises group membership across a routing domain by constructing multicast distribution trees. PIM builds shared distribution trees on which packets from multiple sources are forwarded, as well as source distribution trees on which packets from a single source are forwarded.

Cisco NX-OS supports PIM sparse mode for IPv4 networks (PIM). In PIM sparse mode, multicast traffic is sent only to locations of the network that specifically request it. You can configure PIM to run simultaneously on a router. You can use PIM global parameters to configure rendezvous points (RPs), message packet filtering, and statistics. You can use PIM interface parameters to enable multicast, identify PIM borders, set the PIM hello message interval, and set the designated router (DR) priority.



Note Cisco NX-OS 3550-T

- Supports FHR for PIM-sparse mode.
 - Forms {*,G} only in software.
 - Does not support PIM dense mode.
-

In Cisco NX-OS, multicast is enabled only after you enable the PIM feature on each router and then enable PIM sparse mode on each interface that you want to participate in multicast. You can configure PIM for an IPv4 network. In an IPv4 network, if you have not already enabled IGMP on the router, PIM enables it automatically.

You use the PIM global configuration parameters to configure the range of multicast group addresses to be handled by these distribution modes:

- Any Source Multicast (ASM) provides discovery of multicast sources. It builds a shared tree between sources and receivers of a multicast group and supports switching over to a source tree when a new receiver is added to a group. ASM mode requires that you configure an RP.

For more information about PIM sparse mode and shared distribution trees used by the ASM mode, see [RFC 4601](#).

Hello Messages

The PIM process begins when the router establishes PIM neighbor adjacencies by sending PIM hello messages to the multicast IPv4 address 224.0.0.13. Hello messages are sent periodically at the interval of 30 seconds. When all neighbors have replied, the PIM software chooses the router with the highest priority in each LAN segment as the designated router (DR). The DR priority is based on a DR priority value in the PIM hello message. If the DR priority value is not supplied by all routers, or the priorities match, the highest IP address is used to elect the DR.

The hello message also contains a hold-time value, which is typically 3.5 times the hello interval. If this hold time expires without a subsequent hello message from its neighbor, the device detects a PIM failure on that link.

The configured hold-time changes may not take effect on first two hellos sent after enabling or disabling PIM on an interface. For the first two hellos sent on the interface, thereafter, the configured hold times will be used. This may cause the PIM neighbor to set the incorrect neighbor timeout value for the initial neighbor setup until a hello with the correct hold time is received.

For added security, you can configure an MD5 hash value that the PIM software uses to authenticate PIM hello messages with PIM neighbors.

Join-Prune Messages

When the DR receives an IGMP membership report message from a receiver for a new group or source, the DR creates a tree to connect the receiver to the source by sending a PIM join message out the interface toward the rendezvous point (ASM mode). The rendezvous point (RP) is the root of a shared tree, which is used by all sources and hosts in the PIM domain in the ASM mode.

When the DR determines that the last host has left a group or source, it sends a PIM prune message to remove the path from the distribution tree.

The routers forward the join or prune action hop by hop up the multicast distribution tree to create (join) or tear down (prune) the path.



Note In this publication, the terms “PIM join message” and “PIM prune message” are used to simplify the action taken when referring to the PIM join-prune message with only a join or prune action.

Join-prune messages are sent as quickly as possible by the software. You can filter the join-prune messages by defining a routing policy.

State Refreshes

PIM requires that multicast entries are refreshed within a 3.5-minute timeout interval. The state refresh ensures that traffic is delivered only to active listeners, and it keeps routers from using unnecessary resources.

To maintain the PIM state, the last-hop DR sends join-prune messages once per minute. State creation applies to (*, G) state as follows:

- (*, G) state creation example—An IGMP (*, G) report triggers the DR to send a (*, G) PIM join message toward the RP.

If the state is not refreshed, the PIM software tears down the distribution tree by removing the forwarding paths in the multicast outgoing interface list of the upstream routers.

Rendezvous Points

A rendezvous point (RP) is a router that you select in a multicast network domain that acts as a shared root for a multicast shared tree. You can configure as many RPs as you like, and you can configure them to cover different group ranges.

Static RP

You can statically configure an RP for a multicast group range. You must configure the address of the RP on every router in the domain.

You can define static RPs for the following reasons:

- To configure routers with the Anycast-RP address
- To manually configure an RP on a device
- Cisco Nexus® 3550-T only supports and validates Static-RP.

PIM Register Messages

PIM register messages are unicast to the RP by designated routers (DRs) that are directly connected to multicast sources. The PIM register message has the following functions:

- To notify the RP that a source is actively sending to a multicast group.
- To deliver multicast packets sent by the source to the RP for delivery down the shared tree.

The DR continues to send PIM register messages to the RP until it receives a Register-Stop message from the RP. The RP sends a Register-Stop message in either of the following cases:

- The RP has no receivers for the multicast group being transmitted.
- The RP has joined the SPT to the source but has not started receiving traffic from the source.

The PIM triggered register is enabled by default.

You can use the **ip pim register-source** command to configure the IP source address of register messages when the IP source address of a register message is not a uniquely routed address to which the RP can send packets. This situation might occur if the source address is filtered so that the packets sent to it are not forwarded or if the source address is not unique to the network. In these cases, the replies sent from the RP to the source address will fail to reach the DR, resulting in Protocol Independent Multicast sparse mode (PIM-SM) protocol failures.

The following example shows how to configure the IP source address of the register message to the loopback 3 interface of a DR:

```
ip pim register-source loopback 3
```



Note In Cisco NX-OS, PIM register messages are rate limited to avoid overwhelming the RP.

You can filter PIM register messages by defining a routing policy.

Designated Routers

In PIM ASM mode, the software chooses a designated router (DR) from the routers on each network segment. The DR is responsible for forwarding multicast data for specified groups and sources on that segment.

The DR for each LAN segment is determined as described in the Hello messages.

In ASM mode, the DR is responsible for unicasting PIM register packets to the RP. When a DR receives an IGMP membership report from a directly connected receiver, the shortest path is formed to the RP, which may or may not go through the DR. The result is a shared tree that connects all sources transmitting on the same multicast group to all receivers of that group.



Note PIM Bidir mode is not supported in Cisco Nexus 3550-T Release 10.2(3t).

ASM Switchover from Shared Tree to Source Tree



Note Cisco NX-OS puts the RPF interface into the OIF-list of the MRIB but not into the OIF-list of the MFIB.

In ASM mode, the DR that is connected to a receiver switches over from the shared tree to the shortest-path tree (SPT) to a source unless you configure the PIM parameter to use shared trees only.

During the switchover, messages on the SPT and shared tree might overlap. These messages are different. The shared tree messages are propagated upstream toward the RP, while SPT messages go toward the source.

For information about SPT switchovers, see the “Last-Hop Switchover to the SPT” section in RFC 4601.

Prerequisites for PIM

- You are logged onto the device.
- For global commands, you are in the correct virtual routing and forwarding (VRF) mode. The default configuration mode shown in the examples in this chapter applies to the default VRF.

Guidelines and Limitations for PIM

PIM has the following guidelines and limitations:

- Only PIM-ASM mode is supported in the Cisco Nexus® 3550-T switches.
- Cisco Nexus® 3550-T switch does cut-through forwarding; hence there is no MTU-check implemented. Hardware buffering is not designed for jumbo packets and packets beyond regular mtu size 1518 is not supported.
- L3 Multicast has the following scale numbers:
 - L2MCAST - 1536 system-wide shared with MAC table - {vlan,MAC}
 - L3MCAST - 6000 system-wide {vrf,G,S} entries in hardware

- Only partial support for L3 Multicast on Trunk Vlan is available.
- Layer 3 Multicast traffic is forwarded only to the learned receiver when layer3-multicast receiver-vlan is configured for receiver vlan on the trunk port. If the multicast receiver is learned on non-configured PIM enabled Vlan, a warning is generated. For example,

```
%USER-4-SYSTEM_MSG: L3-Multicast for {22.102.0.100,227.0.1.1} receiver on Trunk Port
Ethernet1/11 vlan 1002 not enabled - exusd
```

The above warning level syslog message is not enabled by default. To display and to enable it, configure `logging monitor 4` and/or `logging console 4`.

- When L3 lookup is done; even the L2 domain multicast receivers receive packets with decremented TTL.
- Cisco Nexus® 3550-T platform switches do not support MSDP.
- RPF failure traffic is dropped and sent to the CPU at a very low rate to trigger PIM asserts.
- For first-hop source detection in most Cisco Nexus devices, traffic coming from the first hop is detected based on the source subnet check, and multicast packets are copied to the CPU only if the source belongs to the local subnet. The Cisco nexus 3550-T switches do not implement source subnet check. All L3 multicast miss traffic is copied to CPU to learn the local multicast source.
- Cisco NX-OS PIM do not interoperate with any version of PIM dense mode or PIM Sparse Mode version 1.
- It is recommended to configure a snooping querier on a L2 device with lower IP address to force the L2 device as the querier. This will be useful in handling the scenario where multi chassis EtherChannel trunk (MCT) is down.
- Device cannot operate as multicast non-DR for a VLAN segment.

- Cisco Nexus 3550-T series switch does not support AutoRP or BSR configuration.
- Cisco Nexus 3550-T series switch does not support PIM on VPC VLANs.

Guidelines and Limitations for Hello Messages

The following guidelines and limitations apply to Hello Messages:

- Default values for the PIM hello interval are recommended and should not be modified.

Guidelines and Limitations for Rendezvous Points

The following guidelines and limitations apply to Rendezvous Points (RP):

- Cisco Nexus 3550-T - 10.2(3t) release can only operate as a static RP.
- To avoid excessive punts of the RPF failed packets, the Cisco Nexus® 3550-T switches may create (S, G) entries for active sources in ASM, although there is no rendezvous point (RP) for such group, or in situation when a reverse path forwarding (RPF) fails for the source.

Default Settings

This table lists the default settings for PIM parameters.

Table 1: Default PIM Parameters

| Parameters | Default |
|-------------------------|--|
| Use shared trees only | Disabled Note {*,G} support is not available in hardware. Hence, no line-rate forwarding can occur if this parameter is enabled. |
| Flush routes on restart | Disabled |
| Log neighbor changes | Disabled |
| Auto-RP message action | Disabled Note Do Not Enable Auto-RP message action since, BSR is not available in Cisco Nexus 3550-T 10.2(3t) release. |
| BSR message action | Disabled Note Do not Enable BSR message action since, BSR is not available in Cisco Nexus 3550-T - 10.2(3t) release. |

| Parameters | Default |
|------------------------------|--|
| PIM sparse mode | Disabled |
| Designated router priority | 1 |
| Hello authentication mode | Disabled |
| Domain border | Disabled Note Do not Enable since Domain border is not available in Cisco Nexus 3550-T - 10.2(3t) release. |
| RP address policy | No message filtering |
| PIM register message policy | No message filtering |
| BSR candidate RP policy | No message filtering (BSR not supported) |
| BSR policy | No message filtering (BSR not supported) |
| Auto-RP mapping agent policy | No message filtering (Auto-RP not supported) |
| Auto-RP RP candidate policy | No message filtering (Auto-RP not supported) |
| Join-prune policy | No message filtering |
| Neighbor adjacency policy | Become adjacent with all PIM neighbors |

Configuring PIM



- Note**
- Cisco NX-OS supports only PIM sparse mode version 2. In this publication, “PIM” refers to PIM sparse mode version 2.
 - There are no {*,G} routes installed in hardware. All hardware forwarding of multicast traffic occurs only after the source trees are formed.

You can configure separate ranges of addresses in the PIM domain using the multicast distribution modes described in the table below.

| Multicast Distribution Mode | Requires RP Configuration | Description |
|-----------------------------|---------------------------|--------------------------|
| ASM | Yes | Any source multicast |
| RPF routes for multicast | No | RPF routes for multicast |

PIM Configuration Tasks

The following steps configure PIM .

1. Select the range of multicast groups that you want to configure in each multicast distribution mode.
2. Enable PIM.
3. Follow the configuration steps for the multicast distribution modes that you selected in Step 1.
4. Configure message filtering.



Note The CLI commands used to configure PIM are as follows:

- Configuration commands begin with **ip pim**.
- Show commands begin with **show ip pim**.

Enabling the PIM Feature

Before you can access the PIM commands, you must enable the PIM feature.

Before you begin

Ensure that you have installed the Enterprise Services license.

Procedure

| | Command or Action | Purpose |
|---------------|--|--|
| Step 1 | configure terminal Example: <pre>switch# configure terminal switch(config)#</pre> | Enters global configuration mode. |
| Step 2 | feature pim Example: <pre>switch(config)# feature pim</pre> | Enables PIM. By default, PIM is disabled. |
| Step 3 | (Optional) show running-configuration pim Example: <pre>switch(config)# show running-configuration pim</pre> | Shows the running-configuration information for PIM. |
| Step 4 | (Optional) copy running-config startup-config Example: <pre>switch(config)# copy running-config startup-config</pre> | Copies the running configuration to the startup configuration. |

Configuring PIM Sparse Mode Parameters

You configure PIM sparse mode on every device interface that you want to participate in a sparse mode domain. You can configure the sparse mode parameters described in the table below.

Table 2: PIM Sparse Mode Parameters

| Parameter | Description |
|----------------------------|--|
| Global to the device | |
| Register rate limit | Configures the IPv4 register rate limit in packets per second. The range is from 1 to 65,535. 0 is no limit. |
| Initial holddown period | Configures the IPv4 initial holddown period in seconds. This holddown period is the time before the MRIB to come up initially. If you want faster convergence, enter a lower value. The range is from 0 to 210. Specify 0 to disable the holddown period. The default is 210. |
| Per device interface | |
| PIM sparse mode | Enables PIM on an interface. |
| Designated router priority | Sets the designated router (DR) priority that is advertised in PIM hello messages on this interface. In a multi-access network with multiple PIM-enabled routers, the router with the highest DR priority is elected as the DR router. If the priorities match, the software elects the DR with the highest IP address. The router that originates PIM register messages for the directly connected multicast sources and sends PIM register messages toward the rendezvous point (RP) for directly connected receivers. Values range from 1 to 255. The default is 1. |
| Designated router delay | Delays participation in the designated router (DR) election by setting the DR priority that is advertised in PIM hello messages to 0 for a specified period. During this delay, no DR changes occur, and the switch is given time to learn all of the multicast states on that interface. After the delay period, the correct DR priority is sent in the hello packets, which retriggers the DR election. Values range from 0 to 0xffff seconds. |
| Hello authentication mode | Enables an MD5 hash authentication key, or password, in PIM hello messages on the interface so that directly connected neighbors can authenticate each other. The PIM hello messages are IPsec-protected using the Authentication Header (AH) option. You can enter an unencrypted (cleartext) key or a 3-DES encrypted key, followed by a space and the MD5 authentication key: <ul style="list-style-type: none"> • 0—Specifies an unencrypted (cleartext) key • 3—Specifies a 3-DES encrypted key • 7—Specifies a Cisco Type 7 encrypted key The authentication key can be up to 16 characters. The default is disabled. |
| Hello interval | Configures the interval at which hello messages are sent in milliseconds. The range is from 1 to 18724286. The default is 30000. <p>Note See the <i>Cisco Nexus® 3550-T Verified Scalability Guide</i> for the verified range of values and associated PIM neighbor scale.</p> |

| Parameter | Description |
|-----------------|---|
| Neighbor policy | <p>Configures which PIM neighbors to become adjacent to based on a prefix-list policy.¹ If the policy does not exist or no prefix lists are configured in a policy, adjacency is established with all neighbors. The default is to become adjacent with all PIM neighbors.</p> <p>Note We recommend that you should configure this feature only if you are an experienced administrator.</p> <p>Note The PIM neighbor policy supports only prefix lists. It does not support ACLs or route maps.</p> |

¹ To configure prefix-list policies, see the *Cisco Nexus® 3550-T Unicast Routing Configuration* section.

Configuring PIM Sparse Mode Parameters

Procedure

| | Command or Action | Purpose |
|---------------|---|---|
| Step 1 | <p>configure terminal</p> <p>Example:</p> <pre>switch# configure terminal switch(config)#</pre> | Enters global configuration mode. |
| Step 2 | <p>(Optional) ip pim register-rate-limit rate</p> <p>Example:</p> <pre>switch(config)# ip pim register-rate-limit 1000</pre> | Configures the rate limit in packets per second. The range is from 1 to 65,535. The default is no limit. |
| Step 3 | <p>(Optional) [ip ipv4] routing multicast holddown holddown-period</p> <p>Example:</p> <pre>switch(config)# ip routing multicast holddown 100</pre> | Configures the initial holddown period in seconds. The range is from 90 to 210. Specify 0 to disable the holddown period. The default is 210. |
| Step 4 | <p>(Optional) show running-configuration pim</p> <p>Example:</p> <pre>switch(config)# show running-configuration pim</pre> | Displays PIM running-configuration information. |
| Step 5 | <p>interface interface</p> <p>Example:</p> <pre>switch(config)# interface ethernet 1/1 switch(config-if)#</pre> | Enters interface configuration mode. |
| Step 6 | <p>ip pim sparse-mode</p> <p>Example:</p> <pre>switch(config-if)# ip pim sparse-mode</pre> | Enables PIM sparse mode on this interface. The default is disabled. |

| | Command or Action | Purpose |
|----------------|--|--|
| Step 7 | (Optional) ip pim dr-priority <i>priority</i> Example: <pre>switch(config-if)# ip pim dr-priority 192</pre> | Sets the designated router (DR) priority that is advertised in PIM hello messages. Values range from 1 to 4294967295. The default is 1. |
| Step 8 | (Optional) ip pim dr-delay <i>delay</i> Example: <pre>switch(config-if)# ip pim dr-delay 3</pre> | <p>Delays participation in the designated router (DR) election by setting the DR priority that is advertised in PIM hello messages to 0 for a specified period. During this delay, no DR changes occur, and the current switch is given time to learn all of the multicast states on that interface. After the delay period expires, the correct DR priority is sent in the hello packets, which retriggers the DR election. Values range from 3 to 0xffff seconds.</p> <p>Note This command delays participation in the DR election only upon bootup or following an IP address or interface state change. It is intended for use with multicast-access Layer 3 interfaces only.</p> |
| Step 9 | (Optional) ip pim hello-authentication ah-md5 <i>auth-key</i> Example: <pre>switch(config-if)# ip pim hello-authentication ah-md5 my_key</pre> | <p>Enables an MD5 hash authentication key in PIM hello messages. You can enter an unencrypted (cleartext) key or one of these values followed by a space and the MD5 authentication key:</p> <ul style="list-style-type: none"> • 0—Specifies an unencrypted (cleartext) key • 3—Specifies a 3-DES encrypted key • 7—Specifies a Cisco Type 7 encrypted key <p>The key can be up to 16 characters. The default is disabled.</p> |
| Step 10 | (Optional) ip pim hello-interval <i>interval</i> Example: <pre>switch(config-if)# ip pim hello-interval 25000</pre> | <p>Configures the interval at which hello messages are sent in milliseconds. The range is from 1000 to 18724286. The default is 30000.</p> <p>Note The minimum value is 1 millisecond.</p> |
| Step 11 | (Optional) show ip pim interface [<i>interface</i> brief] [vrf <i>vrf-name</i> all] | Displays PIM interface information. |

| | Command or Action | Purpose |
|----------------|--|--|
| | Example: switch(config-if)# show ip pim interface | |
| Step 12 | (Optional) copy running-config startup-config Example: switch(config-if)# copy running-config startup-config | Copies the running configuration to the startup configuration. |

Configuring Layer 3 Multicast Receiver VLAN

Procedure

| | Command or Action | Purpose |
|---------------|--|--|
| Step 1 | configure terminal Example: switch# configure terminal switch(config)# | Enters global configuration mode. |
| Step 2 | interface interface Example: switch(config)# interface ethernet 1/1 switch(config-if)# | Enters interface configuration mode. |
| Step 3 | switchport Example: switch(config-if)# switchport | Enables Layer 2 mode. |
| Step 4 | switchport mode trunk Example: switch(config-if)# switchport mode trunk | Enables Layer 2 Trunk mode. |
| Step 5 | [no] switchport trunk l3-multicast receiver-vlan vlan-id Example: switch(config-if)# switchport trunk l3-multicast receiver-vlan 5 | Enables receiver vlan on trunk port. |
| Step 6 | (Optional) show running-config interface ethernet slot/port Example: switch(config-if)# show running-config interface ethernet1/1 | Displays the configured receiver vlan. |

Configuring ASM

To configure ASM mode, you configure sparse mode and the RP selection method, where you indicate the distribution mode and assign the range of multicast groups.

Configuring Static RPs

You can configure an RP statically by configuring the RP address on every router that will participate in the PIM domain.



Note We recommend that the RP address uses the loopback interface and also the interface with the RP address must have **ip pim sparse-mode** enabled.

You can specify a route-map policy name that lists the group prefixes to use with the **match ip multicast** command or specify a prefix-list method of configuration.



Note Cisco NX-OS always uses the longest-match prefix to find the RP, so the behavior is the same irrespective of the position of the group prefix in the route map or in the prefix list.

The following example configuration produces the same output using Cisco NX-OS (231.1.1.0/24 is always denied irrespective of the sequence number):

```
ip prefix-list plist seq 10 deny 231.1.1.0/24
ip prefix-list plist seq 20 permit 231.1.0.0/16
ip prefix-list plist seq 10 permit 231.1.0.0/16
ip prefix-list plist seq 20 deny 231.1.1.0/24
```

Configuring Static RPs

Before you begin

Ensure that you have installed the Enterprise Services license and enabled PIM.

Procedure

| | Command or Action | Purpose |
|---------------|---|--|
| Step 1 | configure terminal Example: switch# configure terminal switch(config)# | Enters global configuration mode. |
| Step 2 | ip pim rp-address <i>rp-address</i> [group-list <i>ip-prefix</i> prefix-list <i>name</i> route-map <i>policy-name</i>] Example: switch(config)# ip pim rp-address 192.0.2.33 group-list 224.0.0.0/9 | Configures a PIM static RP address for a multicast group range. You can specify a prefix-list policy name for the static RP address or a route-map policy name that lists the group prefixes to use with the match ip multicast command. |

| | Command or Action | Purpose |
|---------------|---|--|
| | | The mode is ASM. The example configures PIM ASM mode for the specified group range. |
| Step 3 | (Optional) show ip pim group-range [<i>ip-prefix</i> vrf <i>vrf-name</i>] Example: switch(config)# show ip pim group-range | Displays PIM RP information. |
| Step 4 | (Optional) copy running-config startup-config Example: switch(config)# copy running-config startup-config | Copies the running configuration to the startup configuration. |

Configuring RPF Routes for Multicast

You can define reverse path forwarding (RPF) routes for multicast when you want multicast data to diverge from the unicast traffic path. You can define RPF routes for multicast on border routers to enable RPF to an external network.

Multicast routes are used not to directly forward traffic but to make RPF checks. RPF routes for multicast cannot be redistributed.

Before you begin

Ensure that you have installed the Enterprise Services license and enabled PIM.

Procedure

| | Command or Action | Purpose |
|---------------|--|--|
| Step 1 | configure terminal Example: switch# configure terminal switch(config)# | Enters global configuration mode. |
| Step 2 | ip mroute { <i>ip-addr mask</i> <i>ip-prefix</i> } { <i>next-hop</i> <i>nh-prefix</i> <i>interface</i> } [<i>route-preference</i>] [vrf <i>vrf-name</i>] Example: switch(config)# ip mroute 192.0.2.0/24 10.0.0.1 | Configures an RPF route for multicast for use in RPF calculations. Route preference values range from 1 to 255. The default preference is 1. |
| Step 3 | (Optional) show ip static-route [multicast] [vrf <i>vrf-name</i>] Example: switch(config)# show ip static-route multicast | Displays configured static routes. |

| | Command or Action | Purpose |
|--------|--|--|
| Step 4 | (Optional) <code>copy running-config startup-config</code> | Copies the running configuration to the startup configuration. |

Configuring Message Filtering

You can configure filtering of the PIM messages described in the table below.

Table 3: PIM Message Filtering

| Message Type | Description |
|-----------------------------|---|
| Global to the Device | |
| PIM register policy | Enables PIM register messages to be filtered based on a route-map policy ² where you can specify group or group and source addresses with the match ip multicast command. This policy applies to routers that act as an RP. The default is disabled, which means that the software does not filter PIM register messages. |
| Per Device Interface | |
| Join-prune policy | Enables join-prune messages to be filtered based on a route-map policy where you can specify group, group and source, or group and RP addresses with the match ip multicast command. The default is no filtering of join-prune messages. |

² For information about configuring route-map policies, see the *Cisco Nexus® 3550-T Unicast Routing Configuration* section.

Route maps as a filtering policy can be used (either **permit** or **deny** for each statement) for the following commands:

- The **jp-policy** command can use (*,G) or (RP,G).
- The **igmp report-policy** command can use (*,G).

Route maps as containers can be used for the following commands, where the route-map action (**permit** or **deny**) is ignored:

- The **ip pim rp-address route map** command can use only G.
- The **ip igmp static-oif route map** command can use (*,G) and (*,G-range).

Configuring Message Filtering

Before you begin

Ensure that you have installed the Enterprise Services license and enabled PIM.

Procedure

| | Command or Action | Purpose |
|---------------|---|---|
| Step 1 | configure terminal Example: switch# configure terminal switch(config)# | Enters global configuration mode. |
| Step 2 | (Optional) ip pim log-neighbor-changes Example: switch(config)# ip pim log-neighbor-changes | Enables syslog messages that list the neighbor state changes to be generated. The default is disabled. |
| Step 3 | interface interface Example: switch(config)# interface ethernet 1/1 switch(config-if)# | Enters interface mode on the specified interface. |
| Step 4 | (Optional) ip pim jp-policy policy-name [in out] Example: switch(config-if)# ip pim jp-policy my_jp_policy | Enables join-prune messages to be filtered based on a route-map policy where you can specify group, group and source, or group and RP addresses with the match ip multicast command. The default is no filtering of join-prune messages. |
| Step 5 | (Optional) show run pim Example: switch(config-if)# show run pim | Displays PIM configuration commands. |
| Step 6 | (Optional) copy running-config startup-config Example: switch(config-if)# copy running-config startup-config | Copies the running configuration to the startup configuration. |

Restarting the PIM Processes

When routes are flushed, they are removed from the Multicast Routing Information Base (MRIB) and the Multicast Forwarding Information Base (MFIB).

When you restart PIM, the following tasks are performed:

- The PIM database is deleted.
- The MRIB and MFIB are unaffected and forwarding of traffic continues.
- The multicast route ownership is verified through the MRIB.
- Periodic PIM join and prune messages from neighbors are used to repopulate the database.

Restarting the PIM Process

Before you begin

Ensure that you have installed the Enterprise Services license and enabled PIM.

Procedure

| | Command or Action | Purpose |
|---------------|--|--|
| Step 1 | restart pim Example: switch# restart pim | Restarts the PIM process. Note Traffic loss might occur during the restart process. |
| Step 2 | configure terminal Example: switch# configure terminal switch(config)# | Enters global configuration mode. |
| Step 3 | ip pim flush-routes Example: switch(config)# ip pim flush-routes | Removes routes when the PIM process is restarted. By default, routes are not flushed. |
| Step 4 | (Optional) show running-configuration pim Example: switch(config)# show running-configuration pim | Displays the PIM running-configuration information, including the flush-routes command. |
| Step 5 | (Optional) copy running-config startup-config Example: switch(config)# copy running-config startup-config | Copies the running configuration to the startup configuration. |

Verifying the PIM Configuration

To display the PIM configuration information, perform one of the following tasks.

| Command | Description |
|--|--|
| show ip mroute [<i>ip-address</i>] [detail summary] | Displays the IP multicast routing table. The detail option displays detailed route information. The summary option displays route counts and packet rates. |
| show ip pim group-range [<i>ip-prefix</i>] [vrf vrf-name all] | Displays the learned or configured group addresses, group names, and modes. For similar information, see the ip pim rp command. |

| Command | Description |
|---|---|
| show ip pim interface [<i>interface</i> brief] [vrf vrf-name all] | Displays information by the interface. |
| show ip pim neighbor [interface <i>interface</i> <i>ip-prefix</i>] [vrf vrf-name all] | Displays neighbors by the interface. |
| show ip pim oif-list <i>group</i> [<i>source</i>] [vrf vrf-name all] | Displays all the interfaces in the outgoing interface (OIF) list. |
| show ip pim route [<i>source</i> <i>group</i> [<i>source</i>]] [vrf vrf-name all] | Displays information for each multicast route, including interfaces on which a PIM join for (*, G) has been received. |
| show ip pim rp [<i>ip-prefix</i>] [vrf vrf-name all] | Displays rendezvous points (RPs) known to the software, how they were learned, and their address ranges. For similar information, see the show ip pim group-range command. |
| show running-config pim | Displays the running-configuration information for PIM. |
| show startup-config pim | Displays the startup-configuration information for PIM. |
| show ip pim vrf [<i>vrf-name</i> all] [detail] | Displays per-VRF information. |

Displaying Statistics

You can display and clear PIM statistics by using the commands in this section.

Displaying PIM Statistics

You can display the PIM statistics and memory usage using these commands.

| Command | Description |
|---|---|
| show ip pim policy statistics | Displays policy statistics for register, RP, and join-prune message policies. |
| show ip pim statistics [vrf vrf-name] | Displays global statistics. |

Clearing PIM Statistics

You can clear the PIM statistics using these commands.

| Command | Description |
|---|---|
| clear ip pim interface statistics <i>interface</i> | Clears counters for the specified interface. |
| clear ip pim policy statistics | Clears policy counters for register, RP, and join-prune message policies. |

| Command | Description |
|---|--|
| <code>clear ip pim statistics [vrf vrf-name]</code> | Clears global counters handled by the PIM process. |

Related Documents

| Related Topic | Document Title |
|------------------|--|
| Configuring VRFs | <i>Cisco Nexus® 3550-T Unicast Routing Configuration sec</i> |

MIBs

| MIBs | MIBs Link |
|---------------------|--|
| MIBs related to PIM | To locate and download supported MIBs, go to the following 3500-T MIBs |

