Multicast PIM Commands

This chapter describes the commands used to configure and monitor Protocol Independent Multicast (PIM).

Note For PIM-related commands, IPv4 is the default IP address family; however, many commands, including **clear pim** and **show pim** , include both an IPv4 and IPv6 prefix. To run commands related to IPv6, you must use the IPv6 prefix. You do not need to specify the IPv4 prefix to run IPv4-related commands.

For detailed information about multicast routing concepts, configuration tasks, and examples, refer to *Multicast Configuration Guide for Cisco CRS Routers*.

To use commands of this module, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using any command, contact your AAA administrator for assistance.

accept-register

To configure a rendezvous point (RP) router to filter Protocol Independent Multicast (PIM) register messages, use the **accept-register** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

accept-register *access-list-name*

Syntax Description

access-list-name	Access list number or name.

Command Default

No default behavior or values

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

The **accept-register** command prevents unauthorized sources from registering with the rendezvous point. If an unauthorized source sends a register message to the rendezvous point, the rendezvous point immediately sends back a register-stop message.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to restrict the rendezvous point. Sources in the Source Specific Multicast (SSM) range of addresses are not allowed to register with the rendezvous point. These statements need to be configured only on the rendezvous point.

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# accept-register no-ssm-range
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# exit
RP/0/RP0/CPU0:router(config)# ipv4 access-list no-ssm-range
RP/0/RP0/CPU0:router(config-ipv4-acl)# deny ipv4 any 232.0.0.0 0.255.255.255
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit any
```

auto-rp candidate-rp

To configure a router as a Protocol Independent Multicast (PIM) rendezvous point (RP) candidate that sends messages to the well-known CISCO-RP-ANNOUNCE multicast group (224.0.1.39), use the **auto-rp candidate-rp** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

auto-rp candidate-rp *type interface-path-id* **scope** *ttl-value* [**group-list** *access-list-name*] [**interval** *seconds*] [**bidir**]

Syntax Description

type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command in EXEC mode to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
scope *ttl-value*	Specifies a time-to-live (TTL) value (in router hops) that limits the scope of the auto-rendezvous point (Auto-RP) announce messages that are sent out of that interface. Range is 1 to 255.
group-list *access-list-name*	(Optional) Specifies an access list that describes the group ranges for which this router is the rendezvous point.
interval *seconds*	(Optional) Specifies the time between rendezvous point announcements. Range is 1 to 600.
bidir	(Optional) Specifies a bidirectional rendezvous point for PIM.

Command Default

A router is not configured as a PIM rendezvous point candidate by default.

seconds : 60

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

The **auto-rp candidate-rp** command is used by the rendezvous point for a multicast group range. The router sends an Auto-RP announcement message to the well-known group CISCO-RP-ANNOUNCE (224.0.1.39). This message announces the router as a candidate rendezvous point for the groups in the range described by the access list.

When the **interval** keyword is specified, the interval between Auto-RP announcements is set to number of *seconds* with the total hold time of the announcements automatically set to three times the interval time. The recommended interval time range is from 1 to 180 seconds.

The hold time of the Auto-RP announcement is the time for which the announcement is valid. After the designated hold time, the announcement expires and the entry is purged from the mapping cache until there is another announcement.

If the optional **group-list** keyword is omitted, the group range advertised is 224.0.0.0/4. This range corresponds to all IP multicast group addresses, which indicates that the router is willing to serve as the rendezvous point for all groups.

A router may be configured to serve as a candidate rendezvous point for more than one group range by a carefully crafted access list in the router configuration.

Note The **auto-rp candidate-rp** command is available for IPv4 address prefixes only.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to send rendezvous point announcements from all PIM-enabled interfaces for a maximum of 31 hops. The IP address by which the router wants to be identified as a rendezvous point is the IP address associated with GigabitEthernet interface 0/1/0/1. Access list 5 designates the groups that this router serves as the rendezvous point.

```
RP/0/RP0/CPU0:router(config)# ipv4 access-list 5
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit ipv4 any 224.0.0.0 15.255.255.255
RP/0/RP0/CPU0:router(config-ipv4-acl)# exit
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# auto-rp candidate-rp GigE 0/1/0/1 scope 31
group-list 5
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# end
```

The router identified in the following example advertises itself as the candidate rendezvous point and is associated with loopback interface 0 for the group ranges 239.254.0.0 to 239.255.255.255 and 224.0.0.0 to 231.255.255.255:

```
RP/0/RP0/CPU0:router(config)# ipv4 access-list 10
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit ipv4 any 239.254.0.0 0.0.255.255
RP/0/RP0/CPU0:router(config-ipv4-acl)# exit
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# auto-rp candidate-rp loopback 0 scope 16
group-list 10
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# end
```

Related Commands

Command	Description
auto-rp mapping-agent, on page 8	Configures the router to be a rendezvous point (RP) mapping agent on a specified interface.

auto-rp listen disable

To prevent a Protocol Independent Multicast (PIM) process from learning about IP multicast traffic for the auto-rendezvous point (Auto-RP) group 224.0.1.40 that is flooded across interfaces, use the **auto-rp listen disable** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

auto-rp listen disable

Command Default

PIM rendezvous point mappings are learned through Auto-RP.

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Note The **auto-rp listen disable** command is available for IPv4 address prefixes only.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to disable rendezvous point discovery:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# auto-rp listen disable
```

auto-rp mapping-agent

To configure the router to be a rendezvous point (RP) mapping agent on a specified interface, use the **auto-rp mapping-agent** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

auto-rp mapping-agent *type interface-path-id* **scope** *ttl-value* [**interval** *seconds*]

Syntax Description

type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command in EXEC mode to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
scope *ttl-value*	Specifies time-to-live (TTL) value in router hops that limits the scope of the rendezvous point discovery messages that are sent from that interface. Range is 1 to 255.
interval *seconds*	(Optional) Specifies the time, in seconds, between discovery messages. Range is 1 to 600.

Command Default

A router is not configured as a Protocol Independent Multicast (PIM) rendezvous point mapping agent by default.

seconds : 60

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

After the router is configured as a rendezvous point mapping agent and determines the rendezvous point-to-group mappings through the CISCO-RP-ANNOUNCE (224.0.1.39) group, the router sends the mappings in an auto-rendezvous point (Auto-RP) discovery message to the well-known group CISCO-RP-DISCOVERY (224.0.1.40). A PIM designated router (DR) listens to this well-known group to determine which rendezvous point to use.

More than one rendezvous point mapping agent can be configured in a network sending redundant information, for a slight increase in reliability.

The TTL value is used to limit the range, or scope, of a multicast transmission. Therefore, use this value only on border routers.

The mapping packets are always sourced out of the default interface but have the source IP address as the address of the *type* and *instance* arguments. Packets have a TTL of 1 to 255 and are sent out each configured interval. When not specified, the default is 60 seconds.

Note The **auto-rp mapping-agent** command is available for IPv4 address prefixes only.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to limit Auto-RP discovery messages to 20 hops:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# auto-rp mapping-agent pos 0/0/0/1 scope 20
```

Related Commands

Command	Description
auto-rp candidate-rp, on page 5	Configures a router as a Protocol Independent Multicast (PIM) rendezvous point (RP) candidate that sends messages to the well-known CISCO-RP-ANNOUNCE multicast group (224.0.1.39).

bsr-border

To stop the forwarding of bootstrap router (BSR) messages on a Protocol Independent Multicast (PIM) router interface, use the **bsr-border** command in PIM interface configuration mode. To return to the default behavior, use the **no** form of this command.

bsr-border

Command Default

BSR messages are forwarded on the PIM router interface.

Command Modes

PIM interface configuration

Command History

Release	Modification
Release 3.2	This command was introduced.

Usage Guidelines

When you configure the **bsr-border** command, no PIM Version 2 BSR messages are sent or received through the interface. You should configure an interface bordering another PIM domain with this command to avoid BSR messages from being exchanged between the two domains. BSR messages should not be exchanged between different domains, because routers in one domain may elect rendezvous points (RPs) in the other domain, resulting in protocol malfunction or loss of isolation between the domains.

Note This command is used for the purpose of setting up a PIM domain BSR message border, and not for multicast boundaries.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to configure the Packet-over-SONET/SDH (POS) 0/1/0/0 interface to be the PIM domain border:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# interface pos 0/1/0/0
RP/0/RP0/CPU0:router(config-pim-ipv4-if)# bsr-border
```

bsr candidate-bsr

To configure the router to announce its candidacy as a bootstrap router (BSR), use the **bsr candidate-bsr** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

bsr candidate-bsr *ip-address* [**hash-mask-len** *length*] [**priority** *value*]

Syntax Description

ip-address	IP address of the BSR router for the domain. For IPv4, this is an IP address in four-part dotted-decimal notation. For IPv6, the IP address is specified in hexadecimal format using 16-bit values between colons.
hash-mask-len *length*	(Optional) Specifies the length of a mask that is to be used in the hash function. • All groups with the same seed hash (correspond) to the same rendezvous point (RP). For example, if this value is 24, only the first 24 bits of the group addresses matter. This fact allows you to get one RP for multiple groups. • For IPv4 addresses, we recommend a value of 30. The range is 0 to 32. • For IPv6 addresses, we recommend a value of 126. The range is 0 to 128.
priority *value*	(Optional) Specifies the priority of the candidate BSR. Range is 1 to 255. We recommend the BSR with the higher priority. If the priority values are the same, the router with the higher IP address is the BSR.

Command Default

- *value* : 1
- Default C-RP cache state limit in both Candidate BSR and Elected BSR is 100.
- Configurable maximum C-RP cache in both BSR and Elected BSR is in the range of 1 - 100000.
- Default RP-group mapping state limit in PIMv2 router is 100.
- Configurable maximum RP-group mapping state in PIMv2 router is in the range of 1 - 100000.

Command Modes

PIM configuration

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 4.3	PIM BSR limits were introduced for this command.

Usage Guidelines

The **bsr candidate-bsr** command causes the router to send bootstrap messages to all its Protocol Independent Multicast (PIM) neighbors, with the address of the designated interface as the BSR address. Each neighbor compares the BSR address with the address it had from previous bootstrap messages (not necessarily received on the same interface). If the current address is the same or higher address, the PIM neighbor caches the current address and forwards the bootstrap message. Otherwise, the bootstrap message is dropped.

This router continues to be the BSR until it receives a bootstrap message from another candidate BSR saying that it has a higher priority (or if the same priority, a higher IP address).

Note Use the **bsr candidate-bsr** command only in backbone routers with good connectivity to all parts of the PIM domain. A subrouter that relies on an on-demand dial-up link to connect to the rest of the PIM domain is not a good candidate BSR.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to configure the router as a candidate BSR with a hash mask length of 30:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# bsr candidate-bsr 10.0.0.1 hash-mask-len 30
```

Related Commands

Command	Description
clear pim bsr, on page 17	Clears bootstrap router (BSR) entries from the Protocol Independent Multicast (PIM) rendezvous point (RP) group mapping cache.
show pim bsr candidate-rp, on page 64	Displays Protocol Independent Multicast (PIM) candidate rendezvous point (RP) information for the bootstrap router (BSR).
show pim bsr election, on page 66	Displays Protocol Independent Multicast (PIM) candidate election information for the bootstrap router (BSR).

bsr candidate-rp

To configure the router to advertise itself as a Protocol Independent Multicast (PIM) Version 2 candidate rendezvous point (RP) to the bootstrap router (BSR), use the **bsr candidate-rp** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

bsr candidate-rp *ip-address* [**group-list** *access-list*] [**interval** *seconds*] [**priority** *value*]

Syntax Description

ip-address	IP address of the router that is advertised as a candidate rendezvous point address.
group-list *access-list*	(Optional) Specifies the IP access list number or name that defines the group prefixes that are advertised in association with the rendezvous point address. The access list name cannot contain a space or quotation mark, and must begin with an alphabetic character to avoid confusion with numbered access lists.
interval *seconds*	(Optional) Specifies the candidate rendezvous point advertisement interval in seconds. Range is 30 to 600.
priority *value*	(Optional) Indicates the rendezvous point priority value. Range is 1 to 255.
bidir	(Optional) Configures a bidirectional (bidir) rendezvous point.

Command Default

- *value* : 1
- Default C-RP cache state limit in both Candidate BSR and Elected BSR is 100.
- Configurable maximum C-RP cache in both BSR and Elected BSR is in the range of 1 - 100000.
- Default RP-group mapping state limit in PIMv2 router is 100.
- Configurable maximum RP-group mapping state in PIMv2 router is in the range of 1 - 100000.

Command Modes

PIM configuration

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 4.3	PIM BSR limits were introduced for this command.

Usage Guidelines

The **bsr candidate-rp** command causes the router to send a PIM Version 2 message advertising itself as a candidate rendezvous point to the BSR. The addresses allowed by the access list, together with the router identified by the IP address, constitute the rendezvous point and its range of addresses for which it is responsible.

Note Use the **bsr candidate-rp** command only in backbone routers that have good connectivity to all parts of the PIM domain. That is, a stub router that relies on an on-demand dial-up link to connect to the rest of the PIM domain is not a good candidate rendezvous point.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to configure the router to advertise itself as a candidate rendezvous point to the BSR in its PIM domain. Access list number 4 specifies the group prefix associated with the candidate rendezvous point address 172.16.0.0. This rendezvous point is responsible for the groups with the prefix 239.

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# bsr candidate-rp 172.16.0.0 group-list 4
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# exit
RP/0/RP0/CPU0:router(config)# ipv4 access-list 4
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit ipv4 any 239.0.0.0 0.255.255.255
RP/0/RP0/CPU0:router(config-ipv4-acl)# end
```

Related Commands

Command	Description
bsr candidate-bsr, on page 11	Configures the router to announce its candidacy as a bootstrap router (BSR).

clear pim autorp

To clear auto-rendezvous point (Auto-RP) entries from the Protocol Independent Multicast (PIM) rendezvous point (RP) group mapping cache, use the **clear pim autorp** command in EXEC mode.

clear pim [**vrf** *vrf-name*] [**ipv4**] **autorp** [*rp-address*]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
rp-address	(Optional) Hostname or IP address of the rendezvous point, entered in *A.B.C.D.* format.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

If you do not explicitly specify a particular VRF, the default VRF is used.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows sample output before and after Auto-RP entries have been cleared from the PIM rendezvous point group mapping cache:

```
RP/0/RP0/CPU0:router# show pim group-map

IP PIM Group Mapping Table
(* indicates group mappings being used)
(+ indicates BSR group mappings active in MRIB)


Group Range     Proto  Client    Groups     RP address Info

224.0.1.39/32*  DM     static    1          0.0.0.0
224.0.1.40/32*  DM     static    1          0.0.0.0
224.0.0.0/24*   NO     static    0          0.0.0.0
232.0.0.0/8*    SSM    config    0          0.0.0.0
224.0.0.0/4*    SM     autorp    0          10.1.1.1   RPF: De0,10.1.1.1 (us)
224.0.0.0/4     SM     static    0          0.0.0.0    RPF: Null,0.0.0.0

RP/0/
```

```
RP0

/CPU0:router# clear pim autorp 232.0.0.0/8

RP/0/
RP0

/CPU0:router# show pim group-map


IP PIM Group Mapping Table
(* indicates group mappings being used)
(+ indicates BSR group mappings active in MRIB)

Group Range     Proto  Client    Groups     RP address Info

224.0.1.39/32*  DM     static    1          0.0.0.0
224.0.1.40/32*  DM     static    1          0.0.0.0
224.0.0.0/24*   NO     static    0          0.0.0.0
224.0.0.0/4*    SM     static    0          0.0.0.0    RPF: Null,0.0.0.0
```

clear pim bsr

To clear bootstrap router (BSR) entries from the Protocol Independent Multicast (PIM) rendezvous point (RP) group mapping cache, use the **clear pim bsr** command in EXEC mode.

clear pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **bsr**

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

If you do not explicitly specify a particular VRF, the default VRF is used.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows sample output before and after the BSR group mappings have been cleared from the rendezvous point group mapping cache:

```
RP/0/RP0/CPU0:router# show pim group-map


IP PIM Group Mapping Table
(* indicates group mappings being used)
(+ indicates BSR group mappings active in MRIB)

Group Range         Proto Client Groups RP address      Info

224.0.1.39/32*      DM    static 0      0.0.0.0
224.0.1.40/32*      DM    static 1      0.0.0.0
224.0.0.0/24*       NO    static 0      0.0.0.0
232.0.0.0/8*        SSM   config 0      0.0.0.0
224.0.0.0/4*        SM    bsr+   1      91.1.1.1        RPF: De0,91.1.1.1 (us)
224.0.0.0/4         SM    static 0      0.0.0.0         RPF: Null,0.0.0.
```

```
RP/0/RP0/CPU0:router# clear pim bsr
RP/0/RP0/CPU0:router# show pim group-map

IP PIM Group Mapping Table
(* indicates group mappings being used)
(+ indicates BSR group mappings active in MRIB)

Group Range          Proto Client Groups RP address      Info

224.0.1.39/32*       DM    static 0      0.0.0.0
224.0.1.40/32*       DM    static 1      0.0.0.0
224.0.0.0/24*        NO    static 0      0.0.0.0
232.0.0.0/8*         SSM   config 0      0.0.0.0
224.0.0.0/4*         SM    static 1      0.0.0.0         RPF: Null,0.0.0.0
```

Related Commands

Command	Description
show pim group-map, on page 85	Displays group-to-PIM mode mapping.

clear pim counters

To clear Protocol Independent Multicast (PIM) counters and statistics, use the **clear pim counters** command in EXEC mode.

clear pim [**vrf** *vrf-name*] [{ **ipv4** | **ipv6** }] **counters**

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

If you do not explicitly specify a particular VRF, the default VRF is used.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows sample output before and after clearing PIM counters and statistics:

```
RP/0/RP0/CPU0:router# show pim traffic
PIM Traffic Counters
Elapsed time since counters cleared: 1d01h

                  Received                       Sent
Valid PIM Packets 15759217                    15214426
Hello                9207                       12336
Join-Prune        1076805                      531981
Data Register    14673205                           0
Null Register       73205                           0
Register Stop           0                    14673205
Assert                  0                           0
Batched Assert          0                           0
Bidir DF Election       0                           0
BSR Message             0                           0
Candidate-RP Adv.       0                           0
```

```
Join groups sent                                    0
Prune groups sent                                   0
Output JP bytes                                     0
Output hello bytes                               4104

Errors:
Malformed Packets                                   0
Bad Checksums                                       0
Socket Errors                                       0
Subnet Errors                                       0
Packets dropped since send queue was full           0
Packets dropped due to invalid socket               0
Packets which couldn't be accessed                  0
Packets sent on Loopback Errors                     6
Packets received on PIM-disabled Interface          0
Packets received with Unknown PIM Version           0
```

This table describes the significant fields shown in the display.

Table 1: show pim traffic Field Descriptions

Field	Description
Elapsed time since counters cleared	Time (in days and hours) that had elapsed since the counters were cleared with the **clear pim counters** command.
Valid PIM Packets	Total PIM packets that were received and sent.
HelloJoin-PruneRegisterRegister StopAssert Bidir DF Election	Specific type of PIM packets that were received and sent.
Malformed Packets	Invalid packets due to format errors that were received and sent.
Bad Checksums	Packets received or sent due to invalid checksums.
Socket Errors	Packets received or sent due to errors from the router's IP host stack sockets.
Packets dropped due to invalid socket	Packets received or sent due to invalid sockets in the router's IP host stack.
Packets which couldn't be accessed	Packets received or sent due to errors when accessing packet memory.
Packets sent on Loopback Errors	Packets received or sent due to use of loopback interfaces.
Packets received on PIM-disabled Interface	Packets received or sent due to use of interfaces not enabled for PIM.
Packets received with Unknown PIM Version	Packets received or sent due to invalid PIM version numbers in the packet header.

```
RP/0/RP0/CPU0:router# clear pim counters
RP/0/RP0/CPU0:router# show pim traffic


PIM Traffic Counters
Elapsed time since counters cleared: 00:00:04
```

```
BSR Message                                    0    0
Candidate-RP Adv.                              0    0

Join groups sent                                    0
Prune groups sent                                   0
Output JP bytes                                     0
Output hello bytes                                  0

Errors:
Malformed Packets                                   0
Bad Checksums                                       0
Socket Errors                                       0
Subnet Errors                                       0
Packets dropped since send queue was full           0
Packets dropped due to invalid socket               0
Packets which couldn't be accessed                  0
Packets sent on Loopback Errors                     0
Packets received on PIM-disabled Interface          0
Packets received with Unknown PIM Version           0
```

Related Commands

Command	Description
show pim traffic, on page 136	Displays Protocol Independent Multicast (PIM) traffic counter information.

clear pim topology

To clear group entries from the Protocol Independent Multicast (PIM) topology table and reset the Multicast Routing Information Base (MRIB) connection, use the **clear pim topology** command in EXEC mode.

clear pim [**vrf** *vrf-name*] [{ **ipv4** | **ipv6** }] **topology** [{ *ip-address-name* | **reset** }]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
ip-address-name	(Optional) Can be either one of the following: • Name of the multicast group, as defined in the Domain Name System (DNS) hosts table or with the **domain IPv4** or **domain IPv6** **host** command. • IP address of the multicast group, in IPv4 or IPv6 format according to the specified address family.
reset	(Optional) Deletes all entries from the topology table and resets the MRIB connection.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

The **clear pim topology** command clears existing PIM routes from the PIM topology table. Information obtained from the MRIB table, such as Internet Group Management Protocol (IGMP) local membership, is retained. If a multicast group is specified, only those group entries are cleared.

When the command is used with no arguments, all group entries located in the PIM topology table are cleared of PIM protocol information.

If the **reset** keyword is specified, all information from the topology table is cleared and the MRIB connections are automatically reset. This form of the command can be used to synchronize state between the PIM topology table and the MRIB database. The **reset** keyword should be strictly reserved to force synchronized PIM and MRIB entries when communication between the two components is malfunctioning.

If you do not explicitly specify a particular VRF, the default VRF is used.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to clear the PIM topology table:

```
RP/0/RP0/CPU0:router# clear pim topology
```

dr-priority

To configure the designated router (DR) priority on a Protocol Independent Multicast (PIM) router, use the **dr-priority** command in the appropriate configuration mode. To return to the default behavior, use the **no** form of this command.

dr-priority *value*

Syntax Description

value	An integer value to represent DR priority. Range is from 0 to 4294967295.

Command Default

If this command is not specified in interface configuration mode, the interface adopts the DR priority value specified in PIM configuration mode.

If this command is not specified in PIM configuration mode, the DR priority value is 1.

Command Modes

PIM interface configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

If all the routers on the LAN support the DR priority option in the PIM Version 2 (PIMv2) hello message that they send, you can force the DR election by use of the **dr-priority** command so that a specific router on the subnet is elected as DR. The router with the highest DR priority becomes the DR.

When PIMv2 routers receive a hello message without the DR priority option (or when the message has priority of 0), the receiver knows that the sender of the hello message does not support DR priority and that DR election on the LAN segment should be based on IP address alone.

Note If this command is configured in PIM configuration mode, parameters are inherited by all new and existing interfaces. You can override these parameters on individual interfaces from PIM interface configuration mode.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to configure the router to use DR priority 4 for Packet-over-SONET/SDH (POS) interface 0/1/0/0, but other interfaces will inherit DR priority 2:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# dr-priority 2
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# interface pos 0/1/0/0
RP/0/RP0/CPU0:router(config-pim-ipv4-if)# dr-priority 4
```

embedded-rp

To configure the static address for the embedded rendezvous point (RP) on a Protocol Independent Multicast (PIM) router, use the **embedded-rp** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

embedded-rp *rp-address access-list* [**disable**]

Syntax Description

rp-address	Rendezvous point IPv6 address in *X:X::X* format.
access-list	Number or name of an IPv6 address access list that specifies embedded group ranges.
disable	Disables embedded RP processing.

Command Default

The static address for the embedded rendezvous point is not configured by default.

Command Modes

PIM configuration

Command History

Release	Modification
Release 3.2	This command was introduced.

Usage Guidelines

When the embedded rendezvous point is enabled (which is the default behavior of the PIM router), you should configure a static address for the rendezvous point for the embedded rendezvous point ranges. Additional configuration is not required on other IPv6 PIM routers, because those routers discover the rendezvous point address from the IPv6 group address.

Note The **embedded-rp** command is available only for IPv6 address prefixes.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to configure the static address for the embedded rendezvous point and specify an access list for group ranges:

```
RP/0/RP0/CPU0:router(config)# router pim address-family ipv6
RP/0/RP0/CPU0:router(config-pim-ipv6)# embedded-rp 2:2:2::2 acl_embed
RP/0/RP0/CPU0:router(config)# ipv6 access-list acl_embed
RP/0/RP0/CPU0:router(config-ipv6-acl)# permit ipv6 any ff73:240:2:2:2::/96
RP/0/RP0/CPU0:router(config-ipv6-acl)# permit ipv6 any ff74:240:2:2:2::/96
RP/0/RP0/CPU0:router(config-ipv6-acl)# permit ipv6 any ff75:240:2:2:2::/96
RP/0/RP0/CPU0:router(config-ipv6-acl)# permit ipv6 any ff76:240:2:2:2::/96
RP/0/RP0/CPU0:router(config-ipv6-acl)# permit ipv6 any ff77:240:2:2:2::/96
RP/0/RP0/CPU0:router(config-ipv6-acl)# permit ipv6 any ff78:240:2:2:2::/96
```

The following sample output displays the embedded rendezvous point information that was previously configured:

```
RP/0/RP0/CPU0:routerrouter# show pim ipv6 group-map

IP PIM Group Mapping Table
(* indicates group mappings being used)
(+ indicates BSR group mappings active in MRIB)

Group Range                                             Proto Client   Groups

ff02::/16*                                              NO    perm     0
  RP: ::
ff12::/16*                                              NO    perm     0
  RP: ::
ff22::/16*                                              NO    perm     0
  RP: ::
ff32::/16*                                              NO    perm     0
  RP: ::
ff42::/16*                                              NO    perm     0
  RP: ::
.
.
.
ff73:240:2:2:2::/96*                                    SM    embd-cfg 0
  RP: 2:2:2::2
  RPF: De6tunnel0,2:2:2::2 (us)
ff74:240:2:2:2::/96*                                    SM    embd-cfg 0
  RP: 2:2:2::2
  RPF: De6tunnel0,2:2:2::2 (us)
ff75:240:2:2:2::/96*                                    SM    embd-cfg 0
  RP: 2:2:2::2
  RPF: De6tunnel0,2:2:2::2 (us)
ff76:240:2:2:2::/96*                                    SM    embd-cfg 0
  RP: 2:2:2::2
  RPF: De6tunnel0,2:2:2::2 (us)
ff77:240:2:2:2::/96*                                    SM    embd-cfg 0
  RP: 2:2:2::2
  RPF: De6tunnel0,2:2:2::2 (us)
ff78:240:2:2:2::/96*                                    SM    embd-cfg 0
  RP: 2:2:2::2
  RPF: De6tunnel0,2:2:2::2 (us)
ff70::/12*                                              SM    embd     0
  RP: ::
  RPF: Null,::
fff0::/12*                                              NO    embd     0
  RP: ::
ff33::/32*                                              SSM   config   0
  RP: ::
```

Related Commands

Command	Description
rp-address, on page 50	Statically configures the address of a Protocol Independent Multicast (PIM) rendezvous point (RP) for a particular group.
show pim group-map, on page 85	Displays group-to-PIM mode mapping.

global maximum

To configure the global maximum limit states that are allowed by Protocol Independent Multicast (PIM) for all VRFs, use the **global maximum** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

global maximum [{**register states** | **route-interfaces** | **routes** *number*}]

Syntax Description

register states	(Optional) Specifies the PIM source register states for all VRFs. Range is 0 to 75000. **Note** PIM registers throttle at 20000 due to the default global threshold set.
route-interfaces	(Optional) Specifies the total number of PIM interfaces on routes for all VRFs. Range is 1 to 600000.
routes	(Optional) Specifies the PIM routes for all VRFs. Range is 1 to 200000.

Command Default

Default value is 20000.

Command Modes

PIM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

The **global maximum** command is used to set an upper limit for register states, route interfaces, and routes on all VRFs. When the limit is reached, PIM discontinues route interface creation for its topology table.

Note After the maximum threshold values for routes or route-interfaces are reached, throttling begins and will remain in effect until the values fall below 95% of the Maximum value.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to set the upper limit for PIM route interfaces on all VRFs to 200000:

```
RP/0/RP0/CPU0:router# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# global maximum route-interfaces 200000
```

global maximum bsr crp-cache threshold

To configure the global maximum bsr crp-cache threshold limit that are allowed by Protocol Independent Multicast (PIM) for all VRFs, use the **global maximum bsr** *crp-cache threshold* command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

[**global**] **maximum** [{**bsr** *crp-cache threshold*}]

Syntax Description

global	(Optional) Configures the maximum value for CRP cache and threshold limit to the sum of the caches in all VRFs.
crp-cache	Specifies the CRP cache value. The range is from 1 to 10000.
threshold	Specifies the threshold value for the crp-cache value. Range is between 1 to the set crp-cache value.

Command Default

No default behavior or values.

Command Modes

PIM configuration

Command History

Release	Modification
Release 4.2.0	This command was introduced.

Usage Guidelines

The **global maximum bsr** command is used to the threshold limits for the crp-cache levels.

Use the **global** keyword to configure the maximum value for CRP cache and threshold limit to the sum of the caches in all VRF. However, each VRF, including the default, will still have its own smaller maximum and threshold values. To set the maximum and threshold values in the default VRF, you should omit the **global** keyword.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to set a crp-cache of 2000 and the threshold level to 500 for the crp-cache in the router PIM configuration mode.

```
RP/0/RP0/CPU0:router# router pim

RP/0/RP0/CPU0:router(config-pim)# global maximum bsr crp-cache 2000 ?
   threshold  Set threshold to print warning
   <cr>
```

```
RP/0/RP0/CPU0:router(config-pim)# global maximum bsr crp-cache 2000 threshold ?
   <1-2000>  Threshold value
RP/0/RP0/CPU0:router(config-pim)# global maximum bsr crp-cache 2000 threshold 500
RP/0/RP0/CPU0:router(config-pim)#
```

The following example shows how to set a crp-cache of 2000 and the threshold level to 500 for the crp-cache in the router PIM configuration mode in VRF sub-mode.

```
RP/0/RP0/CPU0:router# router pim

RP/0/RP0/CPU0:router(config-pim)# address-family ipv4

RP/0/RP0/CPU0:router(config-pim-default-ipv4)# global maximum bsr crp-cache 2000 threshold
 500

RP/0/RP0/CPU0:router(config-pim-default-ipv4)# maximum bsr crp-cache 1800 threshold 450

RP/0/RP0/CPU0:router(config-pim-default-ipv4)#
```

The following configuration shows how to set the maximum and threshold level in the default VRF, while all VRFs together have a larger global maximum and threshold level:

```
RP/0/RP0/CPU0:router# router pim

RP/0/RP0/CPU0:router(config-pim)# address-family ipv4

RP/0/RP0/CPU0:router(config-pim-default-ipv4)# global maximum bsr crp-cache 600 threshold
550

RP/0/RP0/CPU0:router(config-pim-default-ipv4)# maximum bsr crp-cache 500 threshold 450

RP/0/RP0/CPU0:router(config-pim-default-ipv4)#
```

hello-interval (PIM)

To configure the frequency of Protocol Independent Multicast (PIM) hello messages, use the **hello-interval** command in the appropriate configuration mode. To return to the default behavior, use the **no** form of this command.

hello-interval *seconds*

Syntax Description

seconds	Interval at which PIM hello messages are sent. Range is 1 to 3600.

Command Default

Default is 30 seconds.

Command Modes

PIM interface configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

Routers configured for IP multicast send PIM hello messages to establish PIM neighbor adjacencies and to determine which router is the designated router (DR) for each LAN segment (subnet).

To establish these adjacencies, at every hello period, a PIM multicast router multicasts a PIM router-query message to the All-PIM-Routers (224.0.0.13) multicast address on each of its multicast-enabled interfaces.

PIM hello messages contain a hold-time value that tells the receiver when the neighbor adjacency associated with the sender should expire if no further PIM hello messages are received. Typically the value of the hold-time field is 3.5 times the interval time value, or 120 seconds if the interval time is 30 seconds.

Use the **show pim neighbor** command to display PIM neighbor adjacencies and elected DRs.

Note If you configure the **hello-interval** command in PIM configuration mode, parameters are inherited by all new and existing interfaces. You can override these parameters on individual interfaces from PIM interface configuration mode.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to configure the PIM hello message interval to 45 seconds. This setting is adopted by all interfaces excluding the 60 second interval time set for Packet-over-SONET/SDH (POS) interface 0/1/0/0:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# hello-interval 45
```

```
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# interface pos 0/1/0/0
RP/0/RP0/CPU0:router(config-pim-ipv4-if)# hello-interval 60
```

Related Commands

Command	Description
dr-priority, on page 24	Configures the designated router (DR) priority on a Protocol Independent Multicast (PIM) router.
show pim neighbor, on page 98	Displays the Protocol Independent Multicast (PIM) neighbors discovered by means of PIM hello messages.

interface (PIM)

To configure Protocol Independent Multicast (PIM) interface properties, use the **interface** command in PIM configuration mode. To disable multicast routing on an interface, use the **no** form of this command.

interface *type interface-path-id*

Syntax Description

type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command in EXEC mode to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

No default behavior or values

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

Use the **interface** command to configure PIM routing properties for specific interfaces. Specifically, this command can be used to override the global settings for the following commands:

- dr-priority
- hello-interval
- join-prune-interval

Use the **interface** command also to enter PIM interface configuration mode.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to enter interface configuration mode to configure PIM routing properties for specific interfaces:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# interface pos 0/1/0/0
```

```
RP/0/RP0/CPU0:router
/CPU0:router(config-pim-ipv4-if)#
```

Related Commands

Command	Description
dr-priority, on page 24	Configures the designated router (DR) priority on a Protocol Independent Multicast (PIM) router.
hello-interval (PIM), on page 30	Configures the frequency of Protocol Independent Multicast (PIM) hello messages.
join-prune-interval, on page 35	Configures the join and prune interval time for Protocol Independent Multicast (PIM) protocol traffic.

interface all disable

To disable Protocol Independent Multicast (PIM) processing on all interfaces, use the **interface all disable** command in PIM configuration mode. To re-enable PIM processing on all interfaces, use the **no** form of this command.

interface all disable

Command Default

No default behavior or values

Command Modes

PIM configuration

Command History

Release	Modification
Release 3.5.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to disable PIM processing on all interfaces:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# interface all disable
```

join-prune-interval

To configure the join and prune interval time for Protocol Independent Multicast (PIM) protocol traffic, use the **join-prune-interval** command in the appropriate configuration mode. To return to the default behavior, use the **no** form of this command.

join-prune-interval *seconds*

Syntax Description

seconds	Interval, in seconds, at which PIM multicast traffic can join or be removed from the shortest path tree (SPT) or rendezvous point tree (RPT). Range is 10 to 600.

Command Default

If this command is not specified in PIM interface configuration mode, the interface adopts the join and prune interval parameter specified in PIM configuration mode.

If this command is not specified in PIM configuration mode, the join and prune interval is 60 seconds.

Command Modes

PIM interface configuration

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

Note If this command is configured in PIM configuration mode, parameters are inherited by all new and existing interfaces. You can override these parameters on individual interfaces from PIM interface configuration mode.

The **join-prune-interval** command is used to configure the frequency at which a PIM sparse-mode router sends periodic join and prune messages.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to change the join and prune interval time to 90 seconds on Packet-over-SONET/SDH (POS) interface 0/1/0/0:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# interface pos 0/1/0/0
RP/0/RP0/CPU0:router(config-pim-ipv4-if)# join-prune-interval 90
```

join-prune-mtu

To configure the maximum size of a PIM Join/Prune message, use the **join-prune-mtu** command in the appropriate mode. To return to the default value, use the **no** form of the command.

join-prune-mtu *value*

Syntax Description

value	Join-prune MTU in bytes. Range is 576 to 65535.

Command Default

65535 bytes

Command Modes

Router PIM configuration mode

Command History

Release	Modification
Release 4.3.1	This command was introduced.

Usage Guidelines

The actual maximum size used for PIM Join/Prune messages is the smaller of the, IP MTU value of the interface and the join-prune-mtu value. In normal operation without this configuration, the PIM Join/Prune packet is packed with Join/Prune messages until the interface MTU size limit is reached. This can lead to large PIM Join/Prune message packets getting sent out, which may affect the processing efficiency on some neighboring routers. Configuring the maximum size of a PIM Join/Prune message helps controlling the MTU size of the PIM Join/Prune packet getting sent out.

Task ID

Task ID	Operation
multicast	read, write

Example

This example shows how to use the **join-prune mtu** command:

```
RP/0/RP0/CPU0:router (config-pim) # join-prune-mtu 1000
```

maximum autorp mapping-agent-cache

To configure the maximum cache setting for an auto-rendezvous point (Auto-RP), use the **maximum autorp mapping-agent-cache** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

maximum autorp mapping-agent-cache *cache-size*

Syntax Description

cache-size	(Required) Specifies the mapping agent cache. Maximum cache size range is 1 to 100.

Command Default

No default behavior or values

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to set the maximum mapping agent cache size to 66:

```
RP/0/RP0/CPU0:router# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# maximum autorp mapping-agent-cache 66
```

Related Commands

Command	Description
maximum group-mappings autorp, on page 38	Configures the maximum number of Protocol Independent Multicast (PIM) group map ranges learned through the auto-rendezvous point (Auto-RP) mechanism.
show pim summary, on page 116	Displays configured Protocol Independent Multicast (PIM) out-of-resource (OOR) limits and current counts.

maximum group-mappings autorp

To configure the maximum number of Protocol Independent Multicast (PIM) group map ranges learned through the auto-rendezvous point (Auto-RP) mechanism, use the **maximum group-mappings** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

maximum group-mappings autorp *number*

Syntax Description

number	Maximum number of PIM group mappings. Range is 1 to 5000.

Command Default

number : 500

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.2	This command was introduced.

Usage Guidelines

The **maximum group-mappings autorp** command lets you set the upper limit for the PIM out-of-resource (OOR) configuration range. The range is initiated from the Auto-RP mapping agent announcement. When the limit has been reached, PIM does not create additional Auto-RP group mapping ranges.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to set the upper limit number for group mapping to 200:

```
RP/0/RP0/CPU0:router# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# maximum group-mappings autorp 200
```

Related Commands

Command	Description
maximum autorp mapping-agent-cache, on page 37	Configures the maximum cache setting for an auto-rendezvous point (Auto-RP).
show pim summary, on page 116	Displays configured Protocol Independent Multicast (PIM) out-of-resource (OOR) limits and current counts.

maximum register-states

To configure the maximum number of sparse-mode source register states that is allowed by Protocol Independent Multicast (PIM), use the **maximum register-states** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

maximum register-states *number*

Syntax Description

number	Maximum number of PIM sparse-mode source register states. Range is 0 to 75000.

Command Default

number : 20000

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

The **maximum register-states** command is used to set an upper limit for PIM register states. When the limit is reached, PIM discontinues route creation from PIM register messages.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to set the upper limit for PIM register states to 10000:

```
RP/0/RP0/CPU0:router# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# maximum register-states 10000
```

Related Commands

Command	Description
show pim summary, on page 116	Displays configured Protocol Independent Multicast (PIM) out-of-resource (OOR) limits and current counts.

maximum route-interfaces

To configure the maximum number of route interface states that is allowed by Protocol Independent Multicast (PIM), use the **maximum route-interfaces** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

maximum route-interfaces *number*

Syntax Description

number	Maximum number of PIM route interface states. Range is 1 to 600000.

Command Default

number : 30000

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

The **maximum route-interfaces** command is used to set an upper limit for route interface states. When the limit is reached, PIM discontinues route interface creation for its topology table.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to set the upper limit for PIM route interface states to 200000:

```
RP/0/RP0/CPU0:router# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# maximum route-interfaces 200000
```

Related Commands

Command	Description
show pim summary, on page 116	Displays configured Protocol Independent Multicast (PIM) out-of-resource (OOR) limits and current counts.

maximum routes

To configure the maximum number of routes that is allowed by Protocol Independent Multicast (PIM), use the **maximum routes** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

maximum routes *number*

Syntax Description

number	Maximum number of PIM routes. Range is 1 to 200000.

Command Default

number : 100000

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

The **maximum routes** command is used to set an upper limit for PIM routes. When the limit is reached, PIM discontinues route creation for its topology table.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to set the upper limit for PIM routes to 200000:

```
RP/0/RP0/CPU0:router# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# maximum routes 200000
```

Related Commands

Command	Description
show pim summary, on page 116	Displays configured Protocol Independent Multicast (PIM) out-of-resource (OOR) limits and current counts.

mofrr

To perform a fast convergence (multicast-only fast reroute, or MoFRR) of specified routes/flows when a failure is detected on one of multiple equal-cost paths between the router and the source, use the **mofrr** command under PIM configuration mode.

mofrr rib *acl_name*

Syntax Description

acl_name	Specifies the flows (S, G) s to be enabled by MoFRR.
rib	Configures MoFRR based on RIB convergence.

Command Default

MoFRR is not enabled by default.

If no VRF is specified, the default VRF is operational.

Command Modes

PIM configuration

PIM vrf configuration

PIM address-family IPv4 and IPv6 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

MoFRR is a mechanism in which two copies of the same multicast stream flow through disjoint paths in the network. At the point in the network (usually the PE closer to the receivers) where the two streams merge, one of the streams is accepted and forwarded on the downstream links, while the other stream is discarded.
.

MoFRR is triggered when a failure is detected on the primary path. MoFRR transmits a multicast join message to PIM from a receiver towards a source on a primary path and then transmits a secondary multicast join message from the receiver towards the source on a backup path. Data packets are received from the primary and secondary paths, with the redundant packets being discarded at topology merge points based on reverse-path forwarding (RPF) checks.

Note Triggered joins are sent when the primary or the secondary RPF information changes. No RPF change prunes are sent for MoFRR streams.

When a failure is detected on the primary path, the repair occurs by changing the interface on which packets are accepted to the secondary interface. Because the repair is local, it is fast and greatly improves convergence times should link or node failures occur on the primary path.

MoFRR switchover occurs at the software level in PIM, based on RIB convergence. Convergence-based switchovers can occur at a frequency of approximately 200 ms for an estimated 400 streams.

Note MoFRR supports all ECMP hashing algorithms except the source-only hash algorithm. The secondary path is chosen by running the same algorithm on the set of paths that does not include the primary path.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to configure MoFRR:

```
RP/0/RP0/CPU0:router# router pim
RP/0/RP0/CPU0:router(config-pim)# mofrr rib acl-green

RP/0/RP0/CPU0:router# router pim
RP/0/RP0/CPU0:router(config-pim)# address-family ipv4
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# mofrr acl-green
```

Related Commands

Command	Description
show mfib counter	Displays Multicast Forwarding Information Base (MFIB) counter statistics for packets that have dropped.
show mfib route	Displays route entries in the MFIB.
show mrib route	Displays all entries in the Multicast Routing Information Base (MRIB).
show pim rpf hash, on page 108	Displays MoFRR hashing information for Routing Information Base (RIB) lookups used to predict RPF next-hop paths for routing tables in PIM.
show pim rpf summary, on page 114	Displays summary information about the interaction of PIM with the RIB.
show pim topology detail, on page 125	Displays detailed PIM routing topology information that includes references to the tables in which reverse path forwarding (RPF) lookups occurred for specific topology route entries.
show pim topology, on page 120	Displays PIM routing topology table information for a specific group or all groups.

neighbor-check-on-recv enable

To block the receipt of join and prune messages from non-Protocol Independent Multicast (PIM) neighbors, use the **neighbor-check-on-recv enable** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

neighbor-check-on-recv enable

Syntax Description

This command has no keywords or arguments.

Command Default

Join and prune messages that are sent from non-PIM neighbors are received and not rejected.

Command Modes

PIM configuration

Command History

Release	Modification
Release 3.2	This command was introduced as **neighbor-check-on-recv disable** .
Release 3.4.0	Command was changed to **neighbor-check-on-recv enable** .

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to enable PIM neighbor checking on received join and prune messages:

```
RP/0/RP0/CPU0:router# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# neighbor-check-on-recv enable
```

Related Commands

Command	Description
neighbor-check-on-send enable , on page 45	Enables Protocol Independent Multicast (PIM) neighbor checking when sending join and prune messages.

neighbor-check-on-send enable

To enable Protocol Independent Multicast (PIM) neighbor checking when sending join and prune messages, use the **neighbor-check-on-send enable** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

neighbor-check-on-send enable

Syntax Description

This command has no keywords or arguments.

Command Default

Join and prune messages are sent to non-PIM neighbors.

Command Modes

PIM configuration

Command History

Release	Modification
Release 3.2	This command was introduced as **neighbor-check-on-send disable** .
Release 3.4.0	Command was changed to **neighbor-check-on-send enable** .

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to enable PIM neighbor checking when sending join and prune messages:

```
RP/0/RP0/CPU0:router# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# neighbor-check-on-send enable
```

Related Commands

Command	Description
neighbor-check-on-recv enable, on page 44	Blocks the receipt of join and prune messages from non-Protocol Independent Multicast (PIM) neighbors.

neighbor-filter

To filter Protocol Independent Multicast (PIM) neighbor messages from specific IP addresses, use the **neighbor-filter** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

neighbor-filter *access-list*

Syntax Description

access-list	Number or name of a standard IP access list that denies PIM packets from a source.

Command Default

PIM neighbor messages are not filtered.

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

The **neighbor-filter** command is used to prevent unauthorized routers on the LAN from becoming PIM neighbors. Hello messages from addresses specified in the command are ignored.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to configure PIM to ignore all hello messages from IP address 10.0.0.1:

```
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# neighbor-filter 1
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# exit
RP/0/RP0/CPU0:router(config)# ipv4 access-list 1
RP/0/RP0/CPU0:router(config-ipv4-acl)# deny ipv4 any 10.0.0.1/24
```

nsf lifetime (PIM)

To configure the nonstop forwarding (NSF) timeout value for the Protocol Independent Multicast (PIM) process, use the **nsf lifetime** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

nsf lifetime *seconds*

Syntax Description

seconds	Maximum time for NSF mode in seconds. Range is 10 to 600.

Command Default

seconds : 120

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

While in PIM NSF mode, PIM is recovering multicast routing topology from the network and updating the Multicast Routing Information Base (MRIB). After the PIM NSF timeout value is reached, PIM signals the MRIB and resumes normal operation.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following command shows how to set the PIM NSF timeout value to 30 seconds:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# nsf lifetime 30
```

Related Commands

Command	Description
nsf (multicast)	Turns on NSF capability for the multicast routing system.
show igmp nsf	Displays the state of NSF operation in IGMP.
show mfib nsf	Displays the state of NSF operation for the MFIB line cards.
show mrib nsf	Displays the state of NSF operation in the MRIB.
show pim nsf, on page 101	Displays the state of NSF operation for PIM.

old-register-checksum

To configure a Cisco IOS XR designated router (DRs) in a network where the rendezvous point is running an older version of Cisco IOS software, use the **old-register-checksum** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

old-register-checksum

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

Cisco IOS XR software accepts register messages with checksum on the Protocol Independent Multicast (PIM) header and the next 4 bytes only. This differs from the Cisco IOS method that accepts register messages with the entire PIM message for all PIM message types. The **old-register-checksum** command generates and accepts registers compatible with Cisco IOS software. This command is provided entirely for backward compatibility with Cisco IOS implementations.

Note To allow interoperability with Cisco IOS rendezvous points running older software, run this command on all DRs in your network running Cisco IOS XR software. Cisco IOS XR register messages are incompatible with Cisco IOS software.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to set a source designated router (DR) to generate a register compatible with an earlier version of Cisco IOS XR PIM rendezvous point:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# old-register-checksum
```

router pim

To enter Protocol Independent Multicast (PIM) configuration mode, use the **router pim** command in global

configuration mode. To return to the default behavior, use the **no** form of this command.

router pim [**address family** { **ipv4** | **ipv6** }]

Syntax Description

address-family	(Optional) Specifies which address prefixes to use.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

The default is IPv4 address prefixes.

Command Modes

Global configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.2	The **address-family** keyword was added.

Usage Guidelines

From PIM configuration mode, you can configure the address of a rendezvous point (RP) for a particular group, configure the nonstop forwarding (NSF) timeout value for the PIM process, and so on.

Task ID

Task ID	Operations
multicast	read, write

Examples

This example shows how to enter PIM configuration mode for IPv4 address prefixes:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)#
```

This example shows how to enter PIM configuration mode for IPv4 address prefixes and specify the **address-family ipv6** keywords:

```
RP/0/RP0/CPU0:router(config)# router pim address-family ipv4
RP/0/RP0/CPU0:router(config-pim-default-ipv4)#

RP/0/RP0/CPU0:router(config)# router pim address-family ipv6
RP/0/RP0/CPU0:router(config-pim-default-ipv6)#
```

rp-address

To statically configure the address of a Protocol Independent Multicast (PIM) rendezvous point (RP) for a particular group, use the **rp-address** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

rp-address *ip-address* [*group-access-list*] [**override**] [**bidir**]

Syntax Description

ip-address	IP address of a router to be a PIM rendezvous point. This address is a unicast IP address in four-part dotted-decimal notation.
group-access-list	(Optional) Name of an access list that defines for which multicast groups the rendezvous point should be used. This list is a standard IP access list.
override	(Optional) Indicates that if there is a conflict, the rendezvous point configured with this command prevails over the rendezvous point learned through the auto rendezvous point (Auto-RP) or BSR mechanism.
bidir	(Optional) Configures a bidirectional (bidir) rendezvous point.

Command Default

No PIM rendezvous points are preconfigured.

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

All routers within a common PIM sparse mode (PIM-SM) or bidir domain require the knowledge of the well-known PIM rendezvous point address. The address is learned through Auto-RP, BSR, or is statically configured using this command.

If the optional *group-access-list-number* argument is not specified, the rendezvous point for the group is applied to the entire IP multicast group range (224.0.0.0/4).

You can configure a single rendezvous point to serve more than one group. The group range specified in the access list determines the PIM rendezvous point group mapping. If no access list is specified, the rendezvous point default maps to 224/4.

If the rendezvous point for a group is learned through a dynamic mechanism, such as Auto-RP, this command might not be required. If there is a conflict between the rendezvous point configured with this command and one learned by Auto-RP, the Auto-RP information is used unless the **override** keyword is specified.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to set the PIM rendezvous point address to 10.0.0.1 for all multicast groups:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# rp-address 10.0.0.1
```

The following example shows how to set the PIM rendezvous point address to 172.16.6.21 for groups 225.2.2.0 - 225.2.2.255:

```
RP/0/RP0/CPU0:router(config)# ipv4 access-list 1
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit ipv4 any 225.2.2.0 0.0.0.255
RP/0/RP0/CPU0:router(config-ipv4-acl)# exit
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-ipv4)# rp-address 172.16.6.21
RP/0/RP0/CPU0:router(config-pim-ipv4)#
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# rp-address 172.16.6.21
```

The following example shows how to set the PIM rendezvous point address to 172.17.1.1 to serve the bidirectional group range defined in access list user1:

```
RP/0/RP0/CPU0:router(config)# ipv4 access-list user1
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit ipv4 any 230.0.0.0 0.255.255.255
RP/0/RP0/CPU0:router(config-ipv4-acl)# exit
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# rp-address 172.17.1.1 user1 bidir
RP/0/RP0/CPU0:router(config-pim-default-ipv4)#
```

Related Commands

Command	Description
ipv4 access-list	Defines a standard IP access list. For more information, see *IP Addresses and Services Command Reference for Cisco CRS Routers*

rpf topology route-policy

To assign a route policy in PIM to select a reverse-path forwarding (RPF) topology, use the **rpf topology route-policy** command in PIM command mode. To disable this configuration, use the **no** form of this command.

rpf topology route-policy *policy-name*

Syntax Description

policy-name	(Required) Name of the specific route policy that you want PIM to associate with a reverse-path forwarding topology.

Command Default

No default behavior or values

Command Modes

PIM configuration

PIM address-family configuration

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

For information about routing policy commands and how to create a routing policy, see *Routing Command Reference for Cisco CRS Routers* and *Routing Configuration Guide for Cisco CRS Routers*.

To assign a route policy using an IPv6 address family prefix, you must enter the command as shown in the Examples section.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following examples show how to associate a specific routing policy in PIM with a RPF topology table for IPv4 and IPv6 address family prefixes:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# rpf topology route-policy mypolicy
RP/0/RP0/CPU0:router(config)# router pim address-family ipv6
RP/0/RP0/CPU0:router(config-pim-default-ipv6)# rpf topology route-policy mypolicy
```

rpf-redirect

To assign a rpf-redirect route policy in PIM, use the **rpf-redirect route-policy** command in PIM command mode. To disable this configuration, use the **no** form of this command.

rpf-redirect route-policy *policy-name*

Syntax Description

policy-name	(Required) Name of the specific route policy that you want PIM to associate with a reverse-path forwarding topology.

Command Default

No default behavior or values

Command Modes

PIM configuration

PIM address-family configuration

Command History

Release	Modification
Release 4.3.0	This command was introduced.

Usage Guidelines

For information about routing policy commands and how to create a routing policy, see *Routing Command Reference for Cisco CRS Routers* and *Routing Configuration Guide for Cisco CRS Routers*.

Task ID

Task ID	Operation
Multicast	read, write

Example

The following example shows how to associate a specific rpf-redirect routing policy to an rpf-redirect bundle for IPv4 address family prefixes:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim)#address-family ipv4
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# rpf-redirect route-policy <route-policy>
```

rpf-redirect bundle

To assign a rpf-redirect bundle in PIM, use the **rpf-redirect bundle** command in PIM command mode. To disable this configuration, use the **no** form of this command.

rpf-redirect bundle <*bundle name*>**bandwidth** <*number in kbps*>**threshold** <*number in kbps*>

Syntax Description

bundle name	(Required) Name of the specific bundle route policy that you want PIM to associate with a reverse-path forwarding topology.
number in kbps (bandwidth)	(Required) The value of the bandwidth in kbps.
number in kbps (threshold)	(Required) The threshold value of the bandwidth set in kbps.

Command Default

No default behavior or values

Command Modes

PIM configuration

PIM address-family configuration

Interface mode

Command History

Release	Modification
Release 4.3.0	This command was introduced.

Usage Guidelines

For information about routing policy commands and how to create a routing policy, see *Routing Command Reference for Cisco CRS Routers* and *Routing Configuration Guide for Cisco CRS Routers*.

Task ID

Task ID	Operation
Multicast	read, write

Example

The following examples show how to associate a specific routing policy bundle in PIM with a RPF redirect for IPv4 address family prefixes:

The following command adds the **GigBitEthernet0/0/4/7** interface to the PIM bundle **WEST** and allows maximum of **6000 kbps** to be used by multicast, and initiates a syslog, an alarm message when the usage reaches the threshold **5000 kbps**.

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim)#address-family ipv4
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# hello-interval 1
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# join-prune-interval 15
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# rpf-redirect route-policy directv
```

```
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# nsf lifetime 60
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# interface GigabitEthernet0/0/4/7
RP/0/RP0/CPU0:router(config-pim-ipv4-if)# enable
RP/0/RP0/CPU0:router(config-pim-ipv4-if)# rpf-redirect bundle WEST bandwidth 6000 threshold
 5000
```

rpf-vector

To enable Reverse Path Forwarding (RPF) vector signaling for Protocol Independent Multicast (PIM), use the **rpf-vector** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

rpf-vector

Syntax Description

This command has no keywords or arguments.

Command Default

By default, RPF vector signaling is disabled.

Command Modes

PIM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.

Usage Guidelines

RPF vector is a PIM proxy that lets core routers without RPF information forward join and prune messages for external sources (for example, a Multiprotocol Label Switching [MPLS]-based BGP-free core, where the MPLS core router is without external routes learned from Border Gateway Protocol [BGP]).

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to enable RPF vector:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# rpf-vector
```

rp-static-deny

To configure the deny range of the static Protocol Independent Multicast (PIM) rendezvous point (RP), use the **rp-static-deny** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

rp-static-deny *access-list*

Syntax Description

access-list	Name of an access list. This list is a standard IP access list.

Command Default

No default behavior or values

Command Modes

PIM configuration

Command History

Release	Modification
Release 3.5.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to configure the PIM RP deny range:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# rp-static-deny listA
```

Related Commands

Command	Description
ipv4 access-list	Defines a standard IP access list.

show auto-rp candidate-rp

To display the group ranges that this router represents (advertises) as a candidate rendezvous point (RP), use the **show auto-rp candidate-rp** command in EXEC mode

.

show auto-rp [**ipv4**] **candidate-rp**

Syntax Description

ipv4	(Optional) Specifies IPv4 address prefixes.

Command Default

IPv4 addressing is the default.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** keyword was added.

Usage Guidelines

The **show auto-rp candidate-rp** command displays all the candidate rendezvous points configured on this router.

Information that is displayed is the time-to-live (TTL) value; the interval from which the rendezvous point announcements were sent; and the mode, such as Protocol Independent Multicast (PIM) sparse mode (SM), to which the rendezvous point belongs.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show auto-rp candidate-rp** command:

```
RP/0/RP0/CPU0:router# show auto-rp candidate-rp

Group Range    Mode   Candidate RP   ttl  interval
224.0.0.0/4     SM       10.0.0.6     30      30
```

This table describes the significant fields shown in the display.

Table 2: show auto-rp candidate-rp Field Descriptions

Field	Description
Group Range	Multicast group address and prefix for which this router is advertised as a rendezvous point.
Mode	PIM protocol mode for which this router is advertised as a rendezvous point , either PIM-SM or bidirectional PIM (bidir).

Field	Description
Candidate RP	Address of the interface serving as a rendezvous point for the range.
ttl	TTL scope value (in router hops) for Auto-RP candidate announcement messages sent out from this candidate rendezvous point interface.
interval	Time between candidate rendezvous point announcement messages for this candidate rendezvous point interface.

Related Commands

Command	Description
auto-rp mapping-agent, on page 8	Configures the router to be a rendezvous point (RP) mapping agent on a specified interface.

show auto-rp mapping-agent

To display the mapping agent cache, use the **show auto-rp mapping-agent** command in EXEC mode

.

show auto-rp [**ipv4**] **mapping-agent**

Syntax Description

ipv4	(Optional) Specifies a particular IPv4 address prefix.

Command Default

IPv4 addressing is the default.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** and **trace** keywords were added.

Usage Guidelines

The **show auto-rp mapping-agent** command shows all the system-wide candidate rendezvous point (RP) announcements that originate from the same or different multicast groups.

Information that is displayed shows that the mapping agent selects one rendezvous point for the group. If two rendezvous point announcements are bound for the same group, the mapping agent selects the one with the higher IP address as the "winner" and sends that out to the CISCO-RP-DISCOVERY group. All multicast routers join this group.

Task ID

Task ID	Operations
multicast	read

Examples

The following sample output shows that the mapping agent has received two candidate rendezvous point announcements for the same group range (224/4) and has selected the one with the higher IP address (winner indicated by a *):

```
RP/0/RP0/CPU0:router# show auto-rp mapping-agent

Mapping Agent Table
10.0.0.6 (expire : 80 secs)
  224.0.0.0/4  SM  *
10.0.0.2 (expire : 75 secs)
  224.0.0.0/4  SM
```

This table describes the significant fields shown in the display.

Table 3: show auto-rp mapping-agent Field Descriptions

Field	Description
10.0.0.6	Rendezvous point address of the advertised candidate rendezvous point.
(expire : 80 secs)	Hold time remaining until the candidate rendezvous point expires from the mapping agent cache.
224.0.0.0/4	Group range (address and prefix) that the candidate rendezvous point serves.
SM	PIM protocol mode for which this router is advertised as a rendezvous point.
*	Winning rendezvous point for the group range.

Related Commands

Command	Description
auto-rp candidate-rp, on page 5	Configures a router as a Protocol Independent Multicast (PIM) rendezvous point (RP) candidate that sends messages to the well-known CISCO-RP-ANNOUNCE multicast group (224.0.1.39).

show pim bgp-safi

To display multicast distribution tree (MDT) secondary address family (SAFI) entries created in Protocol Independent Multicast (PIM), use the **show pim bgp-safi** command in

EXEC mode

.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **bgp-safi**

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.6.0	This command was introduced.
Release 3.9.0	Asplain format for 4-byte Autonomous system numbers notation was supported. The input parameters and output were modified to display 4-byte autonomous system numbers and extended communities in either asplain or asdot notations..

Usage Guidelines

This command has two purposes:

- Creates core SSM trees.
- Resolves RPF path for extranet.

A trigger creates the output displayed when you issue this command:

- The remote PE router uses BGP to advertise the MDT SAFI to PIM.
- PIM creates SAFI entries independently in forward-reference mode to link extranet paths.

Task ID

Task ID	Operations
multicast	read

Examples

The following example shows the output of the **show pim bgp-safi** command:

```
RP/0/RP0/CPU0:router# show pim bgp-safi
grp 226.0.0.1   src 1.1.1.1     rd 1111:1       nexthop 1.1.1.1
grp 226.0.0.2   src 1.1.1.1     rd 111:2        nexthop 1.1.1.1
grp 226.0.0.3   src 1.1.1.1     rd 111:3        nexthop 1.1.1.1
grp 226.0.0.4   src 1.1.1.1     rd 111:4        nexthop 1.1.1.1
```

```
grp 226.0.0.5   src 1.1.1.1     rd 111:5        nexthop 1.1.1.1
grp 226.0.0.6   src 1.1.1.1     rd 111:6        nexthop 1.1.1.1
grp 226.0.0.7   src 1.1.1.1     rd 111:7        nexthop 1.1.1.1
grp 226.0.0.8   src 1.1.1.1     rd 111:8        nexthop 1.1.1.1
grp 226.0.0.9   src 1.1.1.1     rd 111:9        nexthop 1.1.1.1
```

For descriptions of the fields in the foregoing output examples, see this table:

Table 4: show pim bgp-safi Field Descriptions

Field	Description
Grp	MDT default group of a multicast VRF (MVRF) acquired from BGP.
Src	MDT source of originating PE router.
RD	MVRF route distinguisher configured in BGP.
Nexthop	BGP next hop of the PE router advertising this SAFI entry.
Ext	Number of extranet paths linked to this SAFI entry.
BGP	Entries created by BGP a remote PE that used BGP to advertise the MDT SAFI to PIM (trigger 1).

show pim bsr candidate-rp

To display Protocol Independent Multicast (PIM) candidate rendezvous point (RP) information for the bootstrap router (BSR), use the **show pim bsr candidate-rp** command in

EXEC mode

.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **bsr candidate-rp**

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read

Examples

The following example shows how to display PIM candidate rendezvous point information:

```
RP/0/RP0/CPU0:router# show pim bsr candidate-rp

PIM BSR Candidate RP Info

Cand-RP     mode    scope     priority    uptime   group-list
91.1.1.1    SM       16          255      00:00:00     224/4
```

This table describes the significant fields shown in the display.

Table 5: show pim bsr candidate-rp Field Descriptions

Field	Description
Cand-RP	IP address of the candidate BSR rendezvous point.
mode	PIM mode of the candidate BSR rendezvous point.
scope	Number of messages sent.
priority	Candidate BSR rendezvous point priority value.
uptime	Time candidate BSR rendezvous point has been up.

Related Commands

Command	Description
bsr candidate-bsr, on page 11	Configures the router to announce its candidacy as a bootstrap router (BSR).

show pim bsr election

To display Protocol Independent Multicast (PIM) candidate election information for the bootstrap router (BSR), use the **show pim bsr election** command in

EXEC mode

.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **bsr election**

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read

Examples

This example shows how to display PIM candidate election information:

```
RP/0/RP0/CPU0:router# show pim bsr election

PIM BSR Election State

Cand/Elect-State      Uptime     BS-Timer    BSR                 C-BSR

Inactive/Accept-Any   00:00:00   00:00:00    0.0.0.0 [0, 0]   99.1.1.1 [0, 30]
```

This table describes the significant fields shown in the display.

Table 6: show pim bsr election Field Descriptions

Field	Description
Cand/Elect-State	Current candidate BSR state. Possible states include: • No-Info • Not-Elected • Pending • Elected Elect-State indicates the current elected BSR state. Possible states include: • Accept-Any • Accept-Preferred
Uptime	Time the candidate BSR has been up.
BS-Timer	Time remaining before the bootstrap timer fires.
BSR	BSR IP address.
C-BSR	IP address, priority, and hash mask length of the candidate BSR.

Related Commands

Command	Description
bsr candidate-bsr, on page 11	Configures the router to announce its candidacy as a bootstrap router (BSR).

show pim bsr rp-cache

To display Protocol Independent Multicast (PIM) rendezvous point (RP) cache information for the bootstrap router (BSR), use the **show pim bsr rp-cache** command in

EXEC mode

.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **bsr rp-cache**

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim bsr rp-cache** command:

```
RP/0/RP0/CPU0:router# show pim bsr rp-cache

Group(s) 224.0.0.0/4, RP count 1
RP-addr         Priority    Holdtime(s)   Uptime    Expires
40.40.40.1      255         150           03:05:03  00:02:12
```

This table describes the significant fields shown in the display.

Table 7: show pim bsr rp-cache Field Descriptions

Field	Description
Group(s), RP count	Group range and number of rendezvous points.

Field	Description
RP-addr	IP address of the rendezvous point.
Priority	Priority value of the rendezvous point.
Holdtime(s)	Time the rendezvous point announcement is valid.
Uptime	Time the rendezvous point announcement expires.

Related Commands

Command	Description
bsr candidate-rp, on page 13	Configures the router to advertise itself as a Protocol Independent Multicast (PIM) Version 2 candidate rendezvous point (RP) to the bootstrap router (BSR).

show pim context

To show the reverse path forwarding (RPF) table information configured for a VRF context, use the **show pim context** command in

EXEC mode

mode.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **context**

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read

Examples

The following example illustrates output from use of the **show pim context** command:

```
RP/0/RP0/CPU0:router# show pim  vrf 101 context

VRF ID: 0x60000000
Table ID: 0xe0000000
Remote Table ID: 0xe0800000
MDT Default Group : 0.0.0.0
MDT handle: 0x0
Context Active, ITAL Active
Routing Enabled
Registered with MRIB
Not owner of MDT Interface
Raw socket req: T, act: T, LPTS filter req: T, act: T
UDP socket req: T, act: T, UDP vbind req: T, act: T
Reg Inj socket req: F, act: F, Reg Inj LPTS filter req: F, act: F
Mhost Default Interface : Null (publish pending: F)
Remote MDT Default Group : 0.0.0.0
Neighbor-filter: -
```

The following table gives the field descriptions for the **show pim context** command output:

Table 8: show pim context Field Descriptions

Field	Description
VRF ID	VPN routing and forwarding instance identification.
Table ID	Identification of unicast default table as of VRF context activation.
Remote Table ID	Identifies the table ID of the opposite address family. For example, the remote table ID for the VRF context of the
MDT Default Group	Identifies the multicast distribution tree (MDT) group configured as the default for use by the VRF.
Context Active	Identifies whether or not the VRF context was activated.
ITAL Active	Identifies whether or not the VRF is registered with ITAL. If it is, this signifies that the VRF is configured globally.
Routing Enabled	Identifies whether or not PIM is enabled in the VRF.
Registered with MRIB	Identifies whether or not the VRF is registered with Multicast Routing Information Base (MRIB).
Not owner of MDT interface	Identifies a process as not being the owner of the MDT interface. The owner is either the PIM or the PIM IPv6 process.
Owner of MDT interface	Identifies the owner of the MDT interface. The owner is either the PIM or the PIM IPv6 process.
Raw socket req:	Raw socket operations requested.
act:	Action: Indicates whether or not the operations were performed.
T; F	True; False
LPTS filter req	Identifies whether or not the VRF was requested to be added to the socket.
UDP socket req	Identifies whether or not a UDP socket was requested.
UDP vbind req	Identifies whether or not the VRF was added to the UDP socket.
Reg Inj socket req	This Boolean indicates whether or not the register inject socket, used for PIM register messages, was requested.
Reg Inj LPTS filter req	Indicates whether or not the VRF was added to the register inject socket.
Mhost Default Interface	Identifies the default interface to be used for multicast host (Mhost).

Field	Description
Remote MDT Default Group	Identifies the MDT transiting this VRF or address family in use by the remote address family.
Neighbor-filter	Name of the neighbor filter used to filter joins or prunes from neighbors. If the there is no neighbor filter, the output reads: "-".

show pim context detail

To display detailed information about reverse path forwarding (RPF) tables configured for a VRF context, use the **show pim context detail** command in EXEC mode.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **context detail**

Syntax Description

vrf *vrf-name*	(Optional) Displays a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Displays IPv4 address prefixes.
ipv6	(Optional) Displays IPv6 address prefixes.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read

Examples

The following sample output shows the default RPF table information in boldface at the end:

```
RP/0/RP0/CPU0:router# show pim ipv6 context detail

VRF ID: 0x60000000
Table ID: 0xe0000000
Remote Table ID: 0xe0800000
MDT Default Group : 0.0.0.0
MDT handle: 0x0
Context Active, ITAL Active
Routing Enabled
Not Registered with MRIB
Not owner of MDT Interface
Raw socket req: T, act: T, LPTS filter req: T, act: T
UDP socket req: T, act: T, UDP vbind req: T, act: T
Reg Inj socket req: F, act: F, Reg Inj LPTS filter req: F, act: F
Mhost Default Interface : GigabitEthernet0/5/0/0 (publish pending: F)
Remote MDT Default Group : 0.0.0.0
MDT MTU: 1376
MDT max aggregation: 255
MDT Data Switchover Interval: 30 secs
MDT interface retry count: 0
Virtual interfaces not added in IM
Not registered with MRIB
RIB multipath RPF not enabled
```

```
RIB multipath interface not hashed
Not MBGP
OSPF TE not intact
IS-IS TE not intact
Auto RP listen enabled
All interfaces disable operation not done
LPTS sock added
Default granges
Auto RP listen sock added
RPF topology selection route-policy: mt4-p3
Number of Tables: 12 (2 active)
Default RPF Table: IPv4-Unicast-default
   Active, Table ID 0xe0000000
   Registered with ITAL, Registered with RIB
   NSF RIB converged, , NSF RIB converge not received
```

Table 9: show pim context detail Field Descriptions

Field	Description
VRF ID	VPN routing and forwarding instance identification.
Table ID	Identification of unicast default table as of VRF context activation.
Remote Table ID	Identifies the table ID of the opposite address family. For example, the remote table ID for the VRF context of the IPv6 process would be the table ID of the IPv4 process. In the context of an IPv4 process, the remote table ID would be that of the IPv6 address family.
MDT Default Group	Identifies the multicast distribution tree (MDT) group configured as the default for use by the VRF.
MDT handle	Identifies the handle for multicast packets to be passed through the MDT interface.
Context Active	Identifies whether or not the VRF context was activated.
ITAL Active	Identifies whether or not the VRF is registered with ITAL. If it is, this signifies that the VRF is configured globally.
Routing Enabled	Identifies whether or not PIM is enabled in the VRF.
Registered with MRIB	Identifies a VRF as registered with Multicast Routing Information Base (MRIB).
Not owner of MDT interface	Identifies a process as not being the owner of the MDT interface. The owner is either the PIM or the PIM IPv6 process.
Owner of MDT interface	Identifies the owner of the MDT interface. The owner is either the PIM or the PIM IPv6 process.
Raw socket req:	Raw socket operations requested.
act:	Action: Indicates whether or not the operations were performed.

Field	Description
T; F	True; False
LPTS filter req	Identifies whether or not the VRF was requested to be added to the socket.
UDP socket req	Identifies whether or not a UDP socket was requested.
UDP vbind req	Identifies whether or not the VRF was added to the UDP socket.
Reg Inj socket req	This Boolean indicates whether or not the register inject socket, used for PIM register messages, was requested.
Reg Inj LPTS filter req	Indicates whether or not the VRF was added to the register inject socket.
Mhost Default Interface	Identifies the default interface to be used for multicast host (Mhost).
Remote MDT Default Group	Identifies the MDT transiting this VRF or address family in use by the remote address family.
MDT MTU	Identifies the maximum transmission unit value of the multicast distribution tree (MDT).
MDT max aggregation	Identifies the maximum MDT aggegation value.
MDT Data Switchover Interval	Identifies the MDT data swichover interval.
MDT interface retry count	Identifies the number of retries by the MDT interface.
Virtual interfaces not added in IM	Identifies the virtual interfaces not added in IM.
Not registered with MRIB	Identifies a VRF as not registered with the Multicast Routing Information Base (MRIB).
RIB multipath RPF not enabled	Signifies that the RIB multipath RPF is not enabled.
RIB multipath interface not hashed	Signifies that the RIB multipath inteface was not hashed.
Not MBGP	Not Multicast Border Gateway protocol.
OSPF TE not intact	Signifies that OSPF protocol traffic engineering is not intact.
IS-IS TE not intact	Signifies that IS-IS protocol traffic engineering is not intact.
Auto RP listen enabled	Signifies that an automatic RP listening socket was enabled.
All interfaces disable operation not done	Signfies that an all interfaces disable operation was not completed.
LPTS sock added	Identifies an LPTS socket added.
Default granges	Identifies the default granges.
Auto RP listen sock added	Signifies that an automatic RP listening socket was added.

Field	Description
RPF topology selection route-policy	Identifies the route policy for RPF topology.
mt4-p3	Flag that indicates that traffic on this route passed a threshold for the data MDT.
Number of Tables	Identifies the number of tables.
Default RPF Table	Identifies the default RPF table.
IPv4-Unicast-default	Identifies the IPv4 unicast default.
Active, Table ID	Identifies the ID of the active table.
Registered with ITAL	Signifies output is registered with ITAL.
Registered with RIB	Signifies output is registered with RIB.
NSF RIB converged	Signifies receipt of NSF RIB convergence.
	Signifies that NSF RIB convergence information was not received.

show pim context table

To display a summary list of all tables currently configured for a VRF context, use the **show pim context table** command in

EXEC mode

.

show pim [**vrf vrf-name**] [{**ipv4** | **ipv6**}] **context table**

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read

Examples

The following example illustrates the output for PIM table contexts for a VRF default after using the **show pim context table** command:

RP/0/ RP0 /CPU0:router# **show pim ipv4 context table**

```
PIM Table contexts for VRF default

Table                                TableID       Status
IPv4-Unicast-default                 0xe0000000    Active
IPv4-Multicast-default               0xe0100000    Active
IPv4-Multicast-t201                  0xe010000b    Active
IPv4-Multicast-t202                  0xe010000c    Active
IPv4-Multicast-t203                  0xe010000d    Active
IPv4-Multicast-t204                  0xe010000e    Active
IPv4-Multicast-t205                  0xe010000f    Active
IPv4-Multicast-t206                  0xe0100010    Active
IPv4-Multicast-t207                  0xe0100011    Active
IPv4-Multicast-t208                  0x00000000    Inactive
IPv4-Multicast-t209                  0x00000000    Inactive
IPv4-Multicast-t210                  0x00000000    Inactive
```

Table 10: show pim ipv4 context table Field Descriptions

Field	Description
Table	Context table name.
Table ID	RSI table ID for the table.
Status	Identifies whether or not the context table is active or inactive. The table displays “Active” if it was globally configured under a given VRF, and if RSI considers it to be active. The table displays “Inactive” if the opposite is true.

show pim df election-state

To display bidirectional designated forwarder (DF) election state for a rendezvous point (RP) or interface, use the **show pim df election-state** command in

EXEC mode

.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **df election-state** [*rp-ip-address*] [*type interface-path-id*]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
rp-ip-address	(Optional) IP address or name of the rendezvous point. • IP address as defined in the Domain Name System (DNS) hosts table or with the domain IPv4 host in the format *A.B.C.D.* • IP address as defined in the Domain Name System (DNS) hosts table or with the domain IPv6 host in the form of *X:X::X.*
type	(Optional) Interface type. For more information, use the question mark (?) online help function.
interface-path-id	(Optional) Physical interface or virtual interface. **Note** Use the **show interfaces** command in EXEC mode to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

The **show pim df election-state** command shows the state of DF election on an individual interface or individual rendezvous point (RP) basis. The DF election may result in one of the following states: Offer, Winner, Lose, or Backoff.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim df election-state** command; the far right column shows the interface route metric toward the RP:

```
RP/0/RP0/CPU0:router# show pim df election-state pos 0/4/0/0

RP               Interface              DF State         Timer         Metrics
172.16.1.3        POS0/4/0/0            Winner           7s 956ms      [110/2]
172.16.1.6        POS0/4/0/0            Lose             0s 0ms        [inf/inf]
```

This table describes the significant fields shown in the display.

Table 11: show pim df election-state Field Descriptions

Field	Description
RP	Address of the rendezvous point.
Interface	Interface on which the DF election takes place.
DF State	DF election state for this router: Offer, Winner, Lose, or Backoff.
Timer	Time for which the DF election state is valid.
Metrics	Unicast routing metric for the rendezvous point sent from the DF election.

Related Commands

Command	Description
domain ipv4 host	Defines a static hostname-to-address mapping in the host cache using IPv4. For more information, see *IP Addresses and Services Command Reference for Cisco CRS Routers*
show pim df winner , on page 81	Displays the bidirectional DF “winner” for a rendezvous point or an interface.

show pim df winner

To display the bidirectional designated forwarder (DF) "winner" for a rendezvous point (RP) or interface, use the **show pim df winner** command in EXEC mode.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **df winner** [*rp-ip-address*] [*type interface-path-id*]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
rp-ip-address	(Optional) IP address of the rendezvous point: • IP address as defined in the Domain Name System (DNS) hosts table or with the domain IPv4 host in the format *A.B.C.D.* • IP address as defined in the Domain Name System (DNS) hosts table or with the domain IPv6 host in the form of *X:X::X.*
type	(Optional) Interface type. For more information, use the question mark (?) online help function.
interface-path-id	(Optional) Physical interface or virtual interface. **Note** Use the **show interfaces** command in EXEC mode to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

The **show pim df winner** command displays the DF winner address for each interface or rendezvous point.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim df winner** command; the far right column shows the winner metric toward the rendezvous point:

```
RP/0/RP0/CPU0:router# show pim df winner 172.16.1.3

RP               Interface              DF Winner        Metrics
172.16.1.3        Loopback3             172.17.3.2        [110/2]
172.16.1.3        Loopback2             172.17.2.2        [110/2]
172.16.1.3        Loopback1             172.17.1.2        [110/2]
172.16.1.3        POS0/2/0/2             10.10.2.3        [0/0]
172.16.1.3        POS0/2/0/0             10.10.1.2        [110/2]
```

This table describes the significant fields shown in the display.

Table 12: show pim df winner Field Descriptions

Field	Description
RP	Rendezvous point address.
Interface	Interface on which the DF election takes place.
DF Winner	DF winner address.
Metrics	Unicast routing metric for the rendezvous point sent by the DF winner.

Related Commands

Command	Description
domain ipv4 host	Defines a static hostname-to-address mapping in the host cache using IPv4. For more information, see *IP Addresses and Services Command Reference for Cisco CRS Routers*
show pim df election-state, on page 79	Displays the bidirectional DF election state for a rendezvous point or an interface.

show pim global summary

To display configured Protocol Independent Multicast (PIM) out-of-resource (OOR) limits and current counts for all VRFs, use the **show pim global summary** command in EXEC mode.

show pim global summary

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

Use the **show pim global summary**command to display global limits that are shared by all VRFs.

Task ID

Task ID	Operation
multicast	read

Examples

The following is sample output from the **show pim global summary** command that shows PIM routes, with the maximum number of routes allowed being 100000:

```
RP/0/RP0/CPU0:router# show pim global summary

PIM Global Summary

PIM State Counters
                          Current        Maximum        Warning-threshold
Routes                    8              100000         100000
Topology Interface States 8              300000         300000
SM Registers              0              20000          20000
AutoRP Group Ranges       0              500            450
BSR Group Ranges          0              500            450
BSR C-RP caches           0              100            0
```

This table describes the significant fields shown in the display.

Table 13: show pim global summary Field Descriptions

Field	Description
Routes	Current number of routes (in the PIM topology table) and the maximum allowed before the creation of new routes is prohibited to avoid out-of-resource (OOR) conditions.

Field	Description
Topology Interface States	Current total number of interfaces (in the PIM topology table) present in all route entries and the maximum allowed before the creation of new routes is prohibited to avoid OOR conditions.
SM Registers	Current number of sparse mode route entries from which PIM register messages are received and the maximum allowed before the creation of new register states is prohibited to avoid OOR conditions.
AutoRP Group Ranges	Current number of sparse mode group range-to-rendezvous point mappings learned through the auto-rendezvous point (Auto-RP) mechanism and the maximum allowed before the creation of new group ranges is prohibited to avoid OOR conditions.
Warning-threshold	Maximum number of multicast routes that can be configured per router.
BSR Group Ranges	The number of BSR groups and the maximum set range.
BSR C-RP caches	The number of candidate-RP caches in BSR and the maximum set range.

show pim group-map

To display group-to-PIM mode mapping, use the **show pim group-map** command in

EXEC

mode.

show pim [**vrf** *vrf-name*] [{ **ipv4** | **ipv6** }] **group-map** [*ip-address-name*] [**info-source**]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
ip-address-name	(Optional) Can be either one of the following: • IP address name as defined in the Domain Name System (DNS) hosts table or with the domain **ipv4** host in the format *A.B.C.D.* • IP address name as defined in the Domain Name System (DNS) hosts table or with the domain **ipv6** host in the form of *X:X::X.*
info-source	(Optional) Displays the group range information source.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.2	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

The **show pim group-map** command displays all group protocol address mappings for the rendezvous point. Mappings are learned from different clients or through the auto rendezvous point (Auto-RP) mechanism.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim group-map** command:

```
RP/0/RP0/CPU0:router# show pim group-map

IP PIM Group Mapping Table
(* indicates group mappings being used)
```

```
(+ indicates BSR group mappings active in MRIB)

Group Range          Proto Client Groups RP address      Info

224.0.1.39/32*       DM    perm   1      0.0.0.0
224.0.1.40/32*       DM    perm   1      0.0.0.0
224.0.0.0/24*        NO    perm   0      0.0.0.0
232.0.0.0/8*         SSM   config 0      0.0.0.0
224.0.0.0/4*         SM    autorp 1      10.10.2.2       RPF: POS01/0/3,10.10.3.2
224.0.0.0/4          SM    static        0 0.0.0.0       RPF: Null,0.0.0.0
```

In lines 1 and 2, Auto-RP group ranges are specifically denied from the sparse mode group range.

In line 3, link-local multicast groups (224.0.0.0 to 224.0.0.255 as defined by 224.0.0.0/24) are also denied from the sparse mode group range.

In line 4, the Protocol Independent Multicast (PIM) Source Specific Multicast (PIM-SSM) group range is mapped to 232.0.0.0/8.

Line 5 shows that all the remaining groups are in sparse mode mapped to rendezvous point 10.10.3.2.

This table describes the significant fields shown in the display.

Table 14: show pim group-map Field Descriptions

Field	Description
Group Range	Multicast group range that is mapped.
Proto	Multicast forwarding mode.
Client	States how the client was learned.
Groups	Number of groups from the PIM topology table.
RP address	Rendezvous point address.
Info	RPF interface used and the PIM-SM Reverse Path Forwarding (RPF) information toward the rendezvous point.

Related Commands

Command	Description
domain ipv4 host	Defines a static hostname-to-address mapping in the host cache using IPv4. For more information, see *IP Addresses and Services Command Reference for Cisco CRS Routers*
rp-address, on page 50	Configures the address of a PIM rendezvous point for a particular group.
show pim range-list, on page 104	Displays the range-list information for PIM.

show pim interface

To display information about interfaces configured for Protocol Independent Multicast (PIM), use the **show pim interface** command in

EXEC

mode.

show pim [**vrf** *vrf-name*] [{ **ipv4** | **ipv6** }] **interface** [{ *type* *interface-path-id* | **state-on** | **state-off** }] [**detail**]

Syntax Description

	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
type	(Optional) Interface type. For more information, use the question mark (?) online help function.
interface-path-id	(Optional) Physical interface or virtual interface. **Note** Use the **show interfaces** command in EXEC mode to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
state-on	(Optional) Displays only interfaces from which PIM is enabled and active.
state-off	(Optional) Displays only interfaces from which PIM is disabled or inactive.
detail	(Optional) Displays detailed address information.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

The **show pim interface** command displays neighboring information on all PIM-enabled interfaces, such as designated router (DR) priority and DR election winner.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim interface** command:

```
RP/0/RP0/CPU0:router# show pim interface

Address                 Interface             PIM  Nbr   Hello  DR    DR
                                                   Count Intvl  Prior
172.29.52.127           MgmtEth0/0/CPU0/0     off  0     30     1     not elected
10.6.6.6                Loopback0             off  0     30     1     not elected
0.0.0.0                 Loopback60            off  0     30     1     not elected
0.0.0.0                 Loopback61            off  0     30     1     not elected
10.46.4.6               ATM0/2/0/0.1          off  0     30     1     not elected
10.46.5.6               ATM0/2/0/0.2          off  0     30     1     not elected
10.46.6.6               ATM0/2/0/0.3          off  0     30     1     not elected
10.46.7.6               ATM0/2/0/0.4          off  0     30     1     not elected
10.46.8.6               ATM0/2/0/3.1          off  0     30     1     not elected
10.46.9.6               ATM0/2/0/3.2          off  0     30     1     not elected
10.56.16.6              Serial0/3/2/1         off  0     30     1     not elected
10.56.4.2               Serial0/3/0/0/0:0     off  0     30     1     not elected
10.56.4.6               Serial0/3/0/0/1:0     off  0     30     1     not elected
10.56.4.10              Serial0/3/0/0/2:0     off  0     30     1     not elected
10.56.4.14              Serial0/3/0/0/2:1     off  0     30     1     not elected
10.56.4.18              Serial0/3/0/0/3:0     off  0     30     1     not elected
10.56.4.22              Serial0/3/0/0/3:1     off  0     30     1     not elected
10.56.4.26              Serial0/3/0/0/3:2     off  0     30     1     not elected
10.56.4.30              Serial0/3/0/0/3:3     off  0     30     1     not elected
10.56.8.2               Serial0/3/0/1/0:0     off  0     30     1     not elected
10.56.12.6              Serial0/3/2/0.1       off  0     30     1     not elected
10.56.13.6              Serial0/3/2/0.2       off  0     30     1     not elected
10.56.14.6              Serial0/3/2/0.3       off  0     30     1     not elected
10.56.15.6              Serial0/3/2/0.4       off  0     30     1     not elected
10.67.4.6               POS0/4/1/0            off  0     30     1     not elected
10.67.8.6               POS0/4/1/1            off  0     30     1     not elected
```

This table describes the significant fields shown in the display.

Table 15: show pim interface Field Descriptions

Field	Description
Address	IP address of the interface.
Interface	Interface type and number that is configured to run PIM.
PIM	PIM is turned off or turned on this interface.
Nbr Count	Number of PIM neighbors in the neighbor table for the interface.
Hello Intvl	Frequency, in seconds, of PIM hello messages, as set by the **ip pim hello-interval** command in interface configuration mode.
DR Priority	Designated router priority is advertised by the neighbor in its hello messages.

Field	Description
DR	IP address of the DR on the LAN. Note that serial lines do not have DRs, so the IP address is shown as 0.0.0.0. If the interface on this router is the DR, “this system” is indicated; otherwise, the IP address of the external neighbor is given.

Related Commands

Command	Description
show pim neighbor, on page 98	Displays the Protocol Independent Multicast (PIM) neighbors discovered by means of PIM hello messages.

show pim join-prune statistic

To display Protocol Independent Multicast (PIM) join and prune aggregation statistics, use the **show pim join-prune statistics** command in EXEC mode

show pim [**vrf** *vrf-name*] [{ **ipv4** | **ipv6** }] **join-prune statistic** [*type* *interface-path-id*]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
type	(Optional) Interface type. For more information, use the question mark (?) online help function.
interface-path-id	(Optional) Physical interface or virtual interface. **Note** Use the **show interfaces** command in EXEC mode to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

IP addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

The **show pim join-prune statistics** command displays the average PIM join and prune groups for the most recent packets (in increments of 1000/10000/50000) that either were sent out or received from each PIM interface. If fewer than 1000/10000/50000 join and prune group messages are received since PIM was started or the statistics were cleared, the join-prune aggregation shown in the command display is zero (0).

Because each PIM join and prune packet can contain multiple groups, this command can provide a snapshot view of the average pace based on the number of join and prune packets, and on the consideration of the aggregation factor of each join and prune packet.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim join-prune statistics** command with all router interfaces specified:

```
RP/0/RP0/CPU0:router# show pim join-prune statistics

PIM Average Join/Prune Aggregation for last (100/1K/10K) packets
Interface      MTU    Transmitted    Received

Loopback0      1514   0 / 0 / 0      0 / 0 / 0
Encapstunnel0  0      0 / 0 / 0      0 / 0 / 0
Decapstunnel0  0      0 / 0 / 0      0 / 0 / 0
Loopback1      1514   0 / 0 / 0      0 / 0 / 0
POS0/3/0/0     4470   0 / 0 / 0      0 / 0 / 0
POS0/3/0/3     4470   0 / 0 / 0      0 / 0 / 0
```

This table describes the significant fields shown in the display.

Table 16: show pim join-prune statistics Field Descriptions

Field	Description
Interface	Interface from which statistics were collected.
MTU	Maximum transmission unit (MTU) in bytes for the interface.
Transmitted	Number of join and prune states aggregated into transmitted messages in the last 1000/10000/50000 transmitted join and prune messages.
Received	Number of join and prune states aggregated into received messages in the last 1000/10000/50000 received join and prune messages.

show pim rpf-redirect

To display the maximum bandwidth, the bandwidth used by traffic flowing through the local box, and the bandwidth used by other routers sharing the PIM bundle member interfaces of all members of bundles known to the system, use **show pim rpf-redirect** command in EXEC mode.

show pim *ipv4* **rpf-redirect**

Syntax Description

ipv4	(Optional) Specifies IPv4 address prefixes.

Command Default

IPv4 addressing is the default.

Command Modes

EXEC

Command History

Release	Modification
Release 4.3.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
multicast	read

Example

The following sample output from the **show pim rpf-redirect** command displays statistics about the PIM bundles:

```
RP/0/RP0/CPU0:router#show pim rpf-redirect

Mon Aug 11 16:50:35.811 IST

PIM RPF-Redirect bundle database

 Member   Available/Allocated Available/Allocated   Local  / Network   Total
               Bandwidth      Threshold Bandwidth      Bandwidth     Bandwidth
                 (Kbps)               (Kbps)             (Kbps)         (Kbps)


Bundle: east

Gi0/0/0/0    100000/100000        80000/80000             0/0         0
```

where, Available/Allocated Bandwidth (kbps) is the total multicast bandwidth (in kbps) available/allocated for multicast transmission; Available/Threshold Bandwidth (kbps) is the multicast bandwidth threshold beyond which the redirects are enabled, displays the available and the threshold bandwidth (kbps); Local/Network Bandwidth (in kbps) is the difference between the Allocated Bandwidth and Available Bandwidth; and the Total Bandwidth (kbps) is represented by the Local/Network Bandwidth.

show pim rpf-redirect route

To display the content of the snooping database, use **show pim rpf-redirect** command in EXEC mode.

show pim *ipv4* **rpf-redirect route**

Syntax Description

ipv4	(Optional) Specifies IPv4 address prefixes.

Command Default

IPv4 addressing is the default.

Command Modes

EXEC

Command History

Release	Modification
Release 4.3.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
multicast	read

show pim mdt

To display information about data multicast distribution tree (MDT) streams, use the **show pim mdt** command in EXEC mode.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **mdt** {**cache** [{*ip-address* | **detail** | **summary**}] | **interface** | **prefix** [{**local** | **remote**}]}

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
cache	Displays those data-MDT streams currently running and in the cache.
ip-address	(Optional) Specifies the core source IP address or name, or both, for the data MDT streams: • IP address as defined in the Domain Name System (DNS) hosts table or with the domain IPv4 host in the format *A.B.C.D.* • IP address as defined in the Domain Name System (DNS) hosts table or with the domain IPv6 host in the form of *X:X::X.*
detail	Displays detailed cache information.
summary	(Optional) Displays a summary of the data MDT cache.
interface	(Optional) Displays the default MDT interface.
prefix	Displays the local or remote prefixes that can be or have been used.
local	(Optional) Specifies locally assigned data MDT prefixes.
remote	(Optional) Specifies data MDT prefixes learned from remote PE routers.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read

Examples

The following example shows how to display PIM candidate rendezvous point information:

```
RP/0/RP0/CPU0:router# show pim vrf svpn20 mdt cache

Core Source      Cust (Source, Group)                Core Group       Expires
2.2.2.2          (204.161.20.1, 226.1.1.1)           232.1.20.53      00:02:18
2.2.2.2          (204.161.20.1, 226.1.1.2)           232.1.20.52      00:02:18

RP/0/RP0/CPU0:router# show pim vrf all mdt interface

GroupAddress
Interface
Source
Vrf
239.1.1.1
mdt101
Loopback1
101
239.1.1.2
mdt102
Loopback2
102
239.1.1.3
mdt102
Loopback0
103
```

Table 17: show pim mdt Field Descriptions

Field	Description
Core Source	Specifies the core source IP address or name, or both, for the data MDT streams.
Cust (Source, Group)	Specifies the actual multicast traffic source and group address from a customer site.
Core Group	Specifies the core group IP address.
Expires	Time at which data MDT expires.

show pim mstatic

To display multicast static routing information, use the **show pim mstatic** command in

EXEC

mode.

show pim [{ **ipv4** | **ipv6** }] **mstatic** [**ipv4**]

Syntax Description

ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

IPv4 addressing is the default.

Command Modes

EXEC

Command History

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines

The **show pim mstatic** command is used to view all the multicast static routes. Multicast static routes are defined by the **static-rpf** command.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim mstatic** command that shows how to reach IP address 10.0.0.1:

```
RP/0/RP0/CPU0:router# show pim mstatic

IP Multicast Static Routes Information
* 10.0.0.1/32 via pos0/1/0/1 with nexthop 172.16.0.1 and distance 0
```

This table describes the significant fields shown in the display.

Table 18: show pim mstatic Field Descriptions

Field	Description
10.0.0.1	Destination IP address.
pos0/1/0/1	Interface that is entered to reach destination IP address 10.0.0.1
172.16.0.1	Next-hop IP address to enter to reach destination address 10.0.0.1.
0	Distance of this mstatic route.

Related Commands

Command	Description
static-rpf	Configures a static Reverse Path Forwarding (RPF) rule for a specified prefix mask.

show pim neighbor

To display the Protocol Independent Multicast (PIM) neighbors discovered by means of PIM hello messages, use the **show pim neighbor** command in

EXEC

mode.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **neighbor** [*type interface-path-id*] [{**count** | **detail**}]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
type	(Optional) Interface type. For more information, use the question mark (?) online help function.
interface-path-id	(Optional) Physical interface or virtual interface. **Note** Use the **show interfaces** command in EXEC mode to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
count	(Optional) Number of neighbors present on the specified interface, or on all interfaces if one is not specified. The interface on this router counts as one neighbor in the total count.
detail	(Optional) Displays detailed information.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

The **show pim neighbor** command is used to determine the PIM neighbors known to this router through PIM hello messages. Also, this command indicates that an interface is a designated router (DR) and when the neighbor is capable of bidirectional operation.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim neighbor** command:

```
RP/0/RP0/CPU0:router# show pim neighbor

Neighbor Address  Interface              Uptime    Expires DR pri Bidir

172.17.1.2*       Loopback1              03:41:22  00:01:43 1 (DR) B
172.17.2.2*       Loopback2              03:41:20  00:01:31 1 (DR) B
172.17.3.2*       Loopback3              03:41:18  00:01:28 1 (DR) B
10.10.1.1         POS0/2/0/0             03:40:36  00:01:41 1      B
10.10.1.2*        POS0/2/0/0             03:41:28  00:01:32 1 (DR) B
10.10.2.2*        POS0/2/0/2             03:41:26  00:01:36 1      B
10.10.2.3         POS0/2/0/2             03:41:25  00:01:29 1 (DR) B
PIM neighbors in VRF default

Neighbor Address             Interface              Uptime    Expires  DR pri
Flags

10.6.6.6*                    Loopback0              4w1d      00:01:24 1 (DR) B
10.16.8.1                    GigabitEthernet0/4/0/2 3w2d      00:01:24 1      B
10.16.8.6*                   GigabitEthernet0/4/0/2 3w2d      00:01:28 1 (DR) B
192.168.66.6*                GigabitEthernet0/4/0/0.7 4w1d      00:01:28 1 (DR)
B P
192.168.67.6*                GigabitEthernet0/4/0/0.8 4w1d      00:01:40 1 (DR)
B P
192.168.68.6*                GigabitEthernet0/4/0/0.9 4w1d      00:01:24 1 (DR)
B P

PIM neighbors in VRF default

Neighbor Address  Interface                Uptime    Expires       DR     pri Flags

28.28.9.2*        GigabitEthernet0/2/0/9   00:39:34  00:01:40 1    (DR)     B  A
10.1.1.1          GigabitEthernet0/2/0/19  00:49:30  00:01:42 1             B  A
10.1.1.2*         GigabitEthernet0/2/0/19  00:50:01  00:01:41 1    (DR)     B  A
2.2.2.2*          Loopback0                00:50:01  00:01:42 1    (DR)     B  A
```

The following is sample output from the **show pim neighbor** command with the **count** option:

```
RP/0/RP0/CPU0:router# show pim neighbor count

Interface   Nbr count
POS0/3/0/0     1
Loopback1      1
Total Nbrs     2
```

This table describes the significant fields shown in the display.

Table 19: show pim neighbor Field Descriptions

Field	Description
Neighbor Address	IP address of the PIM neighbor.

Field	Description
Interface	Interface type and number on which the neighbor is reachable.
Uptime	Time the entry has been in the PIM neighbor table.
Expires	Time until the entry is removed from the IP multicast routing table.
DR pri	DR priority sent by the neighbor in its hello messages. If this neighbor is elected as the DR on the interface, it is annotated with "(DR)" in the command display.
Bidir	Indicates that the neighbor is capable of bidirectional PIM mode operation.
Nbr count	Number of PIM neighbors in the neighbor table for all interfaces on this router.

Related Commands

Command	Description
show pim interface, on page 87	Displays information about interfaces configured for Protocol Independent Multicast (PIM).

show pim nsf

To display the state of nonstop forwarding (NSF) operation for Protocol Independent Multicast (PIM), use the **show pim nsf** command in EXEC mode.

show pim [{ **ipv4** }] **nsf**

Syntax Description

ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

IPv4 addressing is the default.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.

Usage Guidelines

The **show pim nsf** command displays the current multicast NSF state for PIM. For multicast NSF, the state may be normal or activated for nonstop forwarding. The latter state indicates that recovery is in progress due to a failure in the Multicast Routing Information Base (MRIB) or PIM. The total NSF timeout and time remaining are displayed until NSF expiration.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim nsf** command:

```
RP/0/RP0/CPU0:router# show pim nsf

IP PIM Non-Stop Forwarding Status:
Multicast routing state: Non-Stop Forwarding Activated
NSF Lifetime: 00:02:00
NSF Time Remaining: 00:01:56
```

This table describes the significant fields shown in the display.

Table 20: show pim nsf Field Descriptions

Field	Description
Multicast routing state	PIM state is in NSF recovery mode (Normal or Non-Stop Forwarding Activated).
NSF Lifetime	Total NSF lifetime (seconds, hours, and minutes) configured for PIM.
NSF Time Remaining	Time remaining in NSF recovery for PIM if NSF recovery is activated.

show pim nsr

To display the nonstop routing (NSR) information for Protocol Independent Multicast (PIM), use the **show pim nsr** command in

EXEC
mode

.

show pim [ipv4| ipv6] nsr

Syntax Description

ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

IPv4 addressing is the default.

Command Modes

EXEC

Command History

Release	Modification
Release 5.2.2	This command was introduced.

Usage Guidelines

The **show pim nsr** command displays the current multicast NSR state for PIM. For multicast NSR, the state may be Ready or Not activated for non-stop routing. The latter state indicates that recovery is in progress due to a failure in the Multicast Routing Information Base (MRIB) or PIM. The total NSR timeout and time remaining are displayed until NSR expiration.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim nsr** command:

```
RP/0/RP0/CPU0:router# show pim nsr

PIM NSR Data:
State            : Ready
RMF Timer        : N [-]
RMF Notif done   : Y
Last RMF rdy     : 4w0d [1]
Last RMF not rdy : Never [0]
Last conn up     : Never [0]
Last conn down   : Never [0]
```

This table describes the significant fields shown in the display.

Table 21: show pim nsr Field Descriptions

Field	Description
State	Multicast Non-Stop Routing State: Ready or Not Ready
RMF Timer	Whether RMF timer is running or not, indicates either Yes or No
RMF Notify done	RMF notification received: Yes or No
Last RMF ready	The Time when the last RMF ready notification was received: Yes, No, or Never. The number in the brackets indicate the number of times the RMF ready notification was received. Yes, No, or Never respectively.
Last RMF not ready	The Time when the last RMF ready notification was received: Yes, No, or Never. The number in the brackets indicate the number of times the RMF not ready notification was issued.
Last connection up	The Time when the last RMF ready notification was received: Yes, No, or Never. The number in the brackets indicate the number of times the RMF not ready notification was received.
Last connection down	Whether the Last connection down notification is issued: Yes, No, or Never. The number in the brackets indicate the number of times the RMF not ready notification was received.

Related Commands

Command	Description
show msdp nsr	Displays the state of NSR operation for MSDP.
show mrib nsr	Displays the state of NSR operation in MRIB.
show igmp nsr	Displays the state of NSR operation for IGMP.

show pim range-list

To display range-list information for Protocol Independent Multicast (PIM), use the **show pim range-list** command in

EXEC mode

.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **range-list** [{**autorp** | **config**}] [*ip-address-name*]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
autorp	(Optional) Displays PIM auto-rendezvous point (Auto-RP) range list information.
config	(Optional) Displays PIM command-line interface (CLI) range list information.
ip-address-name	(Optional) IP address of the rendezvous point.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

The **show pim range-list** command is used to determine the multicast forwarding mode to group mapping. The output also indicates the rendezvous point (RP) address for the range, if applicable. The **config** keyword means that the particular range is statically configured.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim range-list** command:

```
RP/0/RP0/CPU0:router# show pim range-list

config SSM Exp: never Src: 0.0.0.0
  230.0.0.0/8 Up: 03:47:09
```

```
config BD RP: 172.16.1.3 Exp: never Src: 0.0.0.0
  239.0.0.0/8 Up: 03:47:16
config SM RP: 172.18.2.6 Exp: never Src: 0.0.0.0
  235.0.0.0/8 Up: 03:47:09
```

This table describes the significant fields shown in the display.

Table 22: show pim range-list Field Descriptions

Field	Description
config	Group range was learned by means of configuration.
SSM	PIM mode is operating in Source Specific Multicast (SSM) mode. Other modes are Sparse-Mode (SM) and bidirectional (BD) mode.
Exp: never	Expiration time for the range is “never”.
Src: 0.0.0.0	Advertising source of the range.
230.0.0.0/8	Group range: address and prefix.
Up: 03:47:09	Total time that the range has existed in the PIM group range table. In other words, the uptime in hours, minutes, and seconds.

Related Commands

Command	Description
show pim group-map, on page 85	Displays group-to-PIM mode mapping.

show pim rpf

To display information about reverse-path forwarding (RPF) in one or more routing tables within Protocol Independent Multicast (PIM), use the **show pim rpf** command in

EXEC mode

.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] {**multicast** | **safi-all** | **unicast**} [**topology** {*tablename* | **all**}] **rpf** [*ip-address / name*]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
multicast	(Optional) Specifies a multicast secondary address family (SAFI).
safi-all	(Optional) Specifies a secondary address family (SAFI) wildcard.
unicast	(Optional) Specifies a unicast secondary address family (SAFI).
topology	(Optional) Specifies the display of multitopology routing table information.
table-name	Name of the specific multitopology table to show.
all	Specifies that detailed information be displayed for all multitopology routing tables in PIM.
ip-address/name	(Optional) IP address or name, or both, for the default or selected route policy : • IP address as defined in the Domain Name System (DNS) hosts table or with the domain IPv4 host in the format *A.B.C.D.* • IP address as defined in the Domain Name System (DNS) hosts table or with the domain IPv6 host in the form of *X:X::X.* **Note** The *ip-address* argument can also be a Protocol Independent Multicast (PIM) rendezvous point (RP) address.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read

Examples

The following example shows output from the **show pim rpf** command:

```
RP/0/RP0/CPU0:router# show pim rpf

Table: IPv4-Unicast-default
* 61.61.1.10/32 [90/181760]
    via GigabitEthernet0/1/0/1.201 with rpf neighbor 11.21.0.20
    via GigabitEthernet0/1/0/1.202 with rpf neighbor 11.22.0.20
    via GigabitEthernet0/1/0/1.203 with rpf neighbor 11.23.0.20
* 61.61.1.91/32 [90/181760]
    via GigabitEthernet0/1/0/1.201 with rpf neighbor 11.21.0.20
    via GigabitEthernet0/1/0/1.202 with rpf neighbor 11.22.0.20
    via GigabitEthernet0/1/0/1.203 with rpf neighbor 11.23.0.20
* 61.61.1.92/32 [90/181760]
    via GigabitEthernet0/1/0/1.201 with rpf neighbor 11.21.0.20
    via GigabitEthernet0/1/0/1.202 with rpf neighbor 11.22.0.20
    via GigabitEthernet0/1/0/1.203 with rpf neighbor 11.23.0.20
* 61.61.1.93/32 [90/181760]
    via GigabitEthernet0/1/0/1.201 with rpf neighbor 11.21.0.20
    via GigabitEthernet0/1/0/1.202 with rpf neighbor 11.22.0.20
    via GigabitEthernet0/1/0/1.203 with rpf neighbor 11.23.0.20
```

show pim rpf hash

To display information for Routing Information Base (RIB) lookups used to predict RPF next-hop paths for routing tables in Protocol Independent Multicast (PIM), use the **show pim rpf hash** command in EXEC mode.

.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] [{**multicast** | **safi-all** | **unicast**}] [**topology** {*table-name* | **all**}] **rpf hash** *root/group ip-address/name* [{**hash-mask-length** *bit-length* | **mofrr**}]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
multicast	(Optional) Specifies a multicast secondary address family (SAFI).
safi-all	(Optional) Specifies a secondary address family (SAFI) wildcard.
unicast	(Optional) Specifies a unicast secondary address family (SAFI).
topology	(Optional) Specifies the display of multitopology routing table information.
table-name	Name of the specific multitopology table to show.
all	Specifies that detailed information be displayed for all multitopology routing tables in PIM.
root/group ip-address / *group-name*	Root or group address, or both, for the default or selected route policy: • IP address as defined in the Domain Name System (DNS) hosts table or with the domain IPv4 host in the format *A.B.C.D.* • IP address as defined in the Domain Name System (DNS) hosts table or with the domain IPv6 host in the form of *X:X::X* .
hash-mask-length *bit-length*	(Optional) Specifies the bootstrap router (BSR) hash mask length to be applied to the next-hop hashing. Default is the BSR hash mask length known for the matching group range (or host mask length if BSR is not configured for the range). • If **ipv4** is specified, the range in bit length is 0 to 32. • If **ipv6** is specified, the range in bit length is 0 to 128. **Note** Not a valid keyword for IPv6 unicast domain names.
mofrr	(Optional) Specifies MOFRR hashing.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

The **show pim rpf hash** command lets you predict the way routes balance across Equal-Cost Multipath (ECMP) next hops. It does not require that route to exist in the Multicast Routing Information Base (MRIB) at the time.

When using the *ip-address* argument for a (*,G) route, use the rendezvous point address and omit the *group-address* argument. For (S,G) routes, use the *ip-address* and the *group-address* arguments.

Task ID

Task ID	Operations
multicast	read

Examples

When you use the **show pim rpf hash** command, Cisco IOS XR software displays statistics regarding route policy invocations in topology tables:

```
RP/0/RP0/CPU0:router# show pim rpf hash 10.0.0.1 239.0.0.1

Multipath RPF selection is enabled.

RPF next-hop neighbor selection result: POS0/2/0/0,10.1.0.1
```

The following example shows the results from use of the **mofrr** keyword:

```
RP/0/RP0/CPU0:router# show pim rpf hash 11.11.0.4 226.1.1.2 mofrr

Table: IPv4-Unicast-default
Multipath RPF selection is enabled.
RPF next-hop neighbor selection result:
GigabitEthernet0/4/0/4,55.55.55.101
Secondary RPF next-hop neighbor selection result:
GigabitEthernet0/4/0/4,55.55.55.101
```

Related Commands

Command	Description
show pim rpf, on page 106	Displays information about reverse-path forwarding (RPF) in one or more routing tables within Protocol Independent Multicast (PIM).

show pim rpf route-policy statistics

To display statistics for reverse-path forwarding (RPF) route policy invocations in Protocol Independent Multicast (PIM) routing tables, use the **show pim rpf route-policy statistics** command in EXEC mode.

show pim [**vrf vrf-name**] [{**ipv4** | **ipv6**}] **rpf route-policy statistics**

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read

Examples

The following sample output from the **show pim rpf route-policy statistics** command displays statistics about route policy invocations in topology tables:

```
RP/0/RP0/CPU0:router# show pim mt4-p201 rpf route-policy statistics

RPF route-policy statistics for VRF default:
    Route-policy name: mt4-p201
    Number of lookup requests 25
    Pass 25, Drop 0
    Default RPF Table selection 5, Specific RPF Table selection 20
```

This table describes the significant fields shown in the display.

Table 23: show pim rpf route-policy statistics Field Description

Field	Description
Route-policy name	Name of a specific route policy.
Number of lookup requests	Number of times the route policy was run to determine the RPF table.
Pass	Number of (S,G) entries that were passed by the route policy.

Field	Description
Drop	Number of (S,G) entries that were dropped by the route policy.
Default RPF Table selection/Specific RPF Table selection	When an (S,G) entry is accepted by the route policy, it can either select the default RPF table (can be either the unicast default or multicast default table) or any specific named or default RPF table. The last line of output indicates the number of entries that fall into these two categories.

show pim rpf route-policy test

To test the outcome of a route-policy with reverse-path forwarding (RPF), use the **show pim rpf route-policy test** command in EXEC mode.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **rpf route-policy test** *src-ip-address*/*grp-address*

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
src-ip-address/ grp-address	Source or group address, or both, for the default or selected route policy, as defined in the Domain Name System (DNS) hosts table or with the domain IPv4 host: • IP address as defined in the Domain Name System (DNS) hosts table or with the domain IPv4 host in the format *A.B.C.D.* • IP address as defined in the Domain Name System (DNS) hosts table or with the domain IPv6 host in the form of *X:X::X.*

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read

Examples

The following sample output from the **show pim rpf route-policy test** command displays the RPF table selected by the route policy for a given source and/or group address:

```
RP/0/RP0/CPU0:router# show pim ipv4 rpf route-policy test 10.11.11.11 225.2.0.1


RPF route-policy test for VRF default:
    Route-policy name: mt4-p2
    Source 10.11.11.11, Group 225.2.0.1
    Result: Pass
    Default RPF Table selected
    RPF Table: IPv4-Unicast-default  (Created, Active)
```

This table describes the significant fields shown in the display.

Table 24: show pim rpf route-policy test Field Descriptions

Field	Description
Route-policy name	Name of a specific route policy.
Source	Source IP name for the route policy.
Group	Group IP name for the route policy.
Result	Specifies whether the (S,G) entry was accepted by the route policy.
Default RPF Table	Specifies whether the (S,G) entry uses the default or a specific RPF table.
RPF Table	Specifies which RPF table was selected, and whether or not the table was created in PIM and is active.

show pim rpf summary

To display summary information about the interaction of Protocol Independent Multicast (PIM) with the Routing Information Base (RIB), including the convergence state, current default RPF table, and the number of source or rendezvous point registrations created, use the **show pim rpf summary** command in EXEC mode.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] [{**multicast** | **safi-all** | **unicast**}] [**topology** {*table-name* | **all**}] **rpf summary**

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
multicast	(Optional) Specifies a multicast secondary address family (SAFI).
safi-all	(Optional) Specifies a secondary address family (SAFI) wildcard.
unicast	(Optional) Specifies a unicast secondary address family (SAFI).
topology	(Optional) Specifies the display of multitopology routing table information.
table-name	Name of the specific multitopology table to show.
all	Specifies that detailed information be displayed for all multitopology routing tables in PIM.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read

Examples

The following sample output shows RPF information for multiple tables. The first part of the output example describes VRF-level information. The remainder consists of information specific to one or more tables.

Note RPF table indicates the table in which the RPF lookup was performed for this route entry.

```
RP/0/RP0/CPU0:router# show pim ipv4 unicast topology all rpf summary


MBGP                Not configured
    OSPF Mcast-intact   Not configured
    ISIS Mcast-intact   Not configured
    ISIS Mcast Topology Not configured

PIM RPFs registered with Unicast RIB table

Default RPF Table: IPv4-Unicast-default
RIB Convergence Timeout Value: 00:30:00
RIB Convergence Time Left:     00:00:00
Multipath RPF Selection is Enabled

Table: IPv4-Multicast-default
    PIM RPF Registrations = 0
    RIB Table converged

Table: IPv4-Multicast-t300
    PIM RPF Registrations = 3
    RIB Table converged

Table: IPv4-Multicast-t310
    PIM RPF Registrations = 5
    RIB Table converged

Table: IPv4-Multicast-t320
    PIM RPF Registrations = 5
    RIB Table converged
```

The first part of the output example describes VRF-level information. The remainder consists of information specific to one or more tables.

The following example shows the sample output for **show pim rpf summary** command:

```
RP/0/RP0/CPU0:router# show pim rpf summary


    MBGP                Not configured
    OSPF Mcast-intact   Configured
    ISIS Mcast-intact   Not configured
    ISIS Mcast Topology Not configured
    MoFRR Flow-based    Configured
    MoFRR RIB           Not configured

PIM RPFs registered with Multicast RIB table

Default RPF Table: IPv4-Multicast-default
RIB Convergence Timeout Value: 00:30:00
RIB Convergence Time Left:     00:00:00
Multipath RPF Selection is Disabled

Table: IPv4-Multicast-default
    PIM RPF Registrations = 3
    RIB Table converged
```

show pim summary

To display configured Protocol Independent Multicast (PIM) out-of-resource (OOR) limits and current counts, use the **show pim summary** command in EXEC mode.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **summary**

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance associated with this count.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC mode

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** keyword and *vrf-name* argument were added.

Usage Guidelines

The **show pim summary** command is used to identify configured OOR information for the PIM protocol, such as number of current and maximum routes.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim summary** command that shows PIM routes, with the maximum number of routes allowed being 100000:

```
RP/0/RP0/CPU0:router# show pim summary

PPIM Summary for VRF:default

PIM State Counters
                          Current        Maximum        Warning-threshold
Routes                    4              100000         100000
Topology Interface States 4              300000         300000
SM Registers              1              20000          20000
AutoRP Group Ranges       0              500            450
BSR Group Ranges          9              500            450
BSR C-RP caches           9              100            100
```

This table describes the significant fields shown in the display.

Table 25: show pim summary Field Descriptions

Field	Description
Routes	Current number of routes (in the PIM topology table) and the maximum allowed before the creation of new routes is prohibited to avoid out-of-resource (OOR) conditions.
Routes x Interfaces	Current total number of interfaces (in the PIM topology table) present in all route entries and the maximum allowed before the creation of new routes is prohibited to avoid OOR conditions.
SM Registers	Current number of sparse mode route entries from which PIM register messages are received and the maximum allowed before the creation of new register states is prohibited to avoid OOR conditions.
AutoRP Group Ranges	Current number of sparse mode group range-to-rendezvous point mappings learned through the auto-rendezvous point (Auto-RP) mechanism and the maximum allowed before the creation of new group ranges is prohibited to avoid OOR conditions.
Warning-threshold	Maximum number of multicast routes that can be configured per router.
BSR Group Ranges	The number of BSR groups and the set range.
BSR C-RP caches	The number of candidate-RP caches in BSR and the set range.

show pim table-context

To display detailed information about multitopology tables, use the **show pim table-context** command in EXEC mode.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] [{**unicast** | **multicast** | **safi-all**}] [**topology** {*table-name* | **all**}] **table-context**

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
unicast	(Optional) Specifies a unicast secondary address family (SAFI).
multicast	(Optional) Specifies a multicast secondary address family (SAFI).
safi-all	(Optional) Specifies a secondary address family (SAFI) wildcard.
topology	(Optional) Specifies the display of multitopology routing table information.
table-name	Name of the specific multitopology table to show.
all	Specifies that detailed information be displayed for all multitopology routing tables in PIM.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

The following sample output shows the PIM table contexts for a VRF default:

```
RP/0/RP0/CPU0:router# show pim table-context

PIM Table contexts for VRF default

Table: IPv4-Unicast-default
    Active, Table ID 0xe0000000, VRF ID 0x60000000
    Registered with ITAL, Registered with RIB
    NSF RIB converged, NSF RIB converge not received
    Number of RPF monitors 1

Table: IPv4-Multicast-default
    Active, Table ID 0xe0100000, VRF ID 0x60000000
    Registered with ITAL, Registered with RIB
```

```
    NSF RIB converged, NSF RIB converge not received
    Number of RPF monitors 0

Description:  A Table is considered to be "active" when it is globally configured under a
given VRF and RSI considers it to be active (and the same is notified to PIM by ITAL). The
 opposite of this means the Table is "inactive".
```

show pim topology

To display Protocol Independent Multicast (PIM) routing topology table information for a specific group or all groups, use the **show pim topology** command in EXEC mode.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **topology** [*src-ip-address* / *grp-address*]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
src-ip-address/ grp-address	Source IP address or group IP address, or both, for the default or selected route policy: • IP address as defined in the Domain Name System (DNS) hosts table or with the domain IPv4 host in the format *A.B.C.D.* • IP address as defined in the Domain Name System (DNS) hosts table or with the domain IPv6 host in the form of *X:X::X.*

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added. The *name* and *ip-address* arguments were combined to be *ip-address* .
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added. The *ip-address* argument was changed to *source-ip-address* [*group-ip-address*].

Usage Guidelines

Use the PIM routing topology table to display various entries for a given group, (*, G), (S, G), and

(S, G) RPT, each with its own interface list.

PIM communicates the contents of these entries through the Multicast Routing Information Base (MRIB), which is an intermediary for communication between multicast routing protocols, such as PIM; local membership protocols, such as Internet Group Management Protocol (IGMP); and the multicast forwarding engine of the system.

The MRIB shows on which interface the data packet should be accepted and on which interfaces the data packet should be forwarded, for a given (S, G) entry. Additionally, the Multicast Forwarding Information Base (MFIB) table is used during forwarding to decide on per-packet forwarding actions.

When multicast-only fast reroute (MoFRR) feature is enabled, the **show pim topology** command shows the SGs that are configured for MoFRR. For information about the MoFRR primary and secondary paths, see the description of the command show pim topology detail, on page 125.

Note For forwarding information, use the **show mfib route** and **show mrib route** commands.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim topology** command:

```
RP/0/RP0/CPU0:router# show pim topology

IP PIM Multicast Topology Table
Entry state: (*/S,G)[RPT/SPT] Protocol Uptime Info
Entry flags: KAT - Keep Alive Timer, AA - Assume Alive, PA - Probe Alive,
 RA - Really Alive, LH - Last Hop, DSS - Don't Signal Sources,
 RR - Register Received, SR - Sending Registers, E - MSDP External, EX - Extranet
 DCC - Don't Check Connected,
 ME - MDT Encap, MD - MDT Decap,
MT - Crossed Data MDT threshold, MA - Data MDT group assigned
Interface state: Name, Uptime, Fwd, Info
Interface flags: LI - Local Interest, LD - Local Dissinterest,
 II - Internal Interest, ID - Internal Dissinterest,
 LH - Last Hop, AS - Assert, AB - Admin Boundary

(11.0.0.1,239.9.9.9)SPT SM Up: 00:00:13
JP: Join(never) RPF: Loopback1,11.0.0.1* Flags: KAT(00:03:16) RA RR
No interfaces in immediate olist

(*,239.9.9.9) SM Up: 4d14h RP: 11.0.0.1*
JP: Join(never) RPF: Decapstunnel0,11.0.0.1 Flags: LH
POS0/3/0/0 4d14h fwd LI II LH

(*,224.0.1.39) DM Up: 02:10:38 RP: 0.0.0.0
JP: Null(never) RPF: Null,0.0.0.0 Flags: LH DSS
  POS0/2/0/0 02:10:38  off LI II LH

(*,224.0.1.40) DM Up: 03:54:23 RP: 0.0.0.0
JP: Null(never) RPF: Null,0.0.0.0 Flags: LH DSS
  POS0/2/0/0 03:54:23  off LI II LH
  POS0/2/0/2           03:54:14  off LI
  POS0/4/0/0 03:53:37  off LI

(*,239.100.1.1) BD Up: 03:51:35 RP: 200.6.1.6
JP: Join(00:00:24) RPF: POS0/4/0/0,10.10.4.6 Flags:
  POS0/2/0/0 03:42:05  fwd Join(00:03:18)
  POS0/2/0/2           03:51:35  fwd Join(00:02:54)
(*,235.1.1.1) SM Up: 03:51:39 RP: 200.6.2.6
JP: Join(00:00:50) RPF: POS0/4/0/0,10.10.4.6 Flags:
  POS0/2/0/2           02:36:09  fwd Join(00:03:20)
  POS0/2/0/0 03:42:04  fwd Join(00:03:16)
```

The following example shows output for a MoFRR convergence:

```
RP/0/RP0/CPU0:router# show pim topology 239.1.1.1

IP PIM Multicast Topology Table
Entry state: (*/S,G)[RPT/SPT] Protocol Uptime Info
```

```
Entry flags: KAT - Keep Alive Timer, AA - Assume Alive, PA - Probe Alive,
    RA - Really Alive, LH - Last Hop, DSS - Don't Signal Sources,
    MF - MOFRR Enabled, MFP - Primary MoFRR,
    MFB - Backup MoFRR, MFA - Active MoFRR,

    RR - Register Received, SR - Sending Registers, E - MSDP External,
    DCC - Don't Check Connected,
    ME - MDT Encap, MD - MDT Decap,
    MT - Crossed Data MDT threshold, MA - Data MDT group assigned
Interface state: Name, Uptime, Fwd, Info
Interface flags: LI - Local Interest, LD - Local Dissinterest,
    II - Internal Interest, ID - Internal Dissinterest,
    LH - Last Hop, AS - Assert, AB - Admin Boundary

(192.1.1.2,239.1.1.1)SPT SSM Up: 13:54:06
JP: Join(00:00:41) RPF: GigabitEthernet0/5/0/3.3,100.100.0.10 MoFRR RIB, Flags:
  GigabitEthernet0/5/0/1      13:54:06  fwd LI LH
RP/0/4/CPU0:Sunnyvale#show pim topology 239.1.1.1 detail

IP PIM Multicast Topology Table
Entry state: (*/S,G)[RPT/SPT] Protocol Uptime Info
Entry flags: KAT - Keep Alive Timer, AA - Assume Alive, PA - Probe Alive,
    RA - Really Alive, LH - Last Hop, DSS - Don't Signal Sources,
    RR - Register Received, SR - Sending Registers, E - MSDP External,
    DCC - Don't Check Connected,
    ME - MDT Encap, MD - MDT Decap,
    MT - Crossed Data MDT threshold, MA - Data MDT group assigned
Interface state: Name, Uptime, Fwd, Info
Interface flags: LI - Local Interest, LD - Local Dissinterest,
    II - Internal Interest, ID - Internal Dissinterest,
    LH - Last Hop, AS - Assert, AB - Admin Boundary

(192.1.1.2,239.1.1.1)SPT SSM Up: 13:54:10
JP: Join(00:00:37) RPF: GigabitEthernet0/5/0/3.3,100.100.0.10 MoFRR RIB, Flags:
RPF Table: IPv4-Unicast-default
RPF Secondary: GigabitEthernet0/5/0/3.2,100.100.200.10
  GigabitEthernet0/5/0/1      13:54:10  fwd LI LH
```

This table describes the significant fields shown in the display. It includes fields that do not appear in the example, but that may appear in your output.

Table 26: show pim topology Field Descriptions

Field	Description
(11.0.0.1,239.9.9.9)SPT	Entry state. Source address, group address, and tree flag (shortest path tree or rendezvous point tree) for the route entry. Note that the tree flag may be missing from the entry.
SM	Entry protocol. PIM protocol mode in which the entry operates: sparse mode (SM), source specific multicast (SSM), bidirectional (BD), or dense-mode (DM).
Up: 00:00:13	Entry uptime. Time (in hours, minutes, and seconds) this entry has existed in the topology table.
RP: 11.0.0.1*	Entry information. Additional information about the route entry. If route entry is a sparse mode or bidirectional PIM route, the RP address is given.

Field	Description
JP: Null(never)	Entry join/prune state. Indicates if and when a join or prune message is sent to the RPF neighbor for the route.
MoFRR RIB, Flags:	Indicates whether the (S,G) route is a RIB-based MoFRR route.
MoFRR, Flags:	Indicates whether the (S,G) route is a flow-based MoFRR route. By default, a flow-based MoFRR route will be a RIB-based MoFRR route but not in the reverse way.
RPF Table	IPv4 Unicast default.
RPF Secondary	Secondary path interface
Entry Information Flags	
KAT - Keep Alive Timer	The keepalive timer tracks whether traffic is flowing for the (S, G) route on which it is set. A route does not time out while the KAT is running. The KAT runs for 3.5 minutes, and the route goes into KAT probing mode for as long as 65 seconds. The route is deleted if no traffic is seen during the probing interval, and there is no longer any reason to keep the route—for example, registers and (S, G) joins.
AA - Assume Alive	Flag that indicates that the route was alive, but recent confirmation of traffic flow was not received.
PA - Probe Alive	Flag that indicates that the route is probing the data plane to determine if traffic is still flowing for this route before it is timed out.
RA - Really Alive	Flag that indicates that the source is confirmed to be sending traffic for the route.
LH - Last Hop	Flag that indicates that the entry is the last-hop router for the entry. If (S, G) routes inherit the LH olist from an (*, G) route, the route entry LH flag appears only on the (*, G) route.
IA - Inherit Alive	Flag that indicates a source VPN routing and forwarding (VRF) route with the KAT active.
DSS - Don’t Signal Sources	Flag that may be set on the last-hop (*, G) entries that indicates that new matching sources should not be signaled from the forwarding plane.
DCC - Don’t Check Connected	Flag that is set when the KAT probes, which indicates that the connected check for new sources should be omitted in the forwarding plane.
RR - Register Received	Flag that indicates that the RP has received and answered PIM register messages for this (S, G) route.
SR - Sending Registers	Flag that indicates that the first-hop DR has begun sending registers for this (S, G) route, but has not yet received a Register-Stop message.
E - MSDP External	Flag that is set on those entries that have sources, learned through Multicast Source Discovery Protocol (MSDP), from another RP.

Field	Description
ME - MDT Encap	Flag that indicates a core encapsulation route for a multicast distribution tree (MDT).
MD - MDT Decap	Flag that indicates a core decapsulation route for an MDT.
MT - Crossed Data MDT threshold	Flag that indicates that traffic on this route passed a threshold for the data MDT.
MA - Data MDT group assigned	Flag that indicates a core encapsulation route for the data MDT.
POS0/2/0/0	Interface name. Name of an interface in the interface list of the entry.
03:54:23	Interface uptime. Time (in hours, minutes, and seconds) this interface has existed in the entry.
off	Interface forwarding status. Outgoing forwarding status of the interface for the entry is “fwd” or “off”.
Interface Information Flags	
LI - Local Interest	Flag that indicates that there are local receivers for this entry on this interface, as reported by Internet Group Management Protocol (IGMP).
LD - Local Disinterest	Flag that indicates that there is explicit disinterest for this entry on this interface, as reported by IGMP exclude mode reports.
II - Internal Interest	Flag that indicates that the host stack of the router has internal receivers for this entry.
ID - Internal Disinterest	Flag that indicates that the host stack of the router has explicit internal disinterest for this entry.
LH - Last Hop	Flag that indicates that this interface has directly connected receivers and this router serves as a last hop for the entry. If the (S, G) outgoing interface list is inherited from a (*, G) route, the LH flag is set on the (*, G) outgoing LH interface.
AS - Assert	Flag that indicates that a PIM assert message was seen on this interface and the active PIM assert state exists.
AB - Administrative Boundary	Flag that indicates that forwarding on this interface is blocked by a configured administrative boundary for this entry’s group range.

Related Commands

Command	Description
show mfib route	Displays all entries in the MFIB table.

show pim topology detail

To display detailed Protocol Independent Multicast (PIM) routing topology information that includes references to the tables in which reverse path forwarding (RPF) lookups occurred for specific topology route entries, use the **show pim topology detail** command in

EXEC

mode.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **topology detail**

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

Use the PIM topology table to display various entries for a given group, (*, G), (S, G), and (S, G)RPT, each with its own interface list.

PIM communicates the contents of these entries through the Multicast Routing Information Base (MRIB), which is an intermediary for communication between multicast routing protocols, such as PIM; local membership protocols, such as Internet Group Management Protocol (IGMP); and the multicast forwarding engine of the system.

The MRIB shows on which interface the data packet should be accepted and on which interfaces the data packet should be forwarded, for a given (S, G) entry. Additionally, the Multicast Forwarding Information Base (MFIB) table is used during forwarding to decide on per-packet forwarding actions.

When the multicast-only fast reroute (MoFRR) feature is enabled, the **show pim topology detail** command shows the primary and secondary paths for SGs configured for MoFRR.

Note For forwarding information, use the **show mfib route** and **show mrib route** commands.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim topology detail** command, showing the RPF table information for each topology entry:

```
RP/0/RP0/CPU0:router# show pim ipv4 topology detail

IP PIM Multicast Topology Table:
Entry state: (*/S,G)[RPT/SPT] Protocol Uptime Info
Entry flags: KAT - Keep Alive Timer, AA - Assume Alive, PA - Probe Alive,
    RA - Really Alive, LH - Last Hop, DSS - Don't Signal Sources,
    RR - Register Received, SR - Sending Registers, E - MSDP External,
    DCC - Don't Check Connected,
    ME - MDT Encap, MD - MDT Decap,
    MT - Crossed Data MDT threshold, MA - Data MDT group assigned
Interface state: Name, Uptime, Fwd, Info
Interface flags: LI - Local Interest, LD - Local Dissinterest,
    II - Internal Interest, ID - Internal Dissinterest,
    LH - Last Hop, AS - Assert, AB - Admin Boundary


(*,224.0.1.40) DM Up: 00:07:28 RP: 0.0.0.0
JP: Null(never) RPF: Null,0.0.0.0 Flags: LH DSS
RPF Table: None
  GigabitEthernet0/1/0/1      00:07:28  off LI II LH
  GigabitEthernet0/1/0/2      00:07:23  off LI LH
  GigabitEthernet0/1/0/1.503  00:07:27  off LI LH

(11.11.11.11,232.5.0.2)SPT SSM Up: 00:07:21
JP: Join(now) RPF: GigabitEthernet0/1/0/1.203,11.23.0.20 Flags:
RPF Table: IPv4-Unicast-default
  GigabitEthernet0/1/0/1.501  00:07:21  fwd LI LH

(61.61.0.10,232.5.0.3)SPT SSM Up: 00:11:57
JP: Join(now) RPF: Null,0.0.0.0 Flags:
RPF Table: None (Dropped due to route-policy)
  No interfaces in immediate olist
```

Note The RPF table output in boldface indicates the table in which the RPF lookup occurred for this route entry.

The following example shows output for a MoFRR convergence:

```
RP/0/RP0/CPU0:router# show pim topology 239.1.1.1 detail

IP PIM Multicast Topology Table
Entry state: (*/S,G)[RPT/SPT] Protocol Uptime Info
Entry flags: KAT - Keep Alive Timer, AA - Assume Alive, PA - Probe Alive,
    RA - Really Alive, LH - Last Hop, DSS - Don't Signal Sources,
    RR - Register Received, SR - Sending Registers, E - MSDP External,
    DCC - Don't Check Connected,
    ME - MDT Encap, MD - MDT Decap,
    MT - Crossed Data MDT threshold, MA - Data MDT group assigned
Interface state: Name, Uptime, Fwd, Info
Interface flags: LI - Local Interest, LD - Local Dissinterest,
    II - Internal Interest, ID - Internal Dissinterest,
    LH - Last Hop, AS - Assert, AB - Admin Boundary

(192.1.1.2,239.1.1.1)SPT SSM Up: 13:54:06
JP: Join(00:00:41) RPF: GigabitEthernet0/5/0/3.3,100.100.0.10 MoFRR RIB, Flags:
```

```
  GigabitEthernet0/5/0/1      13:54:06  fwd LI LH
RP/0/4/CPU0:Sunnyvale#show pim topology 239.1.1.1 detail

IP PIM Multicast Topology Table
Entry state: (*/S,G)[RPT/SPT] Protocol Uptime Info
Entry flags: KAT - Keep Alive Timer, AA - Assume Alive, PA - Probe Alive,
    RA - Really Alive, LH - Last Hop, DSS - Don't Signal Sources,
    RR - Register Received, SR - Sending Registers, E - MSDP External,
    DCC - Don't Check Connected,
    ME - MDT Encap, MD - MDT Decap,
    MT - Crossed Data MDT threshold, MA - Data MDT group assigned
Interface state: Name, Uptime, Fwd, Info
Interface flags: LI - Local Interest, LD - Local Dissinterest,
    II - Internal Interest, ID - Internal Dissinterest,
    LH - Last Hop, AS - Assert, AB - Admin Boundary

(192.1.1.2,239.1.1.1)SPT SSM Up: 13:54:10
JP: Join(00:00:37) RPF: GigabitEthernet0/5/0/3.3,100.100.0.10 MoFRR RIB, Flags:
RPF Table: IPv4-Unicast-default
RPF Secondary: GigabitEthernet0/5/0/3.2,100.100.200.10
  GigabitEthernet0/5/0/1      13:54:10  fwd LI LH
```

Table 26: show pim topology Field Descriptions, on page 122 describes the significant fields shown in the display . This table includes fields that do not appear in the example, but that may appear in your output.

Related Commands

Command	Description
show mfib route	Displays all entries in the MFIB table.
show mrib route	Displays all entries in the MRIB table.

show pim topology entry-flag

To display Protocol Independent Multicast (PIM) routing topology information for a specific entry flag, use the **show pim topology entry-flag** command in

EXEC

mode.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **topology entry-flag** *flag* [{**detail** | **route-count**}]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
flag	Configures a display of routes with the specified entry flag. Valid flags are the following: • **AA** —Assume alive • **DCC** —Don't check connected • **DSS** —Don't signal sources • **E** —MSDP External • **EX** —Extranet flag set • **IA** —Inherit except flag set • **KAT** —Keepalive timer • **LH** —Last hop • **PA** —Probe alive • **RA** —Really alive • **RR** —Registered receiver • **SR** —Sending registers
detail	(Optional) Specifies details about the entry flag information.
route-count	(Optional) Displays the number of routes in the PIM topology table.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.4.0	This command was introduced.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.
Release 3.7.0	The **detail** and **route-count** keywords were added.

Usage Guidelines

Use the PIM topology table to display various entries for a given group, (*, G), (S, G), and (S, G)RPT, each with its own interface list.

PIM communicates the contents of these entries through the Multicast Routing Information Base (MRIB), which is an intermediary for communication between multicast routing protocols, such as PIM; local membership protocols, such as Internet Group Management Protocol (IGMP); and the multicast forwarding engine of the system.

The MRIB shows on which interface the data packet should be accepted and on which interfaces the data packet should be forwarded, for a given (S, G) entry. Additionally, the Multicast Forwarding Information Base (MFIB) table is used during forwarding to decide on per-packet forwarding actions.

Note For forwarding information, use the **show mfib route** and **show mrib route** commands.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim topology entry-flag** command:

```
RP/0/RP0/CPU0:router# show pim topology entry-flag E

IP PIM Multicast Topology Table
Entry state: (*/S,G)[RPT/SPT] Protocol Uptime Info
Entry flags: KAT - Keep Alive Timer, AA - Assume Alive, PA - Probe Alive
    RA - Really Alive, IA - Inherit Alive, LH - Last Hop
    DSS - Don't Signal Sources,  RR - Register Received
    SR - Sending Registers, E - MSDP External, EX - Extranet
    DCC - Don't Check Connected, ME - MDT Encap, MD - MDT Decap
    MT - Crossed Data MDT threshold, MA - Data MDT group assigned
Interface state: Name, Uptime, Fwd, Info
Interface flags: LI - Local Interest, LD - Local Dissinterest,
    II - Internal Interest, ID - Internal Dissinterest,
    LH - Last Hop, AS - Assert, AB - Admin Boundary, EX - Extranet

(202.5.5.202,226.0.0.0)SPT SM Up: 00:27:06
JP: Join(00:00:11) RPF: GigabitEthernet0/2/0/2,44.44.44.103 Flags: KAT(00:01:54) E RA
  No interfaces in immediate olist

(203.5.5.203,226.0.0.0)SPT SM Up: 00:27:06
JP: Join(00:00:11) RPF: GigabitEthernet0/2/0/2,44.44.44.103 Flags: KAT(00:01:54) E RA
  No interfaces in immediate olist

(204.5.5.204,226.0.0.0)SPT SM Up: 00:27:06
JP: Join(00:00:11) RPF: GigabitEthernet0/2/0/2,44.44.44.103 Flags: KAT(00:01:54) E RA
  No interfaces in immediate olist

(204.5.5.204,226.0.0.1)SPT SM Up: 00:27:06
JP: Join(00:00:11) RPF: GigabitEthernet0/2/0/2,44.44.44.103 Flags: KAT(00:01:54) E RA
  No interfaces in immediate olist
```

Table 26: show pim topology Field Descriptions, on page 122 describes the significant fields shown in the display. This table includes fields that do not appear in the example, but that may appear in your output.

Related Commands

Command	Description
show mrib route	Displays all entries in the MRIB table.

show pim topology interface-flag

To display Protocol Independent Multicast (PIM) routing topology information for a specific interface, use the **show pim topology** command in EXEC mode.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **topology interface-flag** *flag* [{**detail** | **route-count**}]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
flag	Configures a display of routes with the specified interface flag. Valid flags are the following:
detail	(Optional) Displays details about the interface flag information.
route-count	(Optional) Displays the number of routes in the PIM topology table.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.4.0	This command was introduced.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.
Release 3.7.0	The **detail** and **route-count** keywords were added.

Usage Guidelines

Use the PIM topology table to display various entries for a given group, (*, G), (S, G), and (S, G)RPT, each with its own interface list.

PIM communicates the contents of these entries through the Multicast Routing Information Base (MRIB), which is an intermediary for communication between multicast routing protocols, such as PIM; local membership protocols, such as Internet Group Management Protocol (IGMP); and the multicast forwarding engine of the system.

The MRIB shows on which interface the data packet should be accepted and on which interfaces the data packet should be forwarded, for a given (S, G) entry. Additionally, the Multicast Forwarding Information Base (MFIB) table is used during forwarding to decide on per-packet forwarding actions.

Note For forwarding information, use the **show mfib route** and **show mrib route** commands.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim topology interface-flag** command:

```
RP/0/RP0/CPU0:router# show pim topology interface-flag LI

IP PIM Multicast Topology Table
Entry state: (*/S,G)[RPT/SPT] Protocol Uptime Info
Entry flags: KAT - Keep Alive Timer, AA - Assume Alive, PA - Probe Alive
    RA - Really Alive, IA - Inherit Alive, LH - Last Hop
    DSS - Don't Signal Sources,  RR - Register Received
    SR - Sending Registers, E - MSDP External, EX - Extranet
    DCC - Don't Check Connected, ME - MDT Encap, MD - MDT Decap
    MT - Crossed Data MDT threshold, MA - Data MDT group assigned
Interface state: Name, Uptime, Fwd, Info
Interface flags: LI - Local Interest, LD - Local Dissinterest,
    II - Internal Interest, ID - Internal Dissinterest,
    LH - Last Hop, AS - Assert, AB - Admin Boundary, EX - Extranet

(*,224.0.1.39) DM Up: 00:27:27 RP: 0.0.0.0
JP: Null(never) RPF: Null,0.0.0.0 Flags: LH DSS
  Loopback5                   00:27:27  off LI II LH

(*,224.0.1.40) DM Up: 00:27:27 RP: 0.0.0.0
JP: Null(never) RPF: Null,0.0.0.0 Flags: LH DSS
  Loopback5                   00:27:26  off LI II LH
  GigabitEthernet0/2/0/2      00:27:27  off LI LH

(*,226.0.0.0) SM Up: 00:27:27 RP: 97.97.97.97*
JP: Join(never) RPF: Decapstunnel0,97.97.97.97 Flags: LH
  Loopback5                   00:27:27  fwd LI LH

(*,226.0.0.1) SM Up: 00:27:27 RP: 97.97.97.97*
JP: Join(never) RPF: Decapstunnel0,97.97.97.97 Flags: LH
  Loopback5                   00:27:27  fwd LI LH

(*,226.0.0.3) SM Up: 00:27:27 RP: 97.97.97.97*
JP: Join(never) RPF: Decapstunnel0,97.97.97.97 Flags: LH
  Loopback5                   00:27:27  fwd LI LH

(*,226.0.0.4) SM Up: 00:27:27 RP: 97.97.97.97*
JP: Join(never) RPF: Decapstunnel0,97.97.97.97 Flags: LH
  Loopback5                   00:27:27  fwd LI LH

(*,226.0.0.5) SM Up: 00:27:27 RP: 97.97.97.97*
JP: Join(never) RPF: Decapstunnel0,97.97.97.97 Flags: LH
  Loopback5                   00:27:27  fwd LI LH

(201.5.5.201,226.1.0.0)SPT SM Up: 00:27:27
JP: Join(never) RPF: Loopback5,201.5.5.201* Flags: KAT(00:00:34) RA RR (00:03:53)
  GigabitEthernet0/2/0/2      00:26:51  fwd Join(00:03:14)
  Loopback5                   00:27:27  fwd LI LH

(204.5.5.204,226.1.0.0)SPT SM Up: 00:27:27
JP: Join(now) RPF: GigabitEthernet0/2/0/2,44.44.44.103 Flags: E
  Loopback5                   00:27:27  fwd LI LH
```

Table 26: show pim topology Field Descriptions, on page 122 describes the significant fields shown in the display. This table includes fields that do not appear in the example, but that may appear in your output.

Related Commands

Command	Description
show mrib route	Displays all entries in the MRIB table.

show pim topology summary

To display summary information about the Protocol Independent Multicast (PIM) routing topology table, use the **show pim topology summary** command in

EXEC mode

.

show pim [**vrf** *vrf-name*] [{**ipv4** | **ipv6**}] **topology summary** [**detail**]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
detail	(Optional) Displays details about the summary information.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 3.4.0	This command was introduced.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.
Release 3.6.0	The *detail* argument was added.

Usage Guidelines

Use the PIM topology table to display various entries for a given group, (*, G), (S, G), and (S, G)RPT, each with its own interface list.

PIM communicates the contents of these entries through the Multicast Routing Information Base (MRIB), which is an intermediary for communication between multicast routing protocols, such as PIM; local membership protocols, such as Internet Group Management Protocol (IGMP); and the multicast forwarding engine of the system.

The MRIB shows on which interface the data packet should be accepted and on which interfaces the data packet should be forwarded, for a given (S, G) entry. Additionally, the Multicast Forwarding Information Base (MFIB) table is used during forwarding to decide on per-packet forwarding actions.

Note For forwarding information, use the **show mfib route** and **show mrib route** commands.

Task ID

Task ID	Operations
multicast	read

Examples

The following example represents sample output from the **show pim topology summary** command:

```
RP/0/RP0/CPU0:router# show pim vrf svpn12 topology summary

Mon Feb  2 04:07:01.249 UTC
PIM TT Summary for VRF svpn12
  No. of group ranges = 9
  No. of (*,G) routes = 8
  No. of (S,G) routes = 2
  No. of (S,G)RPT routes = 0

OSPF Mcast-intact   Not configured
    ISIS Mcast-intact   Not configured
    ISIS Mcast Topology Not configured

Default RPF Table: IPv4-Unicast-default
RIB Convergence Timeout Value: 00:30:00
RIB Convergence Time Left:     00:28:32
Multipath RPF Selection is Enabled

Table: IPv4-Unicast-default
    PIM RPF Registrations = 13
    RIB Table converged

Table: IPv4-Multicast-default
    PIM RPF Registrations = 0
    RIB Table converged
```

For an example of detailed PIM topology output, see show pim topology detail, on page 125.

show pim traffic

To display Protocol Independent Multicast (PIM) traffic counter information, use the **show pim traffic** command in EXEC mode

.

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim traffic** command that displays a row for valid PIM packets, number of hello packets, and so on:

```
RP/0/RP0/CPU0:router# show pim traffic

PIM Traffic Counters
Elapsed time since counters cleared: 1d01h

                   Received                       Sent
Valid PIM Packets 15759217                    15214426
Hello                9207                       12336
Join-Prune        1076805                      531981
Data Register    14673205                           0
Null Register       73205                           0
Register Stop           0                    14673205
Assert                  0                           0
Batched Assert          0                           0
BSR Message             0                           0
Candidate-RP Adv.       0                           0
```

```
Join groups sent                                    0
Prune groups sent                                   0
Output JP bytes                                     0
Output hello bytes                               4104

Errors:
Malformed Packets                                   0
Bad Checksums                                       0
Socket Errors                                       0
Subnet Errors                                       0
Packets dropped since send queue was full           0
Packets dropped due to invalid socket               0
Packets which couldn't be accessed                  0
Packets sent on Loopback Errors                     6
Packets received on PIM-disabled Interface          0
Packets received with Unknown PIM Version           0
```

This table describes the significant fields shown in the display.

Table 27: show pim traffic Field Descriptions

Field	Description
Elapsed time since counters cleared	Time (in days and hours) that had elapsed since the counters were cleared with the **clear pim counters** command.
Valid PIM Packets	Total PIM packets that were received and sent.
HelloJoin-PruneRegisterRegister StopAssert Bidir DF Election	Specific type of PIM packets that were received and sent.
Malformed Packets	Invalid packets due to format errors that were received and sent.
Bad Checksums	Packets received or sent due to invalid checksums.
Socket Errors	Packets received or sent due to errors from the router's IP host stack sockets.
Packets dropped due to invalid socket	Packets received or sent due to invalid sockets in the router's IP host stack.
Packets which couldn't be accessed	Packets received or sent due to errors when accessing packet memory.
Packets sent on Loopback Errors	Packets received or sent due to use of loopback interfaces.
Packets received on PIM-disabled Interface	Packets received or sent due to use of interfaces not enabled for PIM.
Packets received with Unknown PIM Version	Packets received or sent due to invalid PIM version numbers in the packet header.

Related Commands

Command	Description
clear pim counters, on page 19	Clears Protocol Independent Multicast (PIM) counters and statistics.

show pim tunnel info

To display information for the Protocol Independent Multicast (PIM) tunnel interface, use the **show pim tunnel info** command in

EXEC mode

mode.

show pim [**vrf** *vrf-name*] [{ **ipv4** | **ipv6** }] **tunnel info** { *interface-unit* | **all** } [**netio**]

Syntax Description

vrf *vrf-name*	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
interface-unit	Name of virtual tunnel interface that represents the encapsulation tunnel or the decapsulation tunnel.
all	Specifies both encapsulation and decapsulation tunnel interfaces.
netio	(Optional) Displays information obtained from the Netio DLL.

Command Default

IPv4 addressing is the default. If no VRF is specified, the default VRF is operational.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.4.0	The **ipv4** and **ipv6** keywords were added. The **netio** keyword was added.
Release 3.5.0	The **vrf** *vrf-name* keyword and argument were added.

Usage Guidelines

PIM register packets are sent through the virtual encapsulation tunnel interface from the source's first-hop designated router (DR) router to the rendezvous point (RP). On the RP, a virtual decapsulation tunnel is used to represent the receiving interface of the PIM register packets. This command displays tunnel information for both types of interfaces.

Register tunnels are the encapsulated (in PIM register messages) multicast packets from a source that is sent to the RP for distribution through the shared tree. Registering applies only to sparse mode (SM), not to Source Specific Multicast (SSM) and bidirectional PIM.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim tunnel info** command:

```
RP/0/RP0/CPU0:router# show pim tunnel info all

Interface          RP Address      Source Address
Encapstunnel0      10.1.1.1        10.1.1.1
Decapstunnel0      10.1.1.1
```

This table describes the significant fields shown in the display.

Table 28: show pim tunnel info Field Descriptions

Field	Description
Interface	Name of the tunnel interface.
RP Address	IP address of the RP tunnel endpoint.
Source Address	IP address of the first-hop DR tunnel endpoint, applicable only to encapsulation interfaces.

show pim segment-database

To display information about the segment databases configured for Protocol Independent Multicast (PIM), use the **show pim segment-database** command in EXEC mode.

show pim segment-database

Syntax Description

segment-database	Physical database.

Note Use the **show pim segment-database** command in EXEC mode to see a list of all databases currently configured on the router.

For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 6.0.0	This command was introduced.

Usage Guidelines

The **show pim segment-database** command displays information on all PIM-enabled databases, such as Ingress PE, Upstream Info, Upstream Core Added, Downstream Info, and Downstream Core Added.

Task ID

Task ID	Operations
multicast	read

Examples

The following is sample output from the **show pim segment-database** command on iABR with MLDP between iPE and iABR, and IR between iABR and eABR.

```
RP/0/RP0/CPU0:router#show pim segment-database
Mon Nov  2 17:30:44.728 EST

RD: 4:1, Prefix   : [1][4.4.4.4]/40
    Created          : Nov 25 05:51:07.804 (Up: 01:02:13)
    Leaf Type: I-PMSI, UMH: 4.4.4.4, LSM-ID: 524292 (0x80004)
    Upstream Info: 1 [global-id 2]
    Upstream Core Added, S,I Pmsi Received: [0, 1], S/U Leaf Ad Sent: [1,0]
    Downstream Info: 1 [Tunnel:Type 4 IR ID:0x80004 Label 24012]
    Downstream Core Added, S,I Pmsi Sent/Orig: [0/0, 1]
      Leaf AD List:
        Originating router: 2.2.2.2, Label: 24012
```

In the above sample output, `RD: 4:1, Prefix : [1][4.4.4.4]/40` represents the BGP route advertised by iPE with RD 4:1 and loopback address 4.4.4.4, `Leaf Type: I-PMSI, UMH: 4.4.4.4, LSM-ID: 524292 (0x80004)` represents the LSM-ID of downstream core, `Downstream Info: 1 [Tunnel:Type 4 IR ID:0x80004 Label 24012]` represents the Head local-label of the downstream core, and `Originating router: 2.2.2.2, Label: 24012` represents the Outgoing label for the downstream core.

show pim vrf vrf_name mdt cache

To display the data mdt cache information for the protocol independent multicast, use the **show pim vrf** *vrf1* **mdt cache** command in the EXEC mode.

show pim vrf *vrf1* **mdt cache**

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.2.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
multicast	read

```
RP/0/RP0/CPU0:router# show pim vrf vrf1 mdt cache
Core Source      Cust (Source, Group)                Core Data        Expires
110.110.110.110  (192.1.1.2, 232.1.1.1)              [p2mp 1/1/110.110.110.110]  never

RP/0/RSP0/CPU0:PE3#show pim vrf vrf1 mdt rsvpte remote
P2MP ID/Tunel ID/      MDT              Cache DIP Local Vrf routes
Extended Tunnel ID     Source           Count     Entry Using cache
[p2mp 1/1/110.110.110.110]110.110.110.110 1     N   N     1
```

show pim vrf vrf_name rpf

To display RPF information for protocol independent multicast, use the **show pim vrf** *vrf1* **rpf** command in the EXEC mode.

show pim vrf *vrf1* **rpf**

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.2.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
multicast	read

```
RP/0/RP0/CPU0:router# show pim vrf vrf1 rpf
Table: IPv4-Unicast-default
* 192.1.1.2/32 [200/0]
    via MPLS  with rpf neighbor 110.110.110.110
    Connector: 1:1:110.110.110.110, Nexthop: 110.110.110.110
```

show pim vrf vrf_name topology

To display the PIM topology table information for a specific vrf, use the **show pim vrf** *vrf_name* **topology** command in the EXEC mode.

show pim vrf *vrf_name* **topology** *ip_address*

Syntax Description

ip_address	Specifies the IP address.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.2.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
multicast	read

```
RP/0/RP0/CPU0:router# show pim vrf vrf1 topology 232.1.1.1

(192.1.1.2,232.1.1.1)SPT SSM Up: 05:53:44
JP: Join(00:00:09) RPF: GigabitEthernet0/0/0/1.1,192.1.1.2* Flags: MT
  tunnel-mte1                 05:53:44  fwd LI LH
```

spt-threshold infinity

To change the behavior of the last-hop router to always use the shared tree and never perform a shortest-path tree (SPT) switchover, use the **spt-threshold infinity** command in PIM configuration mode. To return to the default behavior, use the **no** form of this command.

spt-threshold infinity [**group-list** *access-list*]

Syntax Description

group-list *access-list*	(Optional) Indicates the groups restricted by the access list.

Command Default

The last-hop Protocol Independent Multicast (PIM) router switches to the shortest-path source tree by default.

Command Modes

PIM configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

The **spt-threshold infinity** command causes the last-hop PIM router to always use the shared tree instead of switching to the shortest-path source tree.

If the **group-list** keyword is not used, this command applies to all multicast groups.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to configure the PIM source group grp1 to always use the shared tree:

```
RP/0/RP0/CPU0:router(config)# router pim
RP/0/RP0/CPU0:router(config-pim-default-ipv4)# spt-threshold infinity group-list grp1
```

ssm

To define the Protocol Independent Multicast (PIM)-Source Specific Multicast (SSM) range of IP multicast addresses, use the **ssm** command in the appropriate configuration mode. To return to the default behavior, use the **no** form of this command.

ssm [{**allow-override** | **disable** | **range** *access-list*}]

Syntax Description

allow-override	(Optional) Allows SSM ranges to be overridden by more specific ranges.
disable	(Optional) Disables SSM group ranges.
range *access-list*	(Optional) Specifies an access list describing group ranges for this router when operating in PIM SSM mode.

Command Default

Interface operates in PIM sparse mode (PIM-SM). IPv4 addressing is the default.

Command Modes

Multicast routing configuration

Multicast routing address-family configuration

Multicast VPN configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.3.0	The **default-range** keyword was deleted.
Release 3.4.0	The **allow-override** keyword was added.
Release 3.5.0	This command was introduced in multicast VPN configuration mode. The *access-list* argument was changed from optional to required.

Usage Guidelines

The **ssm** command performs source filtering, which is the ability of a router to report interest in receiving packets from specific source addresses (or from all but the specific source addresses) to an IP multicast address. Unlike PIM-sparse mode (SM) that uses a rendezvous point (RP) and shared trees, PIM-SSM uses information on source addresses for a multicast group provided by receivers through the local membership protocol Internet Group Management Protocol (IGMP) and is used to directly build source-specific trees.

IGMP Version 3 must be enabled on routers that want to control the sources they receive through the network.

When multicast routing is enabled, the default is PIM-SSM enabled on the default SSM range, 232/8. SSM may be disabled with the **disable** form of the command, or any ranges may be specified in an access list with the **range** form. All forms of this command are mutually exclusive. If an access list is specified, the default SSM range is not used unless specified in the access list.

Task ID

Task ID	Operations
multicast	read, write

Examples

The following example shows how to configure SSM service for the IP address range defined by access list 4, using the **ssm** command:

```
RP/0/RP0/CPU0:router(config)# ipv4 access-list 4
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit ipv4 any 224.2.151.141
RP/0/RP0/CPU0:router(config)# multicast-routing
RP/0/RP0/CPU0:router(config-mcast)# ssm range 4
```