



PIM Dense Mode State Refresh

Feature History

Release	Modification
Cisco IOS	For information about feature support in Cisco IOS software, use Cisco Feature Navigator.
Cisco IOS XE Release 2.1	This feature was introduced on Cisco ASR 1000 Series Routers.

This feature module describes the Protocol Independent Multicast (PIM) Dense Mode (DM) State Refresh feature, which is an extension to the dense operational mode of the PIM Version 2 multicast routing architecture. This feature module includes the following sections:

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Feature Overview

PIM dense mode builds source-based multicast distribution trees that operate on a flood and prune principle. Multicast packets from a source are flooded to all areas of a PIM dense mode network. PIM routers that receive multicast packets and have no directly connected multicast group members or PIM neighbors send a prune message back up the source-based distribution tree toward the source of the packets. As a result, subsequent multicast packets are not flooded to pruned branches of the distribution tree. However, the pruned state in PIM dense mode times out approximately every 3 minutes and the entire PIM dense mode network is reflooded with multicast packets and prune messages. This reflooding of unwanted traffic throughout the PIM dense mode network consumes network bandwidth.



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The PIM Dense Mode State Refresh feature keeps the pruned state in PIM dense mode from timing out by periodically forwarding a control message down the source-based distribution tree. The control message refreshes the prune state on the outgoing interfaces of each router in the distribution tree.

Benefits

The PIM Dense Mode State Refresh feature keeps the pruned state in PIM dense mode from timing out, which saves network bandwidth by greatly reducing the reflooding of unwanted multicast traffic to pruned branches of the PIM dense mode network. This feature also enables PIM routers in a PIM dense mode multicast network to recognize topology changes (sources joining or leaving a multicast group) before the default 3-minute state refresh timeout period.

Restrictions

All routers in a PIM dense mode network must run a Cisco IOS software release, such as Cisco IOS Release 12.1(5)T, that supports the PIM Dense Mode State Refresh feature to process and forward state refresh control messages.

The origination interval for the state refresh control message must be the same for all PIM routers on the same LAN. Specifically, the same origination interval must be configured on each router interface that is directly connected to the LAN.

Related Features and Technologies

The PIM Dense Mode State Refresh feature is an extension of the PIM Version 2 multicast routing architecture, which is documented in the Release 12.1 *Cisco IOS IP and IP Routing Configuration Guide* and the *Cisco IOS IP and IP Routing Command Reference*.

Supported Platforms

The PIM Dense Mode State Refresh feature is supported on the following platforms:

- Cisco 800 series
- Cisco 1400 series
- Cisco 1600 series
- Cisco 1700 series
- Cisco 2500 series
- Cisco 2600 series
- Cisco 3600 series
- Cisco 4000 series (Cisco 4000, 4000-M, 4500, 4500-M, 4700, 4700-M)
- Cisco 7000 series
- Cisco 7200 series
- Cisco 7500 series
- Cisco AS5800 access server

- Cisco AS5400 series
- Cisco AS5300 series
- Cisco AS5200 series
- Cisco MC3810 series
- Cisco MGX8850 WAN edge switch
- Cisco uBR7200 series

Supported Standards, MIBs, and RFCs

Standards

No new or modified standards are supported by this feature.

MIBs

No new or modified MIBs are supported by this feature.

To obtain lists of MIBs supported by platform and Cisco IOS releases, and to download MIB modules, go to the Cisco MIB web site on Cisco Connection Online (CCO) at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

RFCs

No new or modified RFCs are supported by this feature.

Prerequisites

You must have PIM dense mode enabled on an interface before configuring the PIM Dense Mode State Refresh feature.

Configuration Tasks

There are no configuration tasks for enabling the PIM Dense Mode State Refresh feature. By default, all PIM routers that are running a Cisco IOS software release that supports the PIM Dense Mode State Refresh feature automatically process and forward state refresh control messages. To disable the processing and forwarding of state refresh control messages on a PIM router, use the **ip pim state-refresh disable** global configuration command.

The origination of state refresh control messages is disabled by default. To configure the origination of the control messages on a PIM router, use the following commands beginning in global configuration mode:

Command	Purpose
Router(config)# interface <i>type number</i>	Specifies an interface and places the router in interface configuration mode.
Router(config-if)# ip pim state-refresh origination-interval [<i>interval</i>]	Configures the origination of the PIM Dense Mode State Refresh control message. Optionally, you can configure the number of seconds between control messages by using the <i>interval</i> argument. The default interval is 60 seconds. The interval range is 4 seconds to 100 seconds.

Verifying PIM Dense Mode State Refresh Configuration

Use the **show ip pim interface** [*type number*] **detail** and the **show ip pim neighbor** [*interface*] commands to verify that the PIM Dense Mode State Refresh feature is configured correctly. The following output of the **show ip pim interface** [*type number*] **detail** command indicates that processing, forwarding, and origination of state refresh control messages is enabled.

```
Router# show ip pim interface fastethernet 0/1 detail

FastEthernet0/1 is up, line protocol is up
  Internet address is 172.16.8.1/24
  Multicast switching:process
  Multicast packets in/out:0/0
  Multicast boundary:not set
  Multicast TTL threshold:0
  PIM:enabled
    PIM version:2, mode:dense
    PIM DR:172.16.8.1 (this system)
    PIM neighbor count:0
    PIM Hello/Query interval:30 seconds
  → PIM State-Refresh processing:enabled
  → PIM State-Refresh origination:enabled, interval:60 seconds
    PIM NBMA mode:disabled
    PIM ATM multipoint signalling:disabled
    PIM domain border:disabled
  Multicast Tagswitching:disabled
```

The S in the Mode field of the following **show ip pim neighbor** [*interface*] command output indicates that the neighbor has the PIM Dense Mode State Refresh feature configured.

```
Router# show ip pim neighbor

PIM Neighbor Table
Neighbor      Interface      Uptime/Expires   Ver   DR
Address
→ 172.16.5.1   Ethernet1/1     00:09:03/00:01:41 v2    1 / B S
```

Monitoring and Maintaining PIM DM State Refresh

Following are the PIM Dense Mode State Refresh control messages that are sent and received by a PIM router after the **debug ip pim** privileged EXEC command is configured for multicast group 239.0.0.1:

```
Router# debug ip pim 239.0.0.1

*Mar 1 00:25:10.416:PIM:Originating refresh message for
(172.16.8.3,239.0.0.1)
*Mar 1 00:25:10.416:PIM:Send SR on Ethernet1/1 for (172.16.8.3,239.0.0.1)
TTL=9
```

The following output from the **show ip mroute** command displays are the resulting prune timer changes for interface Ethernet 1/0 and multicast group 239.0.0.1. (The following output assumes that the **debug ip pim** privileged EXEC command has already been configured on the router.) In the first output from the **show ip mroute** command, the prune timer reads 00:02:06. The debug messages indicate that a PIM Dense Mode State Refresh control message is received and sent on Ethernet interface 1/0, and that other PIM Dense Mode State Refresh routers were discovered. In the second output from the **show ip mroute** command, the prune timer has been reset to 00:02:55.

```
Router# show ip mroute 239.0.0.1

(172.16.8.3, 239.0.0.1), 00:09:50/00:02:06, flags:PT
  Incoming interface:Ethernet1/1, RPF nbr 172.16.5.2
  Outgoing interface list:
→ Ethernet1/0, Prune/Dense, 00:09:43/00:02:06

Router#
*Mar 1 00:32:06.657:PIM:SR on iif from 172.16.5.2 orig 172.16.8.1 for
(172.16.8.3,239.0.0.1)
*Mar 1 00:32:06.661:      flags:prune-indicator
*Mar 1 00:32:06.661:PIM:Cached metric is [0/0]
*Mar 1 00:32:06.661:PIM:Keep RPF nbr 172.16.5.2
*Mar 1 00:32:06.661:PIM:Send SR on Ethernet1/0 for (172.16.8.3,239.0.0.1)
TTL=8
*Mar 1 00:32:06.661:      flags:prune-indicator

Router# show ip mroute 239.0.0.1

(172.16.8.3, 239.0.0.1), 00:10:01/00:02:55, flags:PT
  Incoming interface:Ethernet1/1, RPF nbr 172.16.5.2
  Outgoing interface list:
→ Ethernet1/0, Prune/Dense, 00:09:55/00:02:55
```

Configuration Examples

The following example is for a PIM router that is originating, processing, and forwarding PIM Dense Mode State Refresh control messages on Fast Ethernet interface 0/1 every 60 seconds:

```
ip multicast-routing

interface FastEthernet0/1
 ip address 172.16.8.1 255.255.255.0
 ip pim state-refresh origination-interval 60
 ip pim dense-mode
```

The following example is for a PIM router that is just processing and forwarding PIM Dense Mode State Refresh control messages on Fast Ethernet interface 1/1:

```
ip multicast-routing

interface FastEthernet1/1
 ip address 172.16.7.3 255.255.255.0
 ip pim dense-mode
```

Command Reference

The following commands are introduced or modified in the feature or features documented in this module. For information about these commands, see the *Cisco IOS IP Multicast Command Reference* at http://www.cisco.com/en/US/docs/ios/ipmulti/command/reference/imc_book.html. For information about all Cisco IOS commands, go to the Command Lookup Tool at <http://tools.cisco.com/Support/CLILookup> or to the *Cisco IOS Master Commands List*.

- **ip pim state-refresh disable**
- **ip pim state-refresh origination-interval**
- **show ip pim interface**

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