IP Multicast Optimization: PIM Dense Mode State Refresh

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Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisite for PIM Dense Mode State Refresh

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

Restrictions on PIM Dense Mode State Refresh

- All routers in a PIM dense mode network must run a software release 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.

Information About PIM Dense Mode State Refresh

PIM Dense Mode State Refresh Overview

The PIM Dense Mode State Refresh feature is an extension of the PIM Version 2 multicast routing architecture.

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.

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.

Related Topics

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Originating Processing and Forwarding PIM Dense Mode State Refresh Control Messages Example, on page 5
Processing and Forwarding PIM Dense Mode State Refresh Control Messages Example, on page 5

Benefits of PIM Dense Mode State Refresh

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.

How to Configure PIM Dense Mode State Refresh

Configuring PIM Dense Mode State Refresh

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 XE 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. To enable state refresh again if it has been disabled, use the **no 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** *type number*	Specifies an interface and places the router in interface configuration mode.
`Router(config-if)#` **ip pim state-refresh origination-interval** [*interval*]	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 *interval* argument. The default interval is 60 seconds. The interval range is 1 second to 100 seconds.

Related Topics

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Processing and Forwarding PIM Dense Mode State Refresh Control Messages Example, on page 5

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 0/1/0 detail
FastEthernet0/1/0 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                                                    Priority/Mode
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 GigabitEthernet1/1/0 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 GigabitEthernet interface1/0/0 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:GigabitEthernet1/1/0, RPF nbr 172.16.5.2
  Outgoing interface list:
 GigabitEthernet1/0/0, 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:GigabitEthernet1/1/0, RPF nbr 172.16.5.2
  Outgoing interface list:
 GigabitEthernet1/0/0, Prune/Dense, 00:09:55/00:02:55
```

Configuration Examples for PIM Dense Mode State Refresh

Originating Processing and Forwarding PIM Dense Mode State Refresh Control Messages Example

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 0/1/0 every 60 seconds:

```
ip multicast-routing distributed
interface FastEthernet0/1/0
 ip address 172.16.8.1 255.255.255.0
 ip pim state-refresh origination-interval 60
 ip pim dense-mode
```

Related Topics

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Processing and Forwarding PIM Dense Mode State Refresh Control Messages Example

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 1/1/0:

```
ip multicast-routing
interface FastEthernet1/1/0
 ip address 172.16.7.3 255.255.255.0
 ip pim dense-mode
```

Related Topics

Configuring PIM Dense Mode State Refresh, on page 3
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Additional References

Related Documents

Related Topic	Document Title
The PIM Dense Mode State Refresh feature is an extension of the PIM Version 2 multicast routing architecture	“Configuring Basic IP Multicast” module

Related Topic	Document Title
IP multicast commands: complete command syntax, command mode, defaults, command history, usage guidelines, and examples	*Cisco IOS IP Multicast Command Reference*

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	--

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing standards has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing standards has not been modified by this feature.	--

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/techsupport

Feature History and Information for PIM Dense Mode State Refresh

Release	Modification
Cisco IOS XE 3.3SE	This feature was introduced.