IP Multicast: PIM Configuration Guide, Cisco IOS Release 15E

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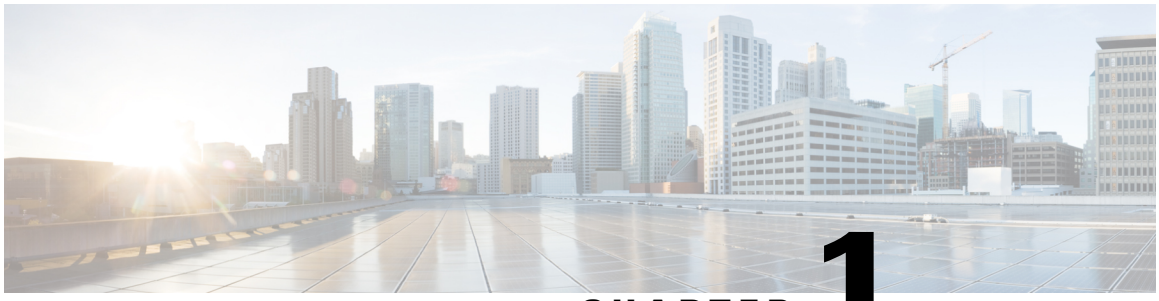

CHAPTER 1

HSRP Aware PIM

This module describes how to configure the HSRP Aware PIM feature for enabling multicast traffic to be forwarded through the Hot Standby Router Protocol (HSRP) active router (AR), allowing Protocol Independent Multicast (PIM) to leverage HSRP redundancy, avoid potential duplicate traffic, and enable failover.

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.

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Restrictions for HSRP Aware PIM

- HSRP IPv6 is not supported.
- Stateful failover is not supported. During PIM stateless failover, the HSRP group's virtual IP address transfers to the standby router but no mrouting sate information is transferred. PIM listens and responds to state change events and creates mroute states upon failover.
- The maximum number of HSRP groups that can be tracked by PIM on each interface is 16.

- The redundancy priority for a PIM DR must be greater than the configured or default value (1) of the PIM DR priority on any device for which the same HSRP group is enabled or the HSRP Active will fail to win the DR election.

Information About HSRP Aware PIM

HSRP Aware PIM

Protocol Independent Multicast (PIM) has no inherent redundancy capabilities and its operation is completely independent of Hot Standby Router Protocol (HSRP) group states. As a result, IP multicast traffic is forwarded not necessarily by the same device as is elected by HSRP. The HSRP Aware PIM feature provides consistent IP multicast forwarding in a redundant network with virtual routing groups enabled.

HSRP Aware PIM enables multicast traffic to be forwarded through the HSRP active router (AR), allowing PIM to leverage HSRP redundancy, avoid potential duplicate traffic, and enable failover, depending on the HSRP states in the device. The PIM designated router (DR) runs on the same gateway as the HSRP AR and maintains mroute states.

In a multiaccess segment (such as LAN), PIM DR election is unaware of the redundancy configuration, and the elected DR and HSRP AR may not be the same router. In order to ensure that the PIM DR is always able to forward PIM Join/Prune message towards RP or FHR, the HSRP AR becomes the PIM DR (if there is only one HSRP group). PIM is responsible for adjusting DR priority based on the group state. When a failover occurs, multicast states are created on the new AR elected by the HSRP group and the AR assumes responsibility for the routing and forwarding of all the traffic addressed to the HSRP virtual IP address.

With HSRP Aware PIM enabled, PIM sends an additional PIM Hello message using the HSRP virtual IP addresses as the source address for each active HSRP group when a device becomes HSRP Active. The PIM Hello will carry a new GenID in order to trigger other routers to respond to the failover. When a downstream device receives this PIM Hello, it will add the virtual address to its PIM neighbor list. The new GenID carried in the PIM Hello will trigger downstream routers to resend PIM Join messages towards the virtual address. Upstream routers will process PIM Join/Prunes (J/P) based on HSRP group state.

If the J/P destination matches the HSRP group virtual address and if the destination device is in HSRP active state, the new AR processes the PIM Join because it is now the acting PIM DR. This allows all PIM Join/Prunes to reach the HSRP group virtual address and minimizes changes and configurations at the downstream routers side.

The IP routing service utilizes the existing virtual routing protocol to provide basic stateless failover services to client applications, such as PIM. Changes in the local HSRP group state and standby router responsibility are communicated to interested client applications. Client applications may build on top of IRS to provide stateful or stateless failover. PIM, as an HSRP client, listens to the state change notifications from HSRP and automatically adjusts the priority of the PIM DR based on the HSRP state. The PIM client also triggers communication between upstream and downstream devices upon failover in order to create an mroute state on the new AR.

How to Configure HSRP Aware PIM

Configuring an HSRP Group on an Interface

Before You Begin

- IP multicast must already be configured on the device.
- PIM must already be configured on the interface.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number* [*name-tag*]
4. **ip address** *ip-address mask*
5. **standby** [*group-number*] **ip** [*ip-address* [*secondary*]]
6. **standby** [*group-number*] **timers** [**msec**] *hellotime* [**msec**] *holdtime*
7. **standby** [*group-number*] **priority** *priority*
8. **standby** [*group-number*] **name** *group-name*
9. **end**
10. **show standby** [*type number* [*group*]] [**all** | **brief**]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* [*name-tag*] **Example:** `Device(config)# interface ethernet 0/0`	Specifies an interface to be configured and enters interface configuration mode.

	Command or Action	Purpose
Step 4	**ip address** *ip-address mask* **Example:** `Device(config-if)# ip address 10.0.0.2 255.255.255.0`	Sets a primary or secondary IP address for an interface.
Step 5	**standby** [*group-number*] **ip** [*ip-address* [*secondary*]] **Example:** `Device(config-if)# standby 1 ip 192.0.2.99`	Activates HSRP and defines an HRSP group.
Step 6	**standby** [*group-number*] **timers** [**msec**] *hellotime* [**msec**] *holdtime* **Example:** `Device(config-if)# standby 1 timers 5 15`	(Optional) Configures the time between hello packets and the time before other devices declare an HSRP active or standby router to be down.
Step 7	**standby** [*group-number*] **priority** *priority* **Example:** `Device(config-if)# standby 1 priority 120`	(Optional) Assigns the HSRP priority to be used to help select the HSRP active and standby routers.
Step 8	**standby** [*group-number*] **name** *group-name* **Example:** `Device(config-if)# standby 1 name HSRP1`	(Optional) Defines a name for the HSRP group. **Note** We recommend that you always configure the **standby ip name** command when configuring an HSRP group to be used for HSRP Aware PIM.
Step 9	**end** **Example:** `Device(config-if)# end`	Returns to privileged EXEC mode.
Step 10	**show standby** [*type number* [*group*]] [**all** | **brief**] **Example:** `Device# show standby`	Displays HSRP group information for verifying the configuration.

Configuring PIM Redundancy

Before You Begin

The HSRP group must already be configured on the interface. See the “Configuring an HSRP Group on an Interface” section.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number* [*name-tag*]
4. **ip address** *ip-address mask*
5. **ip pim redundancy** *group* **dr-priority** *priority*
6. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* [*name-tag*] **Example:** `Device(config)# interface ethernet 0/0`	Specifies an interface to be configured and enters interface configuration mode.
Step 4	**ip address** *ip-address mask* **Example:** `Device(config-if)# ip address 10.0.0.2 255.255.255.0`	Sets a primary or secondary IP address for an interface.
Step 5	**ip pim redundancy** *group* **dr-priority** *priority* **Example:** `Device(config-if)# ip pim redundancy HSRP1 dr-priority 60`	Enables PIM redundancy and assigns a redundancy priority value to the active PIM designated router (DR). • Because HSRP group names are case sensitive, the value of the *group* argument must match the group name configured by using the **standby ip name** command. • The redundancy priority for a PIM DR must be greater than the configured or default value (1) of the PIM DR priority on any device for which the same HSRP group is enabled.
Step 6	**end** **Example:** `Device(config-if)# end`	Returns to privileged EXEC mode.

Configuration Examples for HSRP Aware PIM

Example: Configuring an HSRP Group on an Interface

```
interface ethernet 0/0
 ip address 10.0.0.2 255.255.255.0
 standby 1 ip 192.0.2.99
 standby 1 timers 5 15
 standby 1 priority 120
 standby 1 name HSRP1
 !
!
```

Example: Configuring PIM Redundancy

```
interface ethernet 0/0
 ip address 10.0.0.2 255.255.255.0
 ip pim redundancy HSRP1 dr-priority 60
 !
!
```

Additional References for HSRP Aware PIM

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
IP multicast commands	Cisco IOS IP Multicast Command Reference
HSRP commands	First Hop Redundancy Protocol Command Reference

Standards and RFCs

Standard/RFC	Title
RFC 2281	*Cisco Hot Standby Router Protocol (HSRP)*

MIBs

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

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for HSRP Aware PIM

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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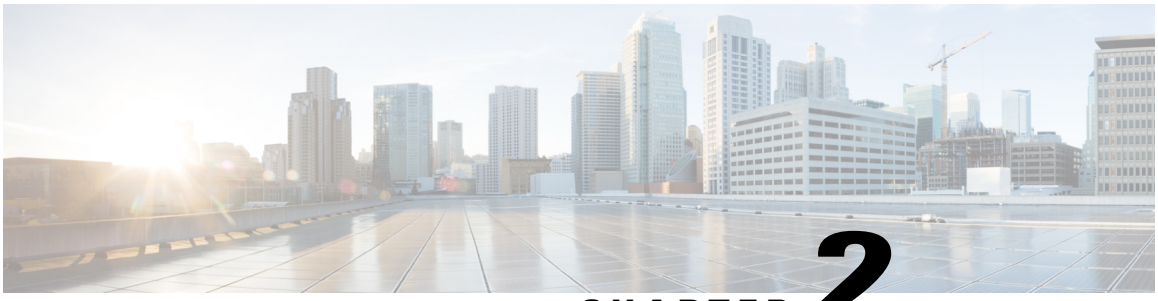
Table 1: Feature Information for HSRP Aware PIM

Feature Name	Releases	Feature Information
HSRP Aware PIM	15.2(4)S 15.3(1)T 15.3(1)SY1 15.2(1)E	The HSRP Aware PIM feature provides consistent IP multicast forwarding in a redundant network with virtual routing groups by enabling multicast traffic to be forwarded through a Hot Standby Router Protocol (HSRP) active router, allowing PIM to leverage HSRP redundancy, avoid potential duplicate traffic, and enable failover, depending on the HSRP states in the device.



CHAPTER 2

IPv6 PIM Passive Mode

This feature allows PIM passive mode to be enabled on an interface so that a PIM passive interface cannot send and receive PIM control messages, but it can act as a reverse path forwarding (RPF) interface for multicast route entries, and it can accept and forward multicast data packets.

Finding Feature Information

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Information About IPv6 PIM Passive Mode

A device configured with PIM will always send out PIM hello messages to all interfaces enabled for IPv6 multicast routing, even if the device is configured not to accept PIM messages from any neighbor on the LAN. The IPv6 PIM passive mode feature allows PIM passive mode to be enabled on an interface so that a PIM passive interface cannot send and receive PIM control messages, but it can act as RPF interface for multicast route entries, and it can accept and forward multicast data packets.

How to Configure IPv6 PIM Passive Mode

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 multicast pim-passive-enable**
4. **interface** *type number*
5. **ipv6 pim passive**

DETAILED STEPS

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2 **configure terminal**

Example:

```
Device# configure terminal
```

Enters global configuration mode.

Step 3 **ipv6 multicast pim-passive-enable**

Example:

```
Device(config)# ipv6 multicast pim-passive-enable
```

Enables the PIM passive feature on an IPv6 device.

Step 4 **interface** *type number*

Example:

```
Device(config)# interface GigabitEthernet 1/0/0
```

Specifies an interface type and number, and places the device in interface configuration mode.

Step 5 **ipv6 pim passive**

Example:

```
Device(config-if)# ipv6 pim passive
```

Enables the PIM passive feature on a specific interface.

Additional References

Related Documents

Related Topic	Document Title
IPv6 addressing and connectivity	*IPv6 Configuration Guide*
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
IPv6 commands	Cisco IOS IPv6 Command Reference
Cisco IOS IPv6 features	Cisco IOS IPv6 Feature Mapping

Standards and RFCs

Standard/RFC	Title
RFCs for IPv6	*IPv6 RFCs*

MIBs

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Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for IPv6 PIM Passive

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Table 2: Feature Information for IPv6 PIM Passive

Feature Name	Releases	Feature Information
IPv6 PIM Passive	15.2(1)E	The IPv6 PIM Passive feature allows PIM passive mode to be enabled on an interface so that a PIM passive interface cannot send and receive PIM control messages, but it can act as RPF interface for multicast route entries, and it can accept and forward multicast data packets.