Implementing Selective Packet Discard in IPv6

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This document describes the Selective Packet Discard (SPD) feature in IPv6. The SPD feature in IPv6 manages the process level input queues on the Route Processor (RD). SPD provides priority to routing protocol packets and other important traffic control Layer 2 keepalives during periods of process level queue congestion.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see 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 for Implementing Selective Packet Discard in IPv6" section on page 7.

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

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Information About Implementing Selective Packet Discard in IPv6

To configure SPD in IPv6, you should understand the following concept:

SPD in IPv6 Overview

The SPD mechanism manages the process level input queues on the RP. SPD provides priority to routing protocol packets and other important traffic control Layer 2 keepalives during periods of process level queue congestion.

SPD State Check

The SPD state check is performed on the IPv6 process input queue on the RP. High-priority packets, such as those of IP precedence 7, are not applied to SPD and are never dropped. All remaining packets, however, can be dropped depending on the length of the IPv6 packet input queue and the SPD state. The possible SPD states are as follows:

- Normal: The queue size is less than the maximum.
- Full drop: The queue size is greater than or equal to the maximum.

In the normal state, the router never drops well-formed and malformed packets. In the full drop state, the router drops all well-formed and malformed packets.

SPD Headroom

With SPD, the behavior of normal IPv6 packets is not changed. However, routing protocol packets are given higher priority, because SPD recognizes routing protocol packets by the IPv6 precedence field. Therefore, if the IPv6 precedence is set to 7, then the packet is given priority.

SPD prioritizes IPv6 packets with a precedence of 7 by allowing the Cisco IOS software to queue them into the process level input queue above the normal input queue limit. The number of packets allowed in excess of the normal limit is called the SPD headroom. The SPD headroom default is 100, which means that a high precedence packet is not dropped if the size of the input hold queue is lower than 175 (which is the input queue default size + SPD headroom size).

Non-IPv6 packets such as Connectionless Network Service Intermediate System-to-Intermediate System (CLNS IS-IS) packets, PPP packets, and High-Level Data Link Control (HDLC) keepalives were treated as normal priority as a result of being Layer 2 instead of Layer 3. In addition, Interior Gateway Protocols (IGPs) operating at Layer 3 or higher are given priority over normal IPv6 packets, but are given the same priority as Border Gateway Protocol (BGP) packets. So, during BGP convergence or during times of very high BGP activity, IGP hellos and keepalives often were dropped, causing IGP adjacencies to fail.

Because IGP and link stability are tenuous and crucial, such packets are given the highest priority and are given extended SPD headroom with a default of 10 packets. These packets are not dropped if the size of the input hold queue is lower than 185 (input queue default size + SPD headroom size + SPD extended headroom).

How to Implement Selective Packet Discard in IPv6

The following tasks describe how to configure and verify SPD for IPv6:

- Configuring the SPD Process Input Queue, page 3 (required)
- Configuring SPD Headroom, page 4 (optional)

Configuring the SPD Process Input Queue

The SPD in IPv6 feature is enabled by default. This task describes how to configure the maximum number of packets in the IPv6 SPD process input queue.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 spd queue max-threshold** *value*
4. **exit**
5. **show ipv6 spd**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ipv6 spd queue max-threshold** *value* **Example:** `Router(config)# ipv6 spd queue max-threshold 100`	Configures the maximum number of packets in the SPD process input queue.
Step 4	**exit** **Example:** `Router(config)# exit`	Returns the router to privileged EXEC mode.
Step 5	**show ipv6 spd** **Example:** `Router# show ipv6 spd`	Displays IPv6 SPD configuration.

Configuring SPD Headroom

To configure SPD headroom and SPD extended headroom, perform the following task.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **spd headroom** *value*
4. **spd extended** *size*
5. **exit**
6. **show ipv6 spd**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**spd headroom** *size* **Example:** `Router(config)# spd headroom 200`	Configures SPD headroom.
Step 4	**spd extended** *size* **Example:** `Router(config)# spd extended 11`	Configures extended SPD headroom.
Step 5	**exit** **Example:** `Router(config)# exit`	Returns the router to privileged EXEC mode.
Step 6	**show ipv6 spd** **Example:** `Router# show ipv6 spd`	Displays the IPv6 SPD configuration.

Configuration Examples for Implementing Selective Packet Discard in IPv6

This section provides the following SPD configuration examples:

Configuring the SPD Process Input Queue: Example

The following example shows the SPD process input queue configuration. The maximum process input queue threshold is 1, and the SPD state is normal. The headroom and extended headroom values are the default:

```
Router# ipv6 spd queue maximum-threshold 1
Router# show ipv6 spd

Current mode: normal
Queue max threshold: 1, Headroom: 100, Extended Headroom: 10
IPv6 packet queue: 0
```

Additional References

The following sections provide references related to the Implementing Selective Packet Discard in IPv6 feature.

Related Documents

Related Topic	Document Title
IPv6 supported feature list	"Start Here: Cisco IOS Software Release Specifics for IPv6 Features," *Cisco IOS IPv6 Configuration Guide*
IPv6 commands: complete command syntax, command mode, defaults, usage guidelines, and examples	*Cisco IOS IPv6 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, and support for existing MIBs has not been modified.	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
RFC 2474	*Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers*

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 Information for Implementing Selective Packet Discard in IPv6

Table 1 lists the features in this module and provides links to specific configuration information. Only features that were introduced or modified in Cisco IOS Release 12.2(2)T or 12.0(3)S or a later release appear in the table.

For information on a feature in this technology that is not documented here, see the *Start Here: Cisco IOS Software Release Specifies for IPv6 Features* roadmap.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 1 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 1 Feature Information for Implementing Selective Packet Discard in IPv6

Feature Name	Releases	Feature Information
IPv6 Selective Packet Discard	12.2(33)SRC 12.2(33)SXH	The SPD mechanism manages the process level input queues on the RP. SPD provides priority to routing protocol packets and other important traffic control Layer 2 keepalives during periods of process level queue congestion. The following commands were introduced or modified: **ipv6 spd queue maximum-threshold**, **show ipv6 spd**, **spd extended**, **spd headroom**.