

## **IPv6 Selective Packet Discard**

The selective packet discard (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

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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.

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

## Information About IPv6 Selective Packet Discard

### 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 6, 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 process input queue is less than the SPD minimum threshold.
- Random drop: The process input queue is between the SPD minimum and maximum thresholds.
- Max: The process input queue is equal to the SPD maximum threshold.

The size of the process input queue governs the SPD state: normal (no drop), random drop, or max. When the process input queue is less than the SPD minimum threshold, SPD takes no action and enters normal state. In the normal state, no packets are dropped. When the input queue reaches the maximum threshold, SPD enters max state, in which normal priority packets are discarded. If the input queue is between the minimum and maximum thresholds, SPD enters the random drop state, in which normal packets may be dropped.

#### SPD Mode

Three IPv6 SPD modes are supported: none (which is the default), aggressive drop, and OSPF mode. The aggressive drop mode discards incorrectly formatted packets when the IPv6 is in the random drop state. OSPF mode provides a mechanism whereby OSPF packets are handled with SPD priority.

#### 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 6, then the packet is given priority.

SPD prioritizes IPv6 packets with a precedence of 6 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).

Because Interior Gateway Protocols (IGPs) 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).

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 are treated as normal priority as a result of being Layer 2 instead of Layer 3. In addition, 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. Therefore, during BGP convergence or during times of very high BGP activity, IGP hellos and keepalives often are dropped, causing IGP adjacencies to fail.

## **How to Configure IPv6 Selective Packet Discard**

### **Configuring the SPD Process Input Queue**

#### **SUMMARY STEPS**

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

#### **DETAILED STEPS**

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to privileged EXEC mode.

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	Command or Action	Purpose
Step 6	show ipv6 spd	Displays IPv6 SPD configuration.
	Example:	
	Router# show ipv6 spd	

## **Configuring an SPD Mode**

#### **SUMMARY STEPS**

- 1. enable
- 2. configure terminal
- 3. ipv6 spd mode {aggressive | tos protocol ospf}

#### **DETAILED STEPS**

	Command or Action	Purpose
Step 1	enable	Enables privileged EXEC mode.
	Example:	• Enter your password if prompted.
	Router> enable	
Step 2	configure terminal	Enters global configuration mode.
	Example:	
	Router# configure terminal	
Step 3	ipv6 spd mode {aggressive   tos protocol ospf}	Configures an IPv6 SPD mode.
	Example:	
	Router(config)# ipv6 spf mode aggressive	

## **Configuring SPD Headroom**

#### **SUMMARY STEPS**

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

#### **DETAILED STEPS**

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

# **Configuration Examples for IPv6 Selective Packet Discard**

### **Example: Configuring the SPD Process Input Queue**

The following example shows the SPD process input queue configuration. The maximum process input queue threshold is 60,000, and the SPD state is normal. The headroom and extended headroom values are the default:

```
Router# ipv6 spd queue max-threshold 5000
Router# show ipv6 spd
Current mode: normal
Queue max threshold: 60000, Headroom: 100, Extended Headroom: 10
IPv6 packet queue: 0
```

# **Additional References**

#### **Related Documents**

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

#### **Standards and RFCs**

Standard/RFC	Title
RFCs for IPv6	IPv6 RFCs

#### **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 Selective Packet Discard**

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.

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

Feature Name	Releases	Feature Information
IPv6: Full Selective Packet Discard Support	Cisco IOS XE Release 2.6	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: clear ipv6 spd, debug ipv6 spd, ipv6 spd mode, ipv6 spd queue max-threshold, ipv6 spd queue min-threshold, monitor event-trace ipv6 spd, show ipv6 spd, spd extended-headroom, spd headroom.

#### Table 1: Feature Information for IPv6 Selective Packet Discard

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