Control Plane DSCP Support for RSVP

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Feature History

Release	Modification
Cisco IOS	For information about feature support in Cisco IOS software, use Cisco Feature Navigator.

This document describes the Cisco control plane differentiated services code point (DSCP) support for Resource Reservation Protocol (RSVP) feature. It identifies the supported platforms, provides configuration examples, and lists related IOS command line interface (CLI) commands.

This document includes the following major sections:

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 www.cisco.com/go/cfn. An account on Cisco.com is not required.

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Feature Overview

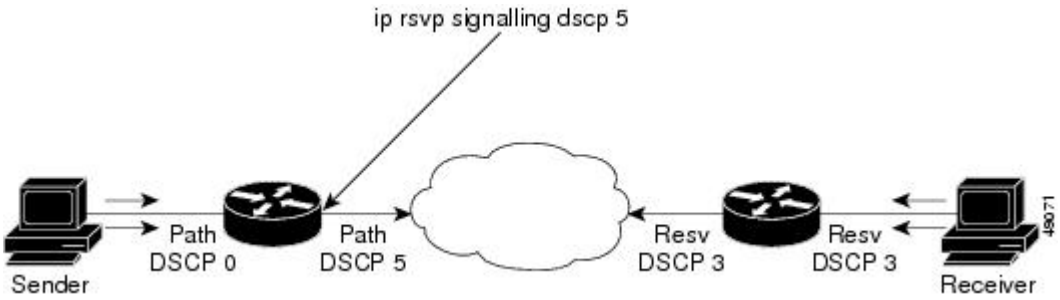
Typically, networks operate on a best-effort delivery basis, which means that all traffic has equal priority and an equal chance of being delivered in a timely manner. When congestion occurs, all traffic has an equal chance of being dropped.

Before traffic can be handled according to its unique requirements, it must be identified or labeled. There are numerous classification techniques for doing this. These include Layer 3 schemes such as IP precedence or the differentiated services code point (DSCP), Layer 2 schemes such as 802.1P, and implicit characteristics of the data itself, such as the traffic type using the Real-Time Transport Protocol (RTP) and a defined port range.

The control plane DSCP support for RSVP feature allows you to set the priority value in the type of service (ToS) byte/differentiated services (DiffServ) field in the Internet Protocol (IP) header for RSVP messages. The IP header functions with resource providers such as weighted fair queueing (WFQ), so that voice frames have priority over data fragments and data frames. When packets arrive in a device's output queue, the voice packets are placed ahead of the data frames.

The figure below shows a path message originating from a sender with a DSCP value of 0 (the default) that is changed to 5 to give the message a higher priority and a reservation (resv) message originating from a receiver with a DSCP of 3.

Figure 1 Control Plane DSCP Support for RSVP



Raising the DSCP value reduces the possibility of packets being dropped, thereby improving call setup time in VoIP environments.

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Benefits

Faster Call Setup Time

The control plane DSCP support for RSVP feature allows you to set the priority for RSVP messages. In a DiffServ QoS environment, higher priority packets get serviced before lower priority packets, thereby improving the call setup time for RSVP sessions.

Improved Message Delivery

During periods of congestion, devices drop lower priority traffic before they drop higher priority traffic. Since RSVP messages can now be marked with higher priority, the likelihood of these messages being dropped is significantly reduced.

Faster Recovery after Failure Conditions

When heavy congestion occurs, many packets are dropped. Network resources attempt to retransmit almost instantaneously resulting in further congestion. This leads to a considerable reduction in throughput.

Previously, RSVP messages were marked best effort and subject to being dropped by congestion avoidance mechanisms such as weighted random early detection (WRED). However, with the control plane DSCP support for RSVP feature, RSVP messages are likely to be dropped later, if at all, thereby providing faster recovery of RSVP reservations.

Restrictions

Control plane DSCP support for RSVP can be configured on interfaces and subinterfaces only. It affects all RSVP messages sent out the interface or that are on any logical circuit of the interface, including subinterfaces, permanent virtual circuits (PVCs), and switched virtual circuits (SVCs).

Supported Platforms

- Cisco 2600 series
- Cisco 3600 series (Cisco 3620, 3640, and 3660)
- Cisco 3810 multiservice access concentrator
- Cisco 7200 series
- Cisco 7500 route/switch processor (RSP) only
- Cisco 12000 series Gigabit Switch Router (GSR)

Prerequisites

The network must support the following Cisco IOS feature before control plane DSCP support for RSVP is enabled:

- Resource Reservation Protocol (RSVP)

Configuration Tasks

Enabling RSVP on an Interface

To enable RSVP on an interface, use the following command, beginning in interface configuration mode:

Command	Purpose
`Device(config-if)#` **ip rsvp bandwidth** [*interface-kbps*] [*single-flow-kbps*]	Enables RSVP on an interface.

Specifying the DSCP

To specify the DSCP, use the following command, beginning in interface configuration mode:

Command	Purpose
`Device(config-if)#` **ip rsvp signalling dscp** [value]	Specifies the DSCP to be used on all RSVP messages transmitted on an interface.

Verifying Control Plane DSCP Support for RSVP Configuration

To verify control plane DSCP support for RSVP configuration, enter the **show ip rsvp interface detail**command to display RSVP-related interface information.

In the following sample output from the **show ip rsvp interface detail**command, only the Se2/0 interface has DSCP configured. Interfaces that are not configured for DSCP do not show the DSCP value, which is 0 by default.

```
Device# show ip rsvp interface detail
Et1/1:
   Bandwidth:
     Curr allocated:0M bits/sec
     Max. allowed (total):7500K bits/sec
     Max. allowed (per flow):7500K bits/sec
   Neighbors:
     Using IP enacp:1.  Using UDP encaps:0
 Et1/2:
   Bandwidth:
     Curr allocated:0M bits/sec
     Max. allowed (total):7500K bits/sec
     Max. allowed (per flow):7500K bits/sec
   Neighbors:
     Using IP enacp:0.  Using UDP encaps:0
Se2/0:
   Bandwidth:
     Curr allocated:10K bits/sec
     Max. allowed (total):1536K bits/sec
     Max. allowed (per flow):1536K bits/sec
   Neighbors:
     Using IP enacp:1.  Using UDP encaps:0
   DSCP value used in Path/Resv msgs:0x6
   Burst Police Factor:300%
   RSVP:Data Packet Classification provided by: none
Device#
```

Monitoring and Maintaining Control Plane DSCP Support for RSVP

To monitor and maintain control plane DSCP support for RSVP, use the following command in EXEC mode:

Command	Purpose
`Device# show ip rsvp interface detail`	Displays RSVP-related information about interfaces.

Configuration Examples

This section provides a configuration example for the control plane DSCP support for RSVP feature.

```
 Device(config-if)# ip rsvp sig ?
 dscp  DSCP for RSVP signalling messages
 Device(config-if)# ip rsvp sig dscp ?
 <0-63>  DSCP value
Device(config-if)# ip rsvp sig dscp 48
Device# show run int e3/0
interface Ethernet3/0
ip address 50.50.50.1 255.255.255.0
fair-queue 64 256 235
ip rsvp signalling dscp 48
ip rsvp bandwidth 7500 7500
```

Additional References

The following sections provide references related to the Control Plane DSCP Support for RSVP feature.

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
RSVP Commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	*Cisco IOS Quality of Service Solutions Command Reference*
Quality of service overview	"Quality of Service Overview" module

Standards

Standard	Title
None	--

MIBs

MIB	MIBs Link
RFC 2206 (RSVP Management Information Base using SMIv2)	To locate and download MIBs for selected platforms, software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
RFC 2205	*Resource Reservation Protocol*

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

Glossary

CBWFQ-- Class-based weighted fair queueing. A queueing mechanism that extends the standard WFQ functionality to provide support for user-defined traffic classes.

class-based weighted fair queueing --See CBWFQ.

differentiated services --See DiffServ.

differentiated services code point --See DSCP.

DiffServ --An architecture based on a simple model where traffic entering a network is classified and possibly conditioned at the boundaries of the network. The class of traffic is then identified with a DS codepoint or bit marking in the IP header. Within the core of the network, packets are forwarded according to the per-hop behavior associated with the DS code point.

DSCP --Differentiated services code point. The six most significant bits of the 1-byte IP type of service (ToS) field. The per-hop behavior represented by a particular DSCP value is configurable. DSCP values range between 0 and 63.

IP precedence --The three most significant bits of the 1-byte type of service (ToS) field. IP precedence values range between zero for low priority and seven for high priority.

latency --The delay between the time a device receives a packet and the time that packet is forwarded out the destination port.

marking --The process of setting a Layer 3 DSCP value in a packet.

QoS --Quality of service. A measure of performance for a transmission system that reflects its transmission quality and service availability.

quality of service --See QoS.

Resource Reservation Protocol --See RSVP.

RSVP --Resource Reservation Protocol. A protocol for reserving network resources to provide quality of service guarantees to application flows.

ToS --Type of service. An 8-bit value in the IP header field.

type of service --See ToS.

Voice over IP --See VoIP.

VoIP --Voice over IP. The ability to carry normal telephony-style voice over an IP-based internet maintaining telephone-like functionality, reliability, and voice quality.

weighted fair queueing --See WFQ.

weighted random early detection --See WRED.

WFQ --Weighted fair queueing. A queue management algorithm that provides a certain fraction of link bandwidth to each of several queues, based on relative bandwidth applied to each of the queues.

WRED --Weighted random early detection. A congestion avoidance mechanism that slows traffic by randomly dropping packets when there is congestion.