Control Plane DSCP Support for RSVP

This document describes the Cisco Control Plane DSCP Support for RSVP feature.

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.

Prerequisites for Control Plane DSCP Support for RSVP

The network must support Resource Reservation Protocol (RSVP) before the Control Plane DSCP Support for RSVP feature is enabled.

Restrictions for Control Plane DSCP Support for RSVP

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

Information About Control Plane DSCP Support for RSVP

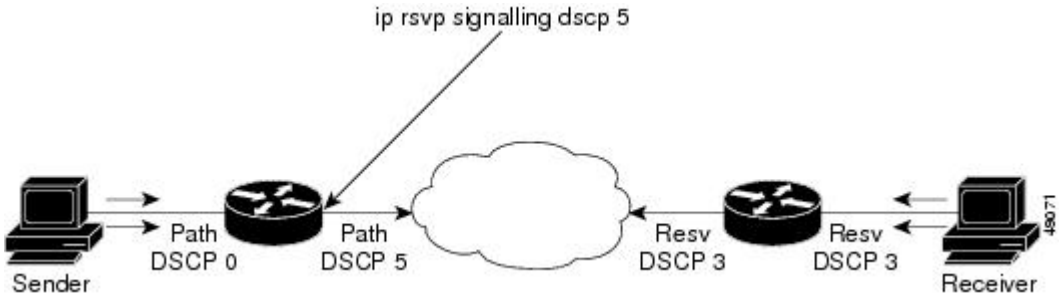
Typically, networks operate on a best-effort delivery basis, which means that all traffic has equal priority and an equal chance of being delivered in a timely manner. When congestion occurs, all traffic has an equal chance of being dropped.

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 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 or differentiated services (DiffServ) field in the 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 router'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), which is changed ito 5 to give the message a higher priority, and it shows 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.

Benefits of Control Plane DSCP Support for RSVP

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, routers 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.

How to Configure Control Plane DSCP Support for RSVP

Enabling RSVP on an Interface

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type slot / subslot / port*
4. **ip rsvp bandwidth** [*interface-kbps*] [*single-flow-kbps*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type slot / subslot / port* **Example:** `Router(config)# interface gigbitEthernet 0/0/0`	Enters interface configuration mode for a specific interface.
Step 4	**ip rsvp bandwidth** [*interface-kbps*] [*single-flow-kbps*] **Example:** `Router(config-if)# ip rsvp bandwidth 23 43`	Enables RSVP on an interface.

Specifying the DSCP

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type slot / subslot / port*
4. **ip rsvp signalling dscp** *value*

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.

	Command or Action	Purpose
Step 3	**interface** *type slot / subslot / port* **Example:** `Router(config)# interface gigbitEthernet 0/1/0`	Enters interface configuration mode for a specific interface.
Step 4	**ip rsvp signalling dscp** *value* **Example:** `Router(config-if)# ip rsvp signalling dscp 10`	Specifies the DSCP to be used on all RSVP messages that are transmitted on an interface.

Verifying Control Plane DSCP Support for RSVP Configuration

SUMMARY STEPS

1. Enter the **show running-config** command to verify the configuration.
2. Enter the **show ip rsvp interface detail**command to display RSVP-related interface information. The following is sample output from the **show ip rsvp interface detail**command. Interfaces that are not configured for DSCP do not show the DSCP value, which is 0 by default.

DETAILED STEPS

Step 1 Enter the **show running-config** command to verify the configuration.

Step 2 Enter the **show ip rsvp interface detail**command to display RSVP-related interface information. The following is sample output from the **show ip rsvp interface detail**command. Interfaces that are not configured for DSCP do not show the DSCP value, which is 0 by default.

Example:

```
Router# show
 ip rsvp interface detail
Gi0/0/0:
   RSVP: Disabled
   Interface State: N/A
   Bandwidth:
     Curr allocated: 0 bits/sec
     Max. allowed (total): 0 bits/sec
     Max. allowed (per flow): 0 bits/sec
     Max. allowed for LSP tunnels using sub-pools (pool 1): 0 bits/sec
     Set aside by policy (total): 0 bits/sec
   Traffic Control:
     RSVP Data Packet Classification is ON
   Signalling:
     DSCP value used in RSVP msgs: 0x17
     Number of refresh intervals to enforce blockade state: 4
   Authentication: disabled
     Key chain:   <none>
     Type:        md5
```

```
  Window size: 1
  Challenge:   disabled
FRR Extension:
  Backup Path: Not Configured
BFD Extension:
  State: Disabled
  Interval: Not Configured
RSVP Hello Extension:
  State: Disabled
RFC 3175 Aggregation: Disabled
  Role: exterior.
```

Configuration Examples for Control Plane DSCP Support for RSVP

The following example shows how to enable RSVP on an interface, specify the DSCP, and verify the control plane DSCP support for RSVP.

```
Router> enable
Router# config terminal
Router(config)# interface gigabitethernet 3/1/0
Router(config-if)# ip rsvp bandwidth 7500 7500
Router(config-if)# ip rsvp signalling dscp 48
Router(config-if)# end
```

The following example shows how to display the RSVP-related information.

```
Router# show running-config interface gigabitEthernet 0/0/0
interface gigabitEthernet 0/0/0
ip address 10.10.10.1 255.255.255.0
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
None	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*
RFC 2206	*RSVP Management Information Base using SMIv2*

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 Control Plane DSCP Support for RSVP

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 Control Plane DSCP Support for RSVP

Feature Name	Releases	Feature Information
Control Plane DSCP Support for RSVP	Cisco IOS XE Release 2.6	The Control Plane DSCP Support for RSVP feature allows you to set the priority value in ToS byte or DiffServ field in the IP header for RSVP messages. The following commands were introduced or modified: **ip rsvp signalling dscp**, **show ip rsvp interface**.

Glossary

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

DiffServ --differentiated services. An architecture based on a simple model where traffic that is entering a network is classified and possibly conditioned at the boundaries of the network. The class of traffic is then identified with a DS code point 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 0 for low priority and 7 for high priority.

latency --The delay between the time when a device receives a packet and the time when the 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.

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 while maintaining telephone-like functionality, reliability, and voice quality.

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.