

RSVP Scalability Enhancements

This document describes the Cisco Resource Reservation Protocol (RSVP) scalability enhancements. It provides an overview of the feature, includes configuration tasks and examples, and lists related Cisco IOS command-line interface (CLI) commands.

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Prerequisites for RSVP Scalability Enhancements

The network must support the following Cisco IOS XE features before the RSVP scalability enhancements are enabled:

- Resource Reservation Protocol (RSVP)
- Class-based weighted fair queueing (CBWFQ)

Restrictions for RSVP Scalability Enhancements

- Sources should not send marked packets without an installed reservation.
- Sources should not send marked packets that exceed the reserved bandwidth.
- Sources should not send marked packets to a destination other than the reserved path.

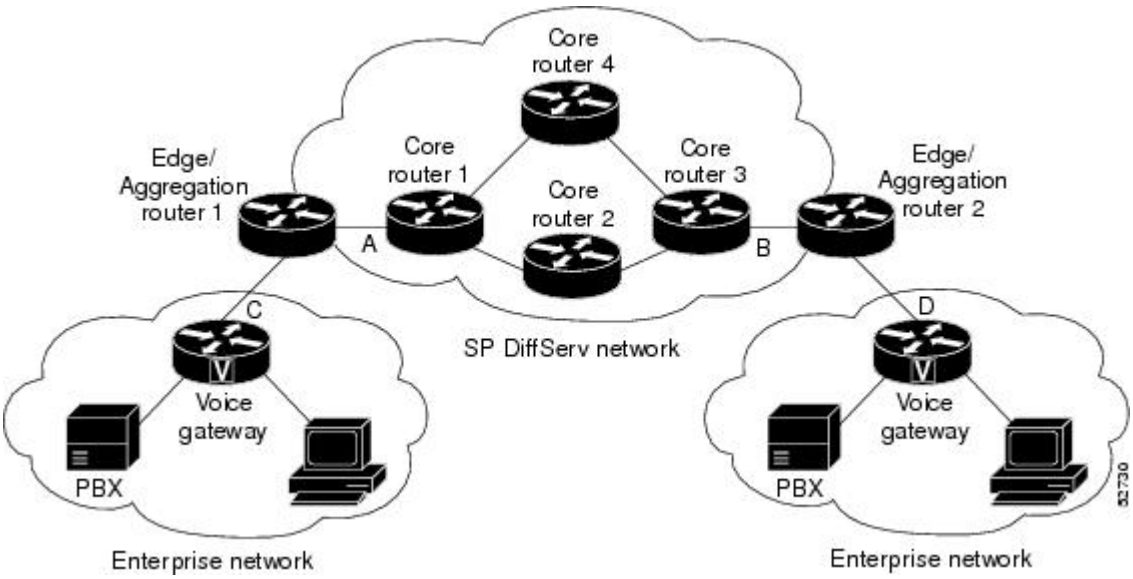
Information About RSVP Scalability Enhancements

RSVP typically performs admission control, classification, policing, and scheduling of data packets on a per-flow basis and keeps a database of information for each flow. RSVP scalability enhancements let you select a resource provider (formerly called a quality of service (QoS) provider) and disable data packet classification so that RSVP performs admission control only. This facilitates integration with service provider (differentiated services (DiffServ)) networks and enables scalability across enterprise networks.

CBWFQ provides the classification, policing, and scheduling functions. CBWFQ puts packets into classes based on the differentiated services code point (DSCP) value in the packet's Internet Protocol (IP) header, thereby eliminating the need for per-flow state and per-flow processing.

The figure below shows two enterprise networks interconnected through a service provider (SP) network. The SP network has an IP backbone configured as a DiffServ network. Each enterprise network has a voice gateway connected to an SP edge/aggregation router via a wide area network (WAN) link. The enterprise networks are connected to a private branch exchange (PBX).

Figure 1: RSVP/DiffServ Integration Topology



The voice gateways are running classic RSVP, which means RSVP is keeping a state per flow and also classifying, marking, and scheduling packets on a per flow basis. The edge/aggregation routers are running classic RSVP on the interfaces (labeled C and D) connected to the voice gateways and running RSVP for admission control only on the interfaces connected to core routers 1 and 3. The core routers in the DiffServ network are not running RSVP, but are forwarding the RSVP messages to the next hop. The core routers inside the DiffServ network implement a specific per hop behavior (PHB) for a collection of flows that have the same DSCP value.

The voice gateways identify voice data packets and set the appropriate DSCP in their IP headers such that the packets are classified into the priority class in the edge/aggregation routers and in core routers 1, 2, 3 or 1, 4, 3.

The interfaces or the edge/aggregation routers (labeled A and B) connected to core routers 1 and 3 are running RSVP, but are doing admission control only per flow against the RSVP bandwidth pool configured on the

DiffServ interfaces of the edge/aggregation routers. CBWFQ is performing the classification, policing, and scheduling functions.

Benefits of RSVP Scalability Enhancements

Enhanced Scalability

RSVP scalability enhancements handle similar flows on a per-class basis instead of a per-flow basis. Since fewer resources are required to maintain per-class QoS guarantees, the RSVP scability enhancements provide faster processing results, thereby enhancing scalability.

Improved Router Performance

RSVP scalability enhancements improve router performance by reducing the cost for data-packet classification and scheduling, which decrease CPU resource consumption. The saved resources can then be used for other network management functions.

How to Configure RSVP Scalability Enhancements

Configuring the Resource Provider

Note The resource provider was formerly called the QoS provider.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type slot / subslot / port*
4. **ip rsvp bandwidth** [*interface-kbps* [*single-flow-kbps*[**bc1** *kbps* | **sub-pool** *kbps*]*]*| **percent** *percent-bandwidth* [*single-flow-kbps*]]
5. **ip rsvp resource-provider none**
6. **end**

DETAILED STEPS

Procedure

	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 gigabitEthernet 0/0/0`	Configures the interface type and enters interface configuration mode.
Step 4	**ip rsvp bandwidth** [*interface-kbps* [*single-flow-kbps*[**bc1** *kbps* | **sub-pool** *kbps*]*]*| **percent** *percent-bandwidth* [*single-flow-kbps*]] **Example:** `Router(config-if)# ip rsvp bandwidth 7500 7500`	Enables RSVP on an interface. • The optional *interface-kbps* and *single-flow-kbps* arguments specify the amount of bandwidth that can be allocated by RSVP flows or to a single flow, respectively. Range is from 1 to 10000000. • The optional **sub-pool**and *kbps*keyword and argument specify subpool traffic and the amount of bandwidth that can be allocated by RSVP flows. Range is from 1 to 10000000. **Note** Repeat this command for each interface on which you want to enable RSVP. **Note** The bandwidth that you configure on the interface must match the bandwidth that you configure for the CBWFQ priority queue.
Step 5	**ip rsvp resource-provider none** **Example:** `Router(config-if)# ip rsvp resource-provider none`	Sets the resource provider to none. **Note** Setting the resource provider to none instructs RSVP to not associate any resources, such as WFQ queues or bandwidth, with a reservation.
Step 6	**end** **Example:** `Router(config-if)# end`	(Optional) Returns to privileged EXEC mode.

Disabling Data Packet Classification

Perform the following task to disable data packet classification. Disabling data packet classification instructs RSVP not to process every packet, but to perform admission control only.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type slot / subslot / port*
4. **ip rsvp data-packet classification none**
5. **end**

DETAILED STEPS

Procedure

	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	**interface** *type slot / subslot / port* **Example:** `Router(config)# interface gigabitEthernet0/0/0`	Configures the interface type and enters interface configuration mode.
Step 4	**ip rsvp data-packet classification none** **Example:** `Router(config-if)# ip rsvp data-packet classification none`	Disables data packet classification.
Step 5	**end** **Example:** `Router(config-if)# end`	(Optional) Returns to privileged EXEC mode.

Configuring Class Maps and Policy Maps

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **class-map** *class-map-name*
4. **exit**

5. **policy-map** *policy-map-name*
6. **end**

DETAILED STEPS

Procedure

	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	**class-map** *class-map-name* **Example:** `Router(config)# class-map class1`	Specifies the name of the class for which you want to create or modify class-map match criteria and enters the class map configuration mode.
Step 4	**exit** **Example:** `Router(config-cmap)# exit`	Returns to the global configuration mode.
Step 5	**policy-map** *policy-map-name* **Example:** `Router(config)# policy-map policy1`	Specifies the name of the policy map to be created, added to, or modified before you can configure policies for classes whose match criteria are defined in a class map.
Step 6	**end** **Example:** `Router(config-control-policymap)# end`	(Optional) Returns to privileged EXEC mode.

Attaching a Policy Map to an Interface

Perform the following task to attach a policy map to an interface. If at the time you configure the RSVP scalability enhancements, there are existing reservations that use classic RSVP, no additional marking, classification, or scheduling is provided for these flows. You can also delete these reservations after you configure the RSVP scalability enhancements.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type slot / subslot / port*
4. **service-policy** {**input** | **output**} *policy-map-name*
5. **end**

DETAILED STEPS

Procedure

	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	**interface** *type slot / subslot / port* **Example:** `Router(config)# interface gigabitEthernet 0/0/0`	Configures the interface type and enters interface configuration mode.
Step 4	**service-policy** {**input** | **output**} *policy-map-name* **Example:** `Router(config-if)# service-policy input policy1`	Attaches a single policy map to one or more interfaces to specify the service policy for those interfaces.
Step 5	**end** **Example:** `Router(config-if)# end`	(Optional) Returns to privileged EXEC mode.

Verifying RSVP Scalability Enhancements Configuration

SUMMARY STEPS

1. Enter the **show ip rsvp interface detail**command to display information about interfaces, subinterfaces, resource providers, and data packet classification. The output in the following example shows that the ATM interface 6/0 has resource provider none configured and that data packet classification is turned off:
2. Enter the **show ip rsvp installed detail**command to display information about interfaces, subinterfaces, their admitted reservations, bandwidth, resource providers, and data packet classification.

3. Wait for a while, then enter the **show ip rsvp installed detail**command again. In the following output, notice there is no increment in the number of packets classified:

DETAILED STEPS

Procedure

Step 1 Enter the **show ip rsvp interface detail**command to display information about interfaces, subinterfaces, resource providers, and data packet classification. The output in the following example shows that the ATM interface 6/0 has resource provider none configured and that data packet classification is turned off:

Example:

```
Router# show ip rsvp interface detail
 AT6/0:
   Bandwidth:
     Curr allocated: 190K bits/sec
     Max. allowed (total): 112320K bits/sec
     Max. allowed (per flow): 112320K bits/sec
   Neighbors:
     Using IP encap: 1.  Using UDP encaps: 0
   DSCP value used in Path/Resv msgs: 0x30
   RSVP Data Packet Classification is OFF
   RSVP resource provider is: none
```

Note
The last two lines in the preceding output verify that the RSVP scalability enhancements (disabled data packet classification and resource provider none) are present.

Step 2 Enter the **show ip rsvp installed detail**command to display information about interfaces, subinterfaces, their admitted reservations, bandwidth, resource providers, and data packet classification.

Example:

```
Router# show ip rsvp installed detail
RSVP: GigabitEthernet0/0/0 has no installed reservations
RSVP: ATM6/0 has the following installed reservations
RSVP Reservation. Destination is 10.20.20.212, Source is 10.10.10.211,
  Protocol is UDP, Destination port is 14, Source port is 14
  Reserved bandwidth: 50K bits/sec, Maximum burst: 1K bytes, Peak rate: 50K bits/sec
  Min Policed Unit: 0 bytes, Max Pkt Size: 1514 bytes
  Resource provider for this flow: None
  Conversation supports 1 reservations
  Data given reserved service: 0 packets (0 bytes)
  Data given best-effort service: 0 packets (0 bytes)
  Reserved traffic classified for 54 seconds
  Long-term average bitrate (bits/sec): 0M reserved, 0M best-effort
RSVP Reservation. Destination is 10.20.20.212, Source is 10.10.10.211,
  Protocol is UDP, Destination port is 10, Source port is 10
  Reserved bandwidth: 20K bits/sec, Maximum burst: 1K bytes, Peak rate: 20K bits/sec
  Min Policed Unit: 0 bytes, Max Pkt Size: 1514 bytes
  Resource provider for this flow: None
  Conversation supports 1 reservations
  Data given reserved service: 0 packets (0 bytes)
  Data given best-effort service: 0 packets (0 bytes)
  Reserved traffic classified for 80 seconds
  Long-term average bitrate (bits/sec): 0M reserved, 0M best-effort
```

Step 3 Wait for a while, then enter the **show ip rsvp installed detail**command again. In the following output, notice there is no increment in the number of packets classified:

Example:

```
Router# show ip rsvp installed detail
RSVP: Ethernet3/3 has no installed reservations
RSVP: ATM6/0 has the following installed reservations
RSVP Reservation. Destination is 10.20.20.212, Source is 10.10.10.211,
  Protocol is UDP, Destination port is 14, Source port is 14
  Reserved bandwidth: 50K bits/sec, Maximum burst: 1K bytes, Peak rate: 50K bits/sec
  Min Policed Unit: 0 bytes, Max Pkt Size: 1514 bytes
  Resource provider for this flow: None
  Conversation supports 1 reservations
  Data given reserved service: 0 packets (0 bytes)
  Data given best-effort service: 0 packets (0 bytes)
  Reserved traffic classified for 60 seconds
  Long-term average bitrate (bits/sec): 0 reserved, OM best-effort
RSVP Reservation. Destination is 10.20.20.212, Source is 10.10.10.211,
  Protocol is UDP, Destination port is 10, Source port is 10
  Reserved bandwidth: 20K bits/sec, Maximum burst: 1K bytes, Peak rate: 20K bits/sec
  Min Policed Unit: 0 bytes, Max Pkt Size: 1514 bytes
  Resource provider for this flow: None
  Conversation supports 1 reservations
  Data given reserved service: 0 packets (0 bytes)
  Data given best-effort service: 0 packets (0 bytes)
  Reserved traffic classified for 86 seconds
  Long-term average bitrate (bits/sec): OM reserved, 0M best-effort
```

Monitoring and Maintaining RSVP Scalability Enhancements

To monitor and maintain RSVP scalability enhancements, use the following commands in EXEC mode. The following commands can be entered in any order.

Command	Purpose
`Router# show ip rsvp installed`	Displays information about interfaces and their admitted reservations.
`Router# show ip rsvp installed detail`	Displays additional information about interfaces and their admitted reservations.
`Router# show ip rsvp interface`	Displays RSVP-related interface information.
`Router# show ip rsvp interface detail`	Displays additional RSVP-related interface information.
`Router# show queueing [custom | fair | priority | random-detect [interface serial-number]]`	Displays all or selected configured queueing strategies and available bandwidth for RSVP reservations.

Configuration Examples for RSVP Scalability Enhancements

Examples Configuring the Resource Provider as None with Data Classification Turned Off

Following is output from the **showiprsvpinterfacedetail** command before a resource provider is configured as none and data-packet classification is turned off:

```
Router# show ip rsvp interface detail
 AT6/0:
   Bandwidth:
     Curr allocated: 190K bits/sec
     Max. allowed (total): 112320K bits/sec
     Max. allowed (per flow): 112320K bits/sec
   Neighbors:
     Using IP encap: 1.  Using UDP encaps: 0
   DSCP value used in Path/Resv msgs: 0x30
```

Following is the output from the **showqueueing**command before a resource provider is configured as none and data packet classification is turned off:

```
Router# show queueing int atm6/0
  Interface ATM6/0 VC 200/100
  Queueing strategy: weighted fair
  Output queue: 63/512/64/3950945 (size/max total/threshold/drops)
     Conversations  2/5/64 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
     Available Bandwidth 450 kilobits/sec
```

Note New reservations do not reduce the available bandwidth (450 kilobits/sec shown above). Instead RSVP performs admission control only using the bandwidth limit configured in the **iprsvpbandwidth** command. The bandwidth configured in this command should match the bandwidth configured in the CBWFQ class that you set up to handle the reserved traffic.

The following example shows how to configure resource provider as none:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# interface atm6/0
Router(config-if)# ip rsvp resource-provider none

Router(config-if)# end
Router#
```

The following example shows how to turn off the data packet classification:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# interface atm6/0
Router(config-if)# ip rsvp data-packet classification none
```

```
Router(config-if)# end
```

Following is the output from the **showiprsvpinterfacedetail** command after resource provider has been configured as none and data packet classification has been turned off:

```
Router# show ip rsvp interface detail
 AT6/0:
   Bandwidth:
     Curr allocated: 190K bits/sec
     Max. allowed (total): 112320K bits/sec
     Max. allowed (per flow): 112320K bits/sec
   Neighbors:
     Using IP encap: 1.  Using UDP encaps: 0
   DSCP value used in Path/Resv msgs: 0x30
   RSVP Data Packet Classification is OFF
   RSVP resource provider is: none
```

The following output from the **showiprsvpinstalleddetail** command verifies that resource provider none is configured and data packet classification is turned off:

```
Router# show ip rsvp installed detail
RSVP: ATM6/0 has the following installed reservations
RSVP Reservation. Destination is 10.20.20.212, Source is 10.10.10.211,
  Protocol is UDP, Destination port is 14, Source port is 14
  Reserved bandwidth: 50K bits/sec, Maximum burst: 1K bytes, Peak rate: 50K bits/sec
  Min Policed Unit: 0 bytes, Max Pkt Size: 1514 bytes
  Resource provider for this flow: None
  Conversation supports 1 reservations
  Data given reserved service: 3192 packets (1557696 bytes)
  Data given best-effort service: 42 packets (20496 bytes)
  Reserved traffic classified for 271 seconds
  Long-term average bitrate (bits/sec): 45880 reserved, 603 best-effort
RSVP Reservation. Destination is 10.20.20.212, Source is 10.10.10.211,
  Protocol is UDP, Destination port is 10, Source port is 10
  Reserved bandwidth: 20K bits/sec, Maximum burst: 1K bytes, Peak rate: 20K bits/sec
  Min Policed Unit: 0 bytes, Max Pkt Size: 1514 bytes
  Resource provider for this flow: None
  Conversation supports 1 reservations
  Data given reserved service: 1348 packets (657824 bytes)
  Data given best-effort service: 0 packets (0 bytes)
  Reserved traffic classified for 296 seconds
  Long-term average bitrate (bits/sec): 17755 reserved, 0M best-effort
```

The following output shows no increments in packet counts after the source sends data packets that match the reservation:

```
Router# show ip rsvp installed detail
RSVP: GigabitEthernet3/3 has no installed reservations
RSVP: ATM6/0 has the following installed reservations
RSVP Reservation. Destination is 10.20.20.212, Source is 10.10.10.211,
  Protocol is UDP, Destination port is 14, Source port is 14
  Reserved bandwidth: 50K bits/sec, Maximum burst: 1K bytes, Peak rate: 50K bits/sec
  Min Policed Unit: 0 bytes, Max Pkt Size: 1514 bytes
  Resource provider for this flow: None
  Conversation supports 1 reservations
  Data given reserved service: 3192 packets (1557696 bytes)
  Data given best-effort service: 42 packets (20496 bytes)
  Reserved traffic classified for 282 seconds
  Long-term average bitrate (bits/sec): 44051 reserved, 579 best-effort
RSVP Reservation. Destination is 145.20.20.212, Source is 145.10.10.211,
  Protocol is UDP, Destination port is 10, Source port is 10
```

```
  Reserved bandwidth: 20K bits/sec, Maximum burst: 1K bytes, Peak rate: 20K bits/sec
  Min Policed Unit: 0 bytes, Max Pkt Size: 1514 bytes
  Resource provider for this flow: None
  Conversation supports 1 reservations
  Data given reserved service: 1348 packets (657824 bytes)
  Data given best-effort service: 0 packets (0 bytes)
  Reserved traffic classified for 307 seconds
  Long-term average bitrate (bits/sec): 17121 reserved, 0M best-effort
```

The following output verifies that data packet classification is occurring:

```
Router# show ip rsvp installed detail
Enter configuration commands, one per line.  End with CNTL/Z.
RSVP: ATM6/0 has the following installed reservations
RSVP Reservation. Destination is 10.20.20.212, Source is 10.10.10.211,
  Protocol is UDP, Destination port is 14, Source port is 14
  Reserved bandwidth: 50K bits/sec, Maximum burst: 1K bytes, Peak rate: 50K bits/sec
  Min Policed Unit: 0 bytes, Max Pkt Size: 1514 bytes
  Resource provider for this flow: None
  Conversation supports 1 reservations
  Data given reserved service: 3683 packets (1797304 bytes)
  Data given best-effort service: 47 packets (22936 bytes)
  Reserved traffic classified for 340 seconds
  Long-term average bitrate (bits/sec): 42201 reserved, 538 best-effort
RSVP Reservation. Destination is 10.20.20.212, Source is 10.10.10.211,
  Protocol is UDP, Destination port is 10, Source port is 10
  Reserved bandwidth: 20K bits/sec, Maximum burst: 1K bytes, Peak rate: 20K bits/sec
  Min Policed Unit: 0 bytes, Max Pkt Size: 1514 bytes
  Resource provider for this flow: None
  Conversation supports 1 reservations
  Data given reserved service: 1556 packets (759328 bytes)
  Data given best-effort service: 0 packets (0 bytes)
  Reserved traffic classified for 364 seconds
  Long-term average bitrate (bits/sec): 16643 reserved, 0M best-effort
```

Note You can use **debugiprsvptraffic-control** and **debugiprsvpwfq** simultaneously. Use the**showdebug** command to see which debugging commands are enabled.

Additional References

The following sections provide references related to the RSVP Scalability Enhancements feature.

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
QoS commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	*Cisco IOS Quality of Service Solutions Command Reference*
QoS configuration tasks related to RSVP	"Configuring RSVP" module

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
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 RSVP Scalability Enhancements

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.

Table 1: Feature Information for RSVP Scalability Enhancements

Feature Name	Releases	Feature Information
RSVP Scalability Enhancements	Cisco IOS XE Release 2.6 Cisco IOS XE Release 3.8S	RSVP scalability enhancements let you select a resource provider (formerly called a QoS provider) and disable data packet classification so that RSVP performs admission control only. This facilitates integration with service provider (DiffServ) networks and enables scalability across enterprise networks. The following commands were introduced or modified: **debug ip rsvp traffic-control**, **debug ip rsvp wfq**, **ip rsvp data-packet classification none**, **ip rsvp resource-provider**, **show ip rsvp installed**, **show ip rsvp interface**, **show queueing**. In Cisco IOS XE Release 3.8S, support was added for the Cisco ASR 903 Router.

Glossary

admission control --The process by which an RSVP reservation is accepted or rejected based on end-to-end available network resources.

aggregate --A collection of packets with the same DSCP.

bandwidth --The difference between the highest and lowest frequencies available for network signals. This term also describes the rated throughput capacity of a given network medium or protocol.

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 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.

enterprise network --A large and diverse network connecting most major points in a company or other organization.

flow --A stream of data traveling between two endpoints across a network (for example, from one LAN station to another). Multiple flows can be transmitted on a single circuit.

packet --A logical grouping of information that includes a header containing control information and (usually) user data. Packets most often refer to network-layer units of data.

PBX --private branch exchange. A digital or analog telephone switchboard located on the subscriber premises and used to connect private and public telephone networks.

PHB --per-hop behavior. A DiffServ concept that specifies how specifically marked packets are to be treated by each DiffServ router.

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.

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.

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