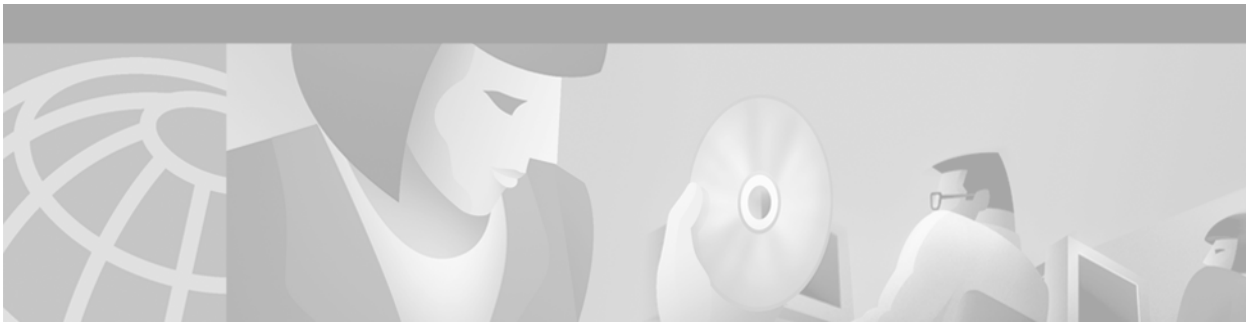

Quality of Service Commands

Use the commands in this chapter to configure quality of service (QoS), a measure of performance for a transmission system that reflects its transmission quality and service availability. The commands are arranged alphabetically.

For QoS configuration information and examples, refer to the *Quality of Service Solutions Configuration Guide*.

access-list rate-limit

To configure an access list for use with committed access rate (CAR) policies, use the **access-list rate-limit** global configuration command. To remove the access list from the configuration, use the **no** form of this command.

access-list rate-limit *acl-index* {*precedence* | *mac-address* | **mask** *prec-mask*}

no access-list rate-limit *acl-index* {*precedence* | *mac-address* | **mask** *prec-mask*}

Syntax Description

acl-index	Access list number. Use any number from 1 to 99 to classify packets by precedence or precedence mask, and use any number from 100 to 199 to classify by MAC address.
precedence	IP precedence.
mac-address	Address of the MAC.
mask *prec-mask*	IP precedence mask; a two-digit hexadecimal number. Use this option when you want to assign multiple precedences to the same rate-limit access list.

Defaults

No CAR access lists are configured.

Command Modes

Global configuration

Command History

Release	Modification
11.1 CC	This command was introduced.

Usage Guidelines

This command classifies packets by the specified IP precedence or MAC address for a particular CAR access list. You can then apply CAR policies, using the **rate-limit** command, to individual rate limit access lists. Thus, packets with different IP precedences or MAC addresses are treated differently by the CAR process.

You can specify only one command for each rate-limit access list. If you enter this command multiple times with the same access list number, the new command will overwrite the previous command.

Use the **mask** keyword to assign multiple IP precedences to the same rate-limit list. To determine the mask value, perform the following steps:

Step 1 Decide which precedences you want to assign to this rate-limit access list.

Step 2 Convert the precedences into an 8-bit number with each bit corresponding to one precedence. For example, an IP precedence of 0 corresponds to 00000001, 1 corresponds to 00000010, 6 corresponds to 01000000, and 7 corresponds to 10000000.

Step 3 Add the 8-bit numbers for the selected precedences. For example, the mask for precedences 1 and 6 is 01000010.

Step 4 The command expects hexadecimal format. Convert the binary mask into the corresponding hexadecimal number. For example, 01000010 becomes 42. This value is used in the **access-list rate-limit** command. Any packets that have an IP precedence of 1 or 6 will match this access list.

A mask of FF matches any precedence, and 00 does not match any precedence.

Examples

The following example assigns any packets with a MAC address of 00e0.34b0.7777 to rate-limit access list 100:

```
router(config)# access-list rate-limit 100 00e0.34b0.7777
```

The following example assigns packets with an IP precedence of 0, 1, or 2 to the rate-limit access list 25:

```
router(config)# access-list rate-limit 25 mask 07
```

Related Commands

Command	Description
show access-lists rate-limit	Displays information about rate-limit access lists.
show ip cef	Displays entries in the FIB that are unresolved or displays a FIB summary.

bgp-policy

To enable Policy Propagation via Border Gateway Protocol (BGP) on the interface, use the **bgp-policy** interface configuration command. To disable Policy Propagation via BGP, use the **no** form of this command.

bgp-policy ip-prec-map

no bgp-policy ip-prec-map

Syntax Description

ip-prec-map	QoS policy based on the IP precedence.

Defaults

Policy Propagation via BGP is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
11.1 CC	This command was introduced.

Usage Guidelines

For the Policy Propagation via BGP feature to work, you must enable BGP and CEF/DCEF. In addition, the proper route-map configuration must be in place to specify the IP precedence (for example, **set ip precedence** route-map configuration command).

Note If you specify both **source** and **destination** on the interface, the software looks up the source address in the routing table and classifies the packet based on the source address first; then the software looks up the destination address in the routing table and reclassifies the packet based on the destination address.

To display QoS policy information for the interface, use the **show ip interface** command.

Examples

The following example enables Policy Propagation via BGP on an interface based on the source address and the IP precedence setting:

```
router# configure terminal
router(config)# interface ethernet 4/0/0
router(config-if)# bgp-policy ip-prec-map
router(config-if)# end
router#
```

clear ip rsvp reservation

To remove Resource Reservation Protocol (RSVP) RESV-related receiver information currently in the database, use the **clear ip rsvp reservation** command in EXEC mode.

clear ip rsvp reservation {*session-ip-address sender-ip-address* {**tcp** | **udp** | *ip-protocol*} *session-dport sender-sport* | *}

Syntax Description

session-ip-address	For unicast sessions, this is the address of the intended receiver; for multicast sessions, it is the IP multicast address of the session.
sender-ip-address	The IP address of the sender.
tcp | **udp** | *ip-protocol*	TCP, User Datagram Protocol (UDP), or IP protocol in the range from 0 to 65535.
session-dport	The destination port. **Note** Port numbers are specified in all cases, because the use of 16-bit ports following the IP header is not limited to UDP or TCP. If destination is zero, source must be zero, and the implication is that ports are not checked. If destination is nonzero, source must be nonzero (except for wildcard filter (wf) reservations, for which the source port is always ignored and can therefore be zero).
sender-sport	The source port. **Note** Port numbers are specified in all cases, because the use of 16-bit ports following the IP header is not limited to UDP or TCP. If destination is zero, source must be zero, and the implication is that ports are not checked. If destination is nonzero, source must be nonzero (except for wildcard filter (wf) reservations, for which the source port is always ignored and can therefore be zero).
*	Wildcard used to clear all senders.

Command Modes

EXEC

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Use the **clear ip rsvp reservation** command to remove the RESV-related sender information currently in the database so that when reservation requests arrive, based on the RSVP admission policy, the relevant ones can be reestablished.

Whenever you change the clockrate or bandwidth of an interface, RSVP does not update its database to reflect the change. This is because such a change requires that RSVP reestablish reservations based on the new clockrate or bandwidth value and arbitrarily dropping some reservations while retaining others is not desired. The solution is to clear the RESV state by issuing the **clear ip rsvp reservation** command.

The **clear ip rsvp reservation** command clears the RESV state from the router on which you issued the command and causes the router to send a PATH TEAR message to the upstream routers thereby clearing the RESV state for that reservation on all the upstream routers.

Examples

The following example clears all the RESV-related receiver information currently in the database:

```
Router# clear ip rsvp reservation *
```

The following example clears all the RESV-related receiver information for a specified reservation currently in the database:

```
Router# clear ip rsvp reservation 10.2.1.1 10.1.1.2 udp 10 20
```

Related Commands

Command	Description
clear ip rsvp sender	Removes RSVP PATH-related sender information currently in the database.

clear ip rsvp sender

To remove Resource Reservation Protocol (RSVP) PATH-related sender information currently in the database, use the **clear ip rsvp sender** command in EXEC mode.

clear ip rsvp sender {*session-ip-address sender-ip-address* {**tcp** | **udp** | *ip-protocol*} *session-dport sender-sport* | *}

Syntax Description

session-ip-address	For unicast sessions, this is the address of the intended receiver; for multicast sessions, it is the IP multicast address of the session.
sender-ip-address	The IP address of the sender.
tcp | **udp** | *ip-protocol*	TCP, User Datagram Protocol (UDP), or IP protocol in the range from 0 to 65535.
session-dport	The destination port. **Note** Port numbers are specified in all cases, because the use of 16-bit ports following the IP header is not limited to UDP or TCP. If destination is zero, source must be zero, and the implication is that ports are not checked. If destination is nonzero, source must be nonzero (except for wildcard filter (wf) reservations, for which the source port is always ignored and can therefore be zero).
sender-sport	The source port. **Note** Port numbers are specified in all cases, because the use of 16-bit ports following the IP header is not limited to UDP or TCP. If destination is zero, source must be zero, and the implication is that ports are not checked. If destination is nonzero, source must be nonzero (except for wildcard filter (wf) reservations, for which the source port is always ignored and can therefore be zero).
*	Wildcard used to clear all senders.

Command Modes

EXEC

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Use the **clear ip rsvp sender** command to remove the PATH-related sender information currently in the database so that when reservation requests arrive, based on the RSVP admission policy, the relevant ones can be reestablished.

Whenever you change the clockrate or bandwidth of an interface, RSVP does not update its database to reflect the change. This is because such a change requires that RSVP reestablish reservations based on the new clockrate or bandwidth value and arbitrarily dropping some reservations while retaining others is not desired. The solution is to clear the PATH state by issuing the **clear ip rsvp sender** command.

The **clear ip rsvp sender** command clears the PATH state from the router on which you issued the command and causes the router to send a PATH TEAR message to the downstream routers thereby clearing the PATH state for that reservation on all the downstream routers.

Examples

The following example clears all the PATH-related sender information currently in the database:

```
Router# clear ip rsvp sender *
```

The following example clears all the PATH-related sender information for a specified reservation currently in the database:

```
Router# clear ip rsvp sender 10.2.1.1 10.1.1.2 udp 10 20
```

Related Commands

Command	Description
clear ip rsvp reservation	Removes RSVP RESV-related receiver information currently in the database.

custom-queue-list

To assign a custom queue list to an interface, use the **custom-queue-list** interface configuration command. To remove a specific list or all list assignments, use the **no** form of this command.

custom-queue-list *list*

no custom-queue-list [*list*]

Syntax Description

list	Any number from 1 to 16 for the custom queue list.

Defaults

No custom queue list is assigned.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Only one queue list can be assigned per interface. Use this command in place of the **priority-list** command (not in addition to it). Custom queueing allows a fairness not provided with priority queueing. With custom queueing, you can control the interface's available bandwidth when it is unable to accommodate the aggregate traffic enqueued. Associated with each output queue is a configurable byte count, which specifies how many bytes of data should be delivered from the current queue by the system before the system moves on to the next queue. When a particular queue is being processed, packets are sent until the number of bytes sent exceeds the queue byte count or until the queue is empty.

Use the **show queueing custom** and **show interfaces** commands to display the current status of the custom output queues.

Examples

In the following example, custom queue list number 3 is assigned to serial interface 0:

```
router(config)# interface serial 0
router(config-if)# custom-queue-list 3
```

Related Commands

Command	Description
queue-list default	Assigns a priority queue for those packets that do not match any other rule in the queue list.
queue-list interface	Establishes queueing priorities on packets entering on an interface.
queue-list queue byte-count	Specifies how many bytes the system allows to be delivered from a given queue during a particular cycle.
queue-list queue limit	Designates the queue length limit for a queue.

Command	Description
show interfaces	Displays statistics for all interfaces configured on the router or access server.
show queue	Lists fair queueing configuration and statistics for a particular interface.
show queueing	Lists all or selected configured queueing strategies.

fair-queue

To enable weighted fair queueing (WFQ) for an interface, use the **fair-queue** interface configuration command. To disable weighted fair queueing for an interface, use the **no** form of this command.

fair-queue [*congestive-discard-threshold* [*dynamic-queues* [*reservable-queues*]]]

no fair-queue

Syntax Description

congestive-discard-threshold	(Optional) Number of messages allowed in each queue. The default is 64 messages, and a new threshold must be a power of 2 in the range 16 to 4096. When a conversation reaches this threshold, new message packets are discarded.
dynamic-queues	(Optional) Number of dynamic queues used for best-effort conversations (that is, a normal conversation not requiring any special network services). Values are 16, 32, 64, 128, 256, 512, 1024, 2048, and 4096. The default is 256.
reservable-queues	(Optional) Number of reservable queues used for reserved conversations in the range 0 to 1000. The default is 0. Reservable queues are used for interfaces configured for features such as Resource Reservation Protocol (RSVP).

Defaults

Fair queueing is enabled by default for physical interfaces whose bandwidth is less than or equal to 2.048 Mbps and that do not use the following: X.25 and Synchronous Data Link Control (SDLC) encapsulations; Link Access Procedure, Balanced (LAPB); tunnels; loopbacks; dialer; bridges; or virtual interfaces. Fair queueing is not an option for these protocols. However, if custom queueing or priority queueing is enabled for a qualifying link, it overrides fair queueing, effectively disabling it. Additionally, fair queueing is automatically disabled if you enable the autonomous or silicon switching engine mechanisms.

Note A variety of queueing mechanisms can be configured using multilink, for example, Multichassis Multilink PPP (MMP). However, if only PPP is used on a tunneled interface—for example, virtual private dialup network (VPND), PPP over Ethernet (PPPoE), or PPP over Frame Relay (PPPoFR)—no queueing can be configured on the virtual interface.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

This command enables WFQ. With WFQ, packets are classified by flow. For example, packets with the same source IP address, destination IP address, source TCP or UDP port, destination TCP or UDP port, and protocol belong to the same flow; see Table 373 for a full list of protocols and traffic stream discrimination fields.

When enabled for an interface, WFQ provides traffic priority management that automatically sorts among individual traffic streams without requiring that you first define access lists. Enabling WFQ requires use of this command only.

When WFQ is enabled for an interface, new messages for high-bandwidth traffic streams are discarded after the configured or default congestive discard threshold has been met. However, low-bandwidth conversations, which include control message conversations, continue to enqueue data. As a result, the fair queue may occasionally contain more messages than its configured threshold number specifies.

WFQ uses a traffic data stream discrimination registry service to determine which traffic stream a message belongs to. For each forwarding protocol, Table 373 shows the attributes of a message that are used to classify traffic into data streams.

Table 373 Weighted Fair Queueing Traffic Stream Discrimination Fields

Forwarder	Fields Used
AppleTalk	• Source net, node, socket • Destination net, node, socket • Type
CLNS	• Source NSAP • Destination NSAP
DECnet	• Source address • Destination address
Frame Relay switching	• DLCI value
IP	• ToS • IP protocol • Source IP address (if message is not fragmented) • Destination IP address (if message is not fragmented) • Source TCP/UDP port • Destination TCP/UDP port
Transparent bridging	• Unicast: source MAC, destination MAC • Ethertype SAP/SNAP multicast: destination MAC address
Source-route bridging	• Unicast: source MAC, destination MAC • SAP/SNAP multicast: destination MAC address
VINES	• Source network/host • Destination network/host • Level 2 protocol
Apollo	• Source network/host/socket • Destination network/host/socket • Level 2 protocol

Table 373 Weighted Fair Queueing Traffic Stream Discrimination Fields (continued)

Forwarder	Fields Used
XNS	• Source/destination network/host/socket • Level 2 protocol
Novell NetWare	• Source/destination network/host/socket • Level 2 protocol
All others (default)	• Control protocols (one queue per protocol)

It is important to note that IP precedence, congestion in Frame Relay switching, and discard eligibility flags affect the weights used for queueing.

IP precedence, which is set by the host or by policy maps, is a number in the range of 0 to 7. Data streams of precedence *number* are weighted so that they are given an effective bit rate of *number*+1 times as fast as a data stream of precedence 0, which is normal.

In Frame Relay switching, message flags for forward explicit congestion notification (FECN), backward explicit congestion notification (BECN), and discard eligibility (DE) message flags cause the algorithm to select weights that effectively impose reduced queue priority, providing the application with "slow down" feedback and sorting traffic, giving the best service to applications within their committed information rate (CIR).

Fair queueing is supported for all LAN and line (WAN) protocols except X.25, including LAPB and SDLC; see the notes in the section "Default." Because tunnels are software interfaces that are themselves routed over physical interfaces, fair queueing is not supported for tunnels. Fair queueing is on by default for interfaces with bandwidth less than or equal to 2 Mbps.

Note For Release 10.3 and earlier for the Cisco 7000 and 7500 routers with an RSP card, if you used the **tx-queue-limit** command to set the transmit limit available to an interface on an MCI or SCI card and you configured custom queueing or priority queueing for that interface, the configured transmit limit was automatically overridden and set to 1. With Cisco IOS Release 12.0, for weighted fair queueing, custom queueing, and priority queueing, the configured transmit limit is derived from the bandwidth value set for the interface using the **bandwidth** command. Bandwidth value divided by 512 rounded up yields the effective transmit limit. However, the derived value only applies in the absence of a **tx-queue-limit** command; that is, a configured transmit limit overrides this derivation.

When Resource Reservation Protocol (RSVP) is configured on an interface that supports fair queueing or on an interface that is configured for fair queueing with the reservable queues set to 0 (the default), the reservable queue size is automatically configured using the following method: interface bandwidth divided by 32 kbps. You can override this default by specifying a reservable queue other than 0. For more information on RSVP, refer to the chapter "Configuring RSVP" in the *Network Protocols Configuration Guide, Part 1*.

Examples

The following example enables use of WFQ on serial interface 0, with a congestive threshold of 300. This threshold means that messages will be discarded from the queueing system only when 300 or more messages have been queued and the message is in a data stream that has more than one message in the queue. The transmit queue limit is set to 2, based on the 384-kilobit (Kb) line set by the **bandwidth** command:

```
router(config)# interface serial 0
router(config-if)# bandwidth 384
router(config-if)# fair-queue 300
```

Unspecified parameters take the default values.

The following example requests a fair queue with a congestive discard threshold of 64 messages, 512 dynamic queues, and 18 RSVP queues:

```
router(config)# interface Serial 3/0
router(config-if)# ip unnumbered Ethernet 0/0
router(config-if)# fair-queue 64 512 18
```

Related Commands

Command	Description
clear ip rsvp reservation	Assigns a custom queue list to an interface.
priority-group	Assigns the specified priority list to an interface.
priority-list default	Assigns a priority queue for those packets that do not match any other rule in the priority list.
show interfaces	Displays statistics for all interfaces configured on the router or access server.
show queue	Lists fair queueing configuration and statistics for a particular interface.
show queueing	Lists all or selected configured queueing strategies.

fair-queue (DWFQ)

To enable distributed weighted fair queueing (DWFQ), use the **fair-queue** interface configuration command. The command enables DWFQ on an interface using a VIP2-40 or greater interface processor. To disable DWFQ, use the **no** form of this command.

fair-queue

no fair-queue

Syntax Description

This command has no arguments or keywords.

Defaults

DWFQ is enabled by default for physical interfaces whose bandwidth is less than or equal to 2.048 Mbps.

DWFQ can be configured on interfaces but not subinterfaces. It is not supported on Fast EtherChannel, tunnel, or other logical or virtual interfaces such as Multilink Point-to-Point Protocol.

Table 374 lists the default queue lengths and thresholds.

Table 374 Default Fair Queues and Thresholds

Queue or Threshold	Default
Congestive discard threshold	64 messages
Dynamic queues	256
Reservable queues	0

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

With DWFQ, packets are classified by flow. Packets with the same source IP address, destination IP address, source TCP or UDP port, destination TCP or UDP port, and protocol belong to the same flow.

DWFQ allocates an equal share of the bandwidth to each flow.

Examples

The following example enables DWFQ on the HSSI 0/0/0 interface:

```
router(config)# interface Hssi0/0/0
router(config-if)# description 45Mbps to R2
router(config-if)# ip address 200.200.14.250 255.255.255.252
router(config-if)# fair-queue
```

Related Commands

Command	Description
show interfaces	Displays statistics for all interfaces configured on the router or access server.
show interfaces fair-queue	Displays information and statistics about WFQ for a VIP-based interface.

ip rsvp bandwidth

To enable RSVP for IP on an interface, use the **ip rsvp bandwidth** interface configuration command. To disable RSVP, use the **no** form of this command.

ip rsvp bandwidth [*interface-kbps* [*single-flow-kbps*]]

no ip rsvp bandwidth [*interface-kbps* [*single-flow-kbps*]]

Syntax Description

interface-kbps	(Optional) Maximum amount of bandwidth, in kbps, that may be allocated by RSVP flows. The range is from 1 to 10,000,000.
single-flow-kbps	(Optional) Maximum amount of bandwidth, in kbps, that may be allocated to a single flow. The range is from 1 to 10,000,000.

Defaults

RSVP is disabled by default. If the **ip rsvp bandwidth** command is entered but no bandwidth values are supplied (for example, **ip rsvp bandwidth** is entered followed by a carriage return, or pressing the Return or Enter key), a default bandwidth value is assumed for both the i*nterface-kbps* and *single-flow-kbps* arguments.

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

This command is not supported on VIP-based routers. RSVP is disabled by default to allow backward compatibility with systems that do not implement RSVP. Weighted Random Early Detection (WRED) or fair queueing must be enabled first.

Examples

The following example shows a T1 (1536 kbps) link configured to permit RSVP reservation of up to 1158 kbps, but no more than 100 kbps for any given flow on serial interface 0. Fair queueing is configured with 15 reservable queues to support those reserved flows, should they be required.

```
router(config)# interface serial 0
router(config-if)# fair-queue 64 256 15
router(config-if)# ip rsvp bandwidth 1158 100
```

Related Commands

Command	Description
fair-queue	Enables WFQ for an interface.
ip rsvp neighbors	Enables neighbors to request a reservation.
ip rsvp reservation	Enables a router to generate an RSVP RESV message.
ip rsvp sender	Enables a router to generate an RSVP PATH message.

Command	Description
ip rsvp udp-multicast	Instructs the router to generate UDP-encapsulated RSVP multicasts whenever it generates an IP-encapsulated multicast packet.
random-detect	Enables WRED or DWRED.
show ip rsvp installed	Displays RSVP-related installed filters and corresponding bandwidth information.
show ip rsvp interface	Displays RSVP-related interface information.
show ip rsvp neighbor	Displays current RSVP neighbors.
show ip rsvp reservation	Displays RSVP-related receiver information currently in the database.
show ip rsvp sender	Displays RSVP PATH-related sender information currently in the database.

ip rsvp neighbors

To enable neighbors to request a reservation, use the **ip rsvp neighbors** interface configuration command. To disable this feature, use the **no** form of this command.

ip rsvp neighbors *access-list-number*

no ip rsvp neighbors *access-list-number*

Syntax Description

access-list-number	Number of a standard or extended access list. It can be any number from 1 to 199.

Defaults

The router accepts messages from any neighbor.

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

This command is not supported on VIP-based routers. Use this command to allow only specific RSVP neighbors to make a reservation. If no limits are specified, any neighbor can request a reservation. If an access list is specified, only neighbors meeting the specified access list requirements can make a reservation.

Examples

The following example allows neighbors meeting access list 1 requirements to request a reservation:

```
router(config)# interface ethernet 0
router(config-if)# ip rsvp neighbors 1
```

Related Commands

Command	Description
fair-queue	Enables WFQ for an interface.
ip rsvp bandwidth	Enables RSVP for IP on an interface.
ip rsvp reservation	Enables a router to generate an RSVP RESV message.
ip rsvp sender	Enables a router to generate an RSVP PATH message.
ip rsvp udp-multicast	Instructs the router to generate UDP-encapsulated RSVP multicasts whenever it generates an IP-encapsulated multicast packet.
random-detect	Enables WRED or DWRED.
show ip rsvp installed	Displays RSVP-related installed filters and corresponding bandwidth information.
show ip rsvp interface	Displays RSVP-related interface information.

Command	Description
show ip rsvp neighbor	Displays current RSVP neighbors.
show ip rsvp reservation	Displays RSVP-related receiver information currently in the database.
show ip rsvp sender	Displays RSVP PATH-related sender information currently in the database.

ip rsvp reservation

To enable a router to generate an RSVP RESV message, use the **ip rsvp reservation** global configuration command. To disable this feature, use the **no** form of this command.

ip rsvp reservation *session-ip-address sender-ip-address* {**tcp** | **udp** | *ip-protocol*} *session-dport sender-sport next-hop-ip-address next-hop-interface* {**ff** | **se** | **wf**} {**rate** | **load**} *bandwidth burst-size*

no ip rsvp reservation *session-ip-address sender-ip-address* {**tcp** | **udp** | *ip-protocol*} *session-dport sender-sport next-hop-ip-address next-hop-interface* {**ff** | **se** | **wf**} {**rate** | **load**} *bandwidth burst-size*

Syntax Description

session-ip-address	For unicast sessions, this is the address of the intended receiver; for multicast sessions, it is the IP multicast address of the session.
sender-ip-address	The IP address of the sender.
tcp | **udp** | *ip-protocol*	TCP, UDP, or IP protocol in the range 0 to 255.
session-dport sender-sport	*session-dport* is the destination port. s*ender-sport* is the source port. Port numbers are specified in all cases, as the use of 16-bit ports following the IP header is not limited to UDP or TCP. If destination is zero, source must be zero, and the implication is that ports are not checked. If destination is nonzero, source must be nonzero.
next-hop-ip-address	Host name or address of the receiver or the router closest to the receiver.
next-hop-interface	Next hop interface or subinterface type and number. Interface type can be **ethernet**, **loopback**, **null**, or **serial**.
ff | **se** | **wf**	Reservation style: Fixed Filter (**ff**) is single reservation. Shared Explicit (**se**) is shared reservation, limited scope. Wild Card Filter (**wf**) is shared reservation, unlimited scope.
rate | **load**	QoS guaranteed bit rate service or controlled load service.
bandwidth	Average bit rate (kbps) to reserve up to 75 percent of total on interface. The range is 1 to 10000000.
burst-size	Maximum burst size (kilobytes of data in queue). The range is 1 to 65535.

Defaults

The router does not simulate receiving an RSVP RESV message by default.

Command Modes

Global configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Use this command to force the router to act like it is generating RSVP RESV messages from the receiver.

This command is not supported on VIP-based routers.

Examples

The following example specifies the use of a Shared Explicit Filter style of reservation and the Controlled Load Service, with token buckets of 100 or 150 kbps and 60 or 65 kbps maximum queue depth:

```
router(config)# interface ethernet 0
router(config-if)# ip rsvp reservation 224.250.0.2 132.240.1.1 UDP 20 30 132.240.4.1
Et1 se load 100 60
router(config-if)# ip rsvp reservation 224.250.0.2 132.240.2.1 TCP 20 30 132.240.4.1
Et1 se load 150 65
```

The following example specifies the use of a Wild Card Filter style of reservation and the Guaranteed Bit Rate Service, with token buckets of 300 or 350 kbps and 60 or 65 kbps maximum queue depth:

```
router(config)# interface ethernet 0
router(config-if)# ip rsvp reservation 224.250.0.3 0.0.0.0 UDP 20 0 132.240.4.1
Et1 wf rate 300 60
router(config-if)# ip rsvp reservation 224.250.0.3 0.0.0.0 UDP 20 0 132.240.4.1
Et1 wf rate 350 65
```

Note that the Wild Card Filter does not admit the specification of the sender; it accepts all senders. This action is denoted by setting the source address and port to zero. If, in any filter style, the destination port is specified to be zero, RSVP does not permit the source port to be anything else; it understands that such protocols do not use ports or that the specification applies to all ports.

Related Commands

Command	Description
fair-queue	Enables WFQ for an interface.
ip rsvp bandwidth	Enables RSVP for IP on an interface.
ip rsvp neighbors	Enables neighbors to request a reservation.
ip rsvp sender	Enables a router to generate an RSVP PATH message.
ip rsvp udp-multicast	Instructs the router to generate UDP-encapsulated RSVP multicasts whenever it generates an IP-encapsulated multicast packet.
random-detect	Enables WRED or DWRED.
show ip rsvp installed	Displays RSVP-related installed filters and corresponding bandwidth information.
show ip rsvp interface	Displays RSVP-related interface information.
show ip rsvp neighbor	Displays current RSVP neighbors.
show ip rsvp reservation	Displays RSVP-related receiver information currently in the database.
show ip rsvp sender	Displays RSVP PATH-related sender information currently in the database.

ip rsvp sender

To enable a router to generate an RSVP PATH message, use the **ip rsvp reservation** global configuration command. To disable this feature, use the **no** form of this command.

ip rsvp sender *session-ip-address sender-ip-address* {**tcp** | **udp** | *ip-protocol*} *session-dport sender-sport previous-hop-ip-address previous-hop-interface bandwidth burst-size*

no ip rsvp sender *session-ip-address sender-ip-address* {**tcp** | **udp** | *ip-protocol*} *session-dport sender-sport previous-hop-ip-address previous-hop-interface bandwidth burst-size*

Syntax Description

session-ip-address	For unicast sessions, this is the address of the intended receiver; for multicast sessions, it is the IP multicast address of the session.
sender-ip-address	The IP address of the sender.
tcp | **udp** | *ip-protocol*	TCP, UDP, or IP protocol in the range 0 to 255.
session-dport sender-sport	*session-dport* is the destination port. s*ender-sport* is the source port. Port numbers are specified in all cases, as the use of 16-bit ports following the IP header is not limited to UDP or TCP. If destination is zero, source must be zero, and the implication is that ports are not checked. If destination is nonzero, source must be nonzero.
previous-hop-ip-address	Address of the sender or the router closest to the sender.
previous-hop-interface	Address of the previous hop interface or subinterface. Interface type can be **ethernet**, **loopback**, **null**, or **serial**.
bandwidth	Average bit rate (kbps) to reserve up to 75 percent of total on interface. The range is 1 to 10000000.
burst-size	Maximum burst size (kilobytes of data in queue). The range is 1 to 65535.

Defaults

The router does not simulate RSVP PATH message generation by default.

Command Modes

Global configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Use this command to force the router to act like it is receiving RSVP PATH messages from the sender.

This command is not supported on VIP-based routers.

Examples

The following example sets up the router to act like it is receiving RSVP PATH messages using UDP over the loopback 1 interface:

```
router(config)# interface ethernet 0
router(config-if)# ip rsvp sender 224.250.0.1 132.240.2.1 udp 20 30 132.240.2.1
loopback 1 50 5
router(config-if)# ip rsvp sender 224.250.0.2 132.240.2.1 udp 20 30 132.240.2.1
loopback 1 50 5
router(config-if)# ip rsvp sender 224.250.0.2 132.240.2.28 udp 20 30 132.240.2.28
loopback 1 50 5
```

Related Commands

Command	Description
fair-queue	Enables WFQ for an interface.
ip rsvp bandwidth	Enables RSVP for IP on an interface.
ip rsvp neighbors	Enables neighbors to request a reservation.
ip rsvp reservation	Enables a router to generate an RSVP RESV message.
ip rsvp udp-multicast	Instructs the router to generate UDP-encapsulated RSVP multicasts whenever it generates an IP-encapsulated multicast packet.
random-detect	Enables WRED or DWRED.
show ip rsvp installed	Displays RSVP-related installed filters and corresponding bandwidth information.
show ip rsvp interface	Displays RSVP-related interface information.
show ip rsvp neighbor	Displays current RSVP neighbors.
show ip rsvp reservation	Displays RSVP-related receiver information currently in the database.
show ip rsvp sender	Displays RSVP PATH-related sender information currently in the database.

ip rsvp udp-multicast

To instruct the router to generate UDP-encapsulated RSVP multicasts whenever it generates an IP-encapsulated multicast packet, use the **ip rsvp udp-multicast** interface configuration command. To disable this feature, use the **no** form of this command.

ip rsvp udp-multicast [*multicast-address*]

no ip rsvp udp-multicast [*multicast-address*]

Syntax Description

multicast-address	(Optional) Host name or UDP multicast address of router.

Defaults

The generation of UDP multicasts is disabled. If a system sends a UDP-encapsulated RSVP message to the router, the router begins using UDP for contact with the neighboring system. The router uses multicast address 224.0.0.14 and starts sending to UDP port 1699. If the command is entered without specifying a multicast address, the router uses the same multicast address.

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Use this command to instruct a router to generate UDP-encapsulated RSVP multicasts whenever it generates an IP-encapsulated multicast packet. Some hosts require this trigger from the router.

Examples

The following example reserves up to 7500 kbps on Ethernet interface 2, with up to 1 Mbps per flow. The router is configured to use UDP encapsulation with the multicast address 224.0.0.14.

```
router(config)# interface ethernet 2
router(config-if)# ip rsvp bandwidth 7500 1000
router(config-if)# ip rsvp udp-multicast 224.0.0.14
```

Related Commands

Command	Description
ip rsvp bandwidth	Enables RSVP for IP on an interface.
ip rsvp neighbors	Enables neighbors to request a reservation.
ip rsvp reservation	Enables a router to generate an RSVP RESV message.
ip rsvp sender	Enables a router to generate an RSVP PATH message.

priority-group

To assign the specified priority list to an interface, use the **priority-group** interface configuration command. To remove the specified priority group assignment, use the **no** form of this command.

priority-group *list-number*

no priority-group *list-number*

Syntax Description

list-number	Priority list number assigned to the interface. Any number from 1 to 16.

Defaults

This command is disabled by default.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Only one list can be assigned per interface. Priority output queueing provides a mechanism to prioritize packets transmitted on an interface.

Use the **show queueing priority** and **show interfaces** commands to display the current status of the output queues.

Examples

The following example causes packets for transmission on serial interface 0 to be classified by priority list 1:

```
router(config)# interface serial 0
router(config-if)# priority-group 1
```

The following example shows how to establish queueing priorities based on the address of the serial link on a STUN connection. Note that you must use the **priority-group** interface configuration command to assign a priority group to an output interface.

```
stun peer-name 131.108.254.6
stun protocol-group 1 sdlc
!
interface serial 0
! Disable the ip address for interface serial 0:
no ip address
! Enable the interface for STUN:
encapsulation stun
!
stun group 2
stun route address 10 tcp 131.108.254.8 local-ack priority
!
! Assign priority group 1 to the input side of interface serial 0:
priority-group 1
! Assign a low priority to priority list 1 on serial link identified
! by group 2 and address A7:
priority-list 1 stun low address 2 A7
```

Related Commands

Command	Description
locaddr-priority-list	Maps LUs to queueing priorities as one of the steps to establishing queueing priorities based on LU addresses.
priority-list	Establishes queueing priorities based upon the protocol type as one of the steps to establishing queueing priorities based on LU addresses.
priority-list default	Assigns a priority queue for those packets that do not match any other rule in the priority list.
priority-list interface	Establishes queueing priorities on packets entering from a given interface.
priority-list protocol	Establishes queueing priorities based on the protocol type.
priority-list protocol ip tcp	Establishes BSTUN or STUN queueing priorities based on the TCP port.
priority-list queue-limit	Specifies the maximum number of packets that can be waiting in each of the priority queues.
priority-list stun address	Establishes STUN queueing priorities based on the address of the serial link.
show interfaces	Displays statistics for all interfaces configured on the router or access server.
show queue	Lists fair queueing configuration and statistics for a particular interface.
show queueing	Lists all or selected configured queueing strategies.

priority-list default

To assign a priority queue for those packets that do not match any other rule in the priority list, use the **priority-list default** global configuration command. To return to the default or assign **normal** as the default, use the **no** form of this command.

priority-list *list-number* **default** {**high** | **medium** | **normal** | **low**}

no priority-list *list-number*

Syntax Description

list-number	Any number from 1 to 16 that identifies the priority list.
high | **medium** | **normal** | **low**	Priority queue level. The **normal** queue is used, if you use the **no** form of this command.

Defaults

This command is not enabled by default.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

When you use multiple rules, remember that the system reads the priority settings in order of appearance. When classifying a packet, the system searches the list of rules specified by **priority-list** commands for a matching protocol or interface type. When a match is found, the system assigns the packet to the appropriate queue. The system searches the list in the order it is specified, and the first matching rule terminates the search.

Examples

The following example sets the priority queue for those packets that do not match any other rule in the priority list to a low priority:

```
router(config)# priority-list 1 default low
```

Related Commands

Command	Description
priority-group	Assigns the specified priority list to an interface.
priority-list interface	Establishes queueing priorities on packets entering from a given interface.
priority-list protocol	Establishes queueing priorities based on the protocol type.
priority-list queue-limit	Specifies the maximum number of packets that can be waiting in each of the priority queues.

Command	Description
show queue	Lists fair queueing configuration and statistics for a particular interface.
show queueing	Lists all or selected configured queueing strategies.

priority-list interface

To establish queueing priorities on packets entering from a given interface, use the **priority-list interface** global configuration command. To remove an entry from the list, use the **no** form of this command with the appropriate arguments.

priority-list *list-number* **interface** *interface-type interface-number* {**high** | **medium** | **normal** | **low**}

no priority-list *list-number*

Syntax Description

list-number	Arbitrary integer from 1 to 16 that identifies the priority list selected by the user.
interface-type	The name of the interface.
interface-number	The number of the interface.
high | **medium** | **normal** | **low**	Priority queue level.

Defaults

No queueing priorities are established by default.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

When you use multiple rules, remember that the system reads the priority settings in order of appearance. When classifying a packet, the system searches the list of rules specified by **priority-list** commands for a matching protocol or interface type. When a match is found, the system assigns the packet to the appropriate queue. The system searches the list in the order it is specified, and the first matching rule terminates the search.

Examples

The following example assigns a list entering on serial interface 0 to a medium priority queue level:

```
router(config)# priority-list 3 interface serial 0 medium
```

Note These commands define a rule that determines how packets are attached to an interface. Once the rule is defined, the packet is actually attached to the interface using the **priority-group** command.

Related Commands

Command	Description
priority-group	Assigns the specified priority list to an interface.
priority-list default	Assigns a priority queue for those packets that do not match any other rule in the priority list.
priority-list protocol	Establishes queueing priorities based on the protocol type.
priority-list queue-limit	Specifies the maximum number of packets that can be waiting in each of the priority queues.
show queue	Lists fair queueing configuration and statistics for a particular interface.
show queueing	Lists all or selected configured queueing strategies.

priority-list protocol

To establish queueing priorities based upon the protocol type, use the **priority-list protocol** global configuration command. To remove a priority list entry assigned by protocol type, use the **no** form of this command followed by the appropriate *list-number* argument and the **protocol** keyword.

priority-list *list-number* **protocol** *protocol-name* {**high** | **medium** | **normal** | **low**} *queue-keyword keyword-value*

no priority-list *list-number* **protocol** [*protocol-name* {**high** | **medium** | **normal** | **low**} *queue-keyword keyword-value*]

Syntax Description

list-number	Any number from 1 to 16 that identifies the priority list selected by the user.
protocol-name	Protocol type: **aarp**, **apollo**, **appletalk**, **arp**, **bridge** (transparent), **clns**, **clns_es**, **clns_is**, **compressedtcp**, **cmns**, **decnet**, **decnet_node**, **decnet_router-l1**, **decnet_router-l2**, **dlsw**, **ip**, **ipx**, **pad**, **rsrb**, **stun**, **vines**, **xns**, and **x25**.
high | **medium** | **normal** | **low**	Priority queue level.
queue-keyword keyword-value	Possible keywords are **fragments**, **gt**, **list**, **lt**, **tcp**, and **udp**. See Table 375.

Defaults

No queueing priorities are established.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

When you use multiple rules for a single protocol, remember that the system reads the priority settings in order of appearance. When classifying a packet, the system searches the list of rules specified by **priority-list** commands for a matching protocol type. When a match is found, the system assigns the packet to the appropriate queue. The system searches the list in the order it is specified, and the first matching rule terminates the search.

The **decnet_router-l1** keyword refers to the multicast address for all level 1 routers, which are intra-area routers, and the **decnet_router-l2** keyword refers to all level 2 routers, which are interarea routers.

The **dlsw**, **rsrb**, and **stun** keywords refer only to direct encapsulation.

Use Table 375, Table 376, and Table 377 to configure the queueing priorities for your system.

Table 375 Protocol Priority Queue Keywords and Values

Option	Description
fragments	Assigns the priority level defined to fragmented IP packets (for use with the IP protocol only). More specifically, this command matches IP packets whose fragment offset field is nonzero. The initial fragment of a fragmented IP packet has a fragment offset of zero, so such packets are not matched by this command. **Note** Packets with a nonzero fragment offset do not contain TCP or UDP headers, so other instances of this command that use the **tcp** or **udp** keyword will always fail to match such packets.
gt *byte-count*	Specifies a greater-than count. The priority level assigned goes into effect when a packet size exceeds the value entered for the argument *byte-count.* **Note** The size of the packet must also include additional bytes because of MAC encapsulation on the outgoing interface.
list *list-number*	Assigns traffic priorities according to a specified list when used with AppleTalk, bridging, IP, IPX, VINES, or XNS. The argument *list-number* is the access list number as specified by the **access-list** global configuration command for the specified *protocol-name*. For example, if the protocol is AppleTalk, *list-number* should be a valid AppleTalk access list number.
lt *byte-count*	Specifies a less-than count. The priority level assigned goes into effect when a packet size is less than the value entered for the argument *byte-count*. **Note** The size of the packet must also include additional bytes because of MAC encapsulation on the outgoing interface.
tcp *port*	Assigns the priority level defined to TCP segments originating from or destined to a specified port (for use with the IP protocol only). Table 376 lists common TCP services and their port numbers.
udp *port*	Assigns the priority level defined to UDP packets originating from or destined to a specified port (for use with the IP protocol only). Table 377 lists common UDP services and their port numbers.

Table 376 Common TCP Services and Their Port Numbers

Service	Port
FTP data	20
FTP	21
SMTP	25
Telnet	23

Table 377 Common UDP Services and Their Port Numbers

Service	Port
DNS	53
NFS	2049
RPC	111
SNMP	161
TFTP	69

Note Table 376 and Table 377 include some of the more common TCP and UDP port numbers. However, you can specify any port number to be prioritized; you are not limited to those listed.
For some protocols, such as TFTP and FTP, only the initial request uses port 69. Subsequent packets use a randomly chosen port number. For these types of protocols, the use of port numbers fails to be an effective method to manage queued traffic.

Examples

The following example assigns 1 as the arbitrary priority list number, specifies DECnet as the protocol type, and assigns a high-priority level to the DECnet packets transmitted on this interface:

```
router(config)# priority-list 1 protocol decnet high
```

The following example assigns a medium-priority level to every DECnet packet with a size greater than 200 bytes:

```
router(config)# priority-list 2 protocol decnet medium gt 200
```

The following example assigns a medium-priority level to every DECnet packet with a size less than 200 bytes:

```
router(config)# priority-list 4 protocol decnet medium lt 200
```

The following example assigns a high-priority level to traffic that matches IP access list 10:

```
router(config)# priority-list 1 protocol ip high list 10
```

The following example assigns a medium-priority level to Telnet packets:

```
router(config)# priority-list 4 protocol ip medium tcp 23
```

The following example assigns a medium-priority level to UDP Domain Name Service packets:

```
router(config)# priority-list 4 protocol ip medium udp 53
```

The following example assigns a high-priority level to traffic that matches Ethernet type code access list 201:

```
router(config)# priority-list 1 protocol bridge high list 201
```

The following example assigns a high-priority level to DLSw+ traffic with TCP encapsulation:

```
router(config)# priority-list 1 protocol ip high tcp 2065
```

The following example assigns a high-priority level to DLSw+ traffic with direct encapsulation:

```
router(config)# priority-list 1 protocol dlsw high
```

Note These commands define a rule that determines how packets are attached to an interface. Once the rule is defined, the packet is actually attached to the interface using the **priority-group** command.

Related Commands

Command	Description
priority-group	Assigns the specified priority list to an interface.
priority-list default	Assigns a priority queue for those packets that do not match any other rule in the priority list.
priority-list interface	Establishes queueing priorities on packets entering from a given interface.
priority-list queue-limit	Specifies the maximum number of packets that can be waiting in each of the priority queues.
show queue	Lists fair queueing configuration and statistics for a particular interface.
show queueing	Lists all or selected configured queueing strategies.

priority-list queue-limit

To specify the maximum number of packets that can be waiting in each of the priority queues, use the **priority-list queue-limit** global configuration command. To select the normal queue, use the **no** form of this command.

priority-list *list-number* **queue-limit** [*high-limit* [*medium-limit* [*normal-limit* [*low-limit*]]]]

no priority-list *list-number* **queue-limit**

Syntax Description

list-number	Any number from 1 to 16 that identifies the priority list.
high-limit *medium-limit* *normal-limit* *low-limit*	(Optional) Priority queue maximum length. A value of 0 for any of the four arguments means that the queue can be of unlimited size for that particular queue. For default values for these arguments, see Table 378.

Defaults

This command is not enabled by default.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

If a priority queue overflows, excess packets are discarded and quench messages can be sent, if appropriate, for the protocol.

The default queue limit arguments are listed in Table 378.

Table 378 Default Priority Queue Packet Limits

Priority Queue Argument	Packet Limits
high-limit	20
medium-limit	40
normal-limit	60
low-limit	80

Note If priority queueing is enabled and there is an active ISDN (Integrated Services Digital Network) call in the queue, changing the configuration of the **priority-list queue-limit** command drops the call from the queue. For more information about priority queueing, refer to the *Quality of Service Configuration Guide*, Release 12.0.

Examples

The following example sets the maximum packets in the priority queue to 10:

```
router(config)# priority-list 2 queue-limit 10 40 60 80
```

Related Commands

Command	Description
priority-group	Assigns the specified priority list to an interface.
priority-list default	Assigns a priority queue for those packets that do not match any other rule in the priority list.
priority-list interface	Establishes queueing priorities on packets entering from a given interface.
priority-list protocol	Establishes queueing priorities based on the protocol type.
show queue	Lists fair queueing configuration and statistics for a particular interface.
show queueing	Lists all or selected configured queueing strategies.

queue-list default

To assign a priority queue for those packets that do not match any other rule in the queue list, use the **queue-list default** global configuration command. To restore the default value, use the **no** form of this command.

queue-list *list-number* **default** *queue-number*

no queue-list *list-number* **default** *queue-number*

Syntax Description

list-number	Number of the queue list. Any number from 1 to 16.
queue-number	Number of the queue. Any number from 1 to 16. The default number of the queue list is queue number 1.

Defaults

This command is disabled by default.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

When you use multiple rules, remember that the system reads the **queue-list** commands in order of appearance. When classifying a packet, the system searches the list of rules specified by **queue-list** commands for a matching protocol or interface type. When a match is found, the system assigns the packet to the appropriate queue. The system searches the list in the order it is specified, and the first matching rule terminates the search.

Queue number 0 is a system queue. It is emptied before any of the other queues are processed. The system enqueues high-priority packets, such as keepalives, to this queue.

Use the **show interfaces** command to display the current status of the output queues.

Examples

In the following example, the default queue for list 10 is set to queue number 2:

```
router(config)# queue-list 10 default 2
```

Related Commands

Command	Description
clear ip rsvp reservation	Assigns a custom queue list to an interface.
queue-list interface	Establishes queueing priorities on packets entering on an interface.
queue-list protocol	Establishes queueing priority based on the protocol type.
queue-list queue byte-count	Specifies how many bytes the system allows to be delivered from a given queue during a particular cycle.

Command	Description
queue-list queue limit	Designates the queue length limit for a queue.
show queue	Lists fair queueing configuration and statistics for a particular interface.
show queueing	Lists all or selected configured queueing strategies.

queue-list interface

To establish queueing priorities on packets entering on an interface, use the **queue-list interface** global configuration command. To remove an entry from the list, use the **no** form of this command.

queue-list *list-number* **interface** *interface-type interface-number queue-number*

no queue-list *list-number* **interface** *interface-type interface-number queue-number*

Syntax Description

list-number	Number of the queue list. Any number from 1 to 16.
interface-type	Name of the interface.
interface-number	Number of the interface.
queue-number	Number of the queue. Any number from 1 to 16.

Defaults

No queueing priorities are established.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

When you use multiple rules, remember that the system reads the **queue-list** commands in order of appearance. When classifying a packet, the system searches the list of rules specified by **queue-list** commands for a matching protocol or interface type. When a match is found, the system assigns the packet to the appropriate queue. The list is searched in the order it is specified, and the first matching rule terminates the search.

Examples

In the following example, queue list 4 establishes queueing priorities for packets entering on interface tunnel 3. The queue number assigned is 10.

```
router(config)# queue-list 4 interface tunnel 3 10
```

Related Commands

Command	Description
clear ip rsvp reservation	Assigns a custom queue list to an interface.
queue-list default	Assigns a priority queue for those packets that do not match any other rule in the queue list.
queue-list protocol	Establishes queueing priority based on the protocol type.
queue-list queue byte-count	Specifies how many bytes the system allows to be delivered from a given queue during a particular cycle.
queue-list queue limit	Designates the queue length limit for a queue.

Command	Description
show queue	Lists fair queueing configuration and statistics for a particular interface.
show queueing	Lists all or selected configured queueing strategies.

queue-list protocol

To establish queueing priority based upon the protocol type, use the **queue-list protocol** global configuration command. To remove an entry from the list, use the **no** form of this command with the appropriate list number.

queue-list *list-number* **protocol** *protocol-name queue-number queue-keyword keyword-value*

no queue-list *list-number* **protocol** *protocol-name queue-number queue-keyword keyword-value*

Syntax Description

list-number	Number of the queue list. Any number from 1 to 16.
protocol-name	Required argument that specifies the protocol type: **aarp**, **apollo**, **appletalk**, **arp**, **bridge** (transparent), **clns**, **clns_es**, **clns_is**, **cmns**, **compressedtcp**, **decnet**, **decnet_node**, **decnet_routerl1**, **decnet_routerl2**, **dlsw**, **ip**, **ipx**, **pad**, **rsrb**, **stun**, **vines**, **xns**, and **x25**.
queue-number	Number of the queue. Any number from 1 to 16.
queue-keyword keyword-value	Possible keywords are **gt**, **list**, **lt**, **tcp**, and **udp**. See Table 375.

Defaults

No queueing priorities are established.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

When you use multiple rules, remember that the system reads the **queue-list** commands in order of appearance. When classifying a packet, the system searches the list of rules specified by **queue-list** commands for a matching protocol or interface type. When a match is found, the packet is assigned to the appropriate queue. The list is searched in the order it is specified, and the first matching rule terminates the search.

The **decnet_router-l1** keyword refers to the multicast address for all level 1 routers, which are intra-area routers, and the **decnet_router-l2** keyword refers to all level 2 routers, which are interarea routers.

The **dlsw**, **rsrb**, and **stun** keywords refer only to direct encapsulation.

Use Table 375, Table 376, and Table 377 from the **priority-list protocol** command to configure the queueing priorities for your system.

Examples

The following example assigns 1 as the custom queue list, specifies DECnet as the protocol type, and assigns 3 as a queue number to the packets transmitted on this interface:

```
router(config)# queue-list 1 protocol decnet 3
```

The following example assigns DECnet packets with a size greater than 200 bytes to queue number 2:

```
router(config)# queue-list 2 protocol decnet 2 gt 200
```

The following example assigns DECnet packets with a size less than 200 bytes to queue number 2:

```
router(config)# queue-list 4 protocol decnet 2 lt 200
```

The following example assigns traffic that matches IP access list 10 to queue number 1:

```
router(config)# queue-list 1 protocol ip 1 list 10
```

The following example assigns Telnet packets to queue number 2:

```
router(config)# queue-list 4 protocol ip 2 tcp 23
```

The following example assigns UDP Domain Name Service packets to queue number 2:

```
router(config)# queue-list 4 protocol ip 2 udp 53
```

The following example assigns traffic that matches Ethernet type code access list 201 to queue number 1:

```
router(config)# queue-list 1 protocol bridge 1 list 201
```

Related Commands

Command	Description
clear ip rsvp reservation	Assigns a custom queue list to an interface.
queue-list default	Assigns a priority queue for those packets that do not match any other rule in the queue list.
queue-list queue byte-count	Specifies how many bytes the system allows to be delivered from a given queue during a particular cycle.
queue-list queue limit	Designates the queue length limit for a queue.
show queue	Lists fair queueing configuration and statistics for a particular interface.
show queueing	Lists all or selected configured queueing strategies.

queue-list queue byte-count

To specify how many bytes the system allows to be delivered from a given queue during a particular cycle, use the **queue-list queue byte-count** global configuration command. To return the byte count to the default value, use the **no** form of this command.

queue-list *list-number* **queue** *queue-number* **byte-count** *byte-count-number*

no queue-list *list-number* **queue** *queue-number* **byte-count** *byte-count-number*

Syntax Description

list-number	Number of the queue list. Any number from 1 to 16.
queue-number	Number of the queue. Any number from 1 to 16.
byte-count-number	Average number of bytes the system allows to be delivered from a given queue during a particular cycle. The default byte count is 1500 bytes.

Defaults

This command is not enabled by default.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Examples

In the following example, queue list 9 establishes the byte count as 1400 for queue number 10:

```
router(config)# queue-list 9 queue 10 byte-count 1400
```

Related Commands

Command	Description
clear ip rsvp reservation	Assigns a custom queue list to an interface.
queue-list default	Assigns a priority queue for those packets that do not match any other rule in the queue list.
queue-list interface	Establishes queueing priorities on packets entering on an interface.
queue-list protocol	Establishes queueing priority based on the protocol type.
queue-list queue byte-count	Specifies how many bytes the system allows to be delivered from a given queue during a particular cycle.
queue-list queue limit	Designates the queue length limit for a queue.
show queue	Lists fair queueing configuration and statistics for a particular interface.
show queueing	Lists all or selected configured queueing strategies.

queue-list queue limit

To designate the queue length limit for a queue, use the **queue-list queue limit** global configuration command. To return the queue length to the default value, use the **no** form of this command.

queue-list *list-number* **queue** *queue-number* **limit** *limit-number*

no queue-list *list-number* **queue** *queue-number* **limit** *limit-number*

Syntax Description

list-number	Number of the queue list. Any number from 1 to 16.
queue-number	Number of the queue. Any number from 1 to 16.
limit-number	Maximum number of packets that can be enqueued at any time. The range is 0 to 32767 queue entries. A value of 0 means that the queue can be of unlimited size. The default queue is 20 entries.

Defaults

This command is not enabled by default.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Examples

In the following example, the queue length of queue 10 is increased to 40:

```
router(config)# queue-list 5 queue 10 limit 40
```

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