identity policy (policy-map)

To create an identity policy, use the **identity policy** command in policy-map class configuration mode. To remove the policy, use the **no** form of this command.

identity policy *policy-name*

no identity policy *policy-name*

Syntax Description

policy-name	Name of the policy.

Command Default

An identity policy is not created.

Command Modes

Policy-map class configuration (config-pmap-class)

Command History

Release	Modification
12.4(6)T	This command was introduced.

Usage Guidelines

This command refers to the global identity policy that is configured on the device that contains the access policies that are to be applied. Only a single identity policy can be configured under the policy class configuration submode. If the identity policy is not defined on the device, an error is generated during the application of the policy.

Examples

The following example shows how create an identity policy called healthy_identity:

```
Router(config)# policy-map type control tag healthy_pmap
Router(config-pmap)# class healthy_class
Router(config-pmap-class)# identity policy healthy_identity
Router(config-pmap-class)# end
```

The following example shows how to add an access group called healthy_acl to the identity policy named healthy_identity:

```
Router(config)# identity policy healthy_identity
Router(config-identity-policy)# access-group healthy_acl
Router(config-identity-policy)# end
```

Related Commands

Command	Description
class type tag	Associates a class map with a policy map.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.

ingress-class-map

To classify the IPv4, IPv6, and MPLS packets for POS, channelized, and clear-channel SPAs, use the **ingress-class-map** command in global configuration mode to first define the ingress classification template. The ingress classification template is identified by the index-id that will be applied to an interface later. Use the **no** form of this command to remove the template.

ingress-class-map *class-map index*

no ingress-class-map

Syntax Description

class-map index	Class-map index-id to identify the ingress classification template that is a combination of IPv4, IPv6, and MPLS classifications. The valid range for the maximum number of index class maps per carrier card (CC) is 1 to 62 multiplied-by maximum number of carrier card slots.

Defaults

No ingress-class-map index-ids are configured.

Command Modes

Global configuration (config)

Command History

Release	Modification
Cisco IOS XE Release 3.1S	This command was introduced.

Usage Guidelines

To classify high priority packets such as IPv4, IPv6, or MPLS in a SIP or SPA, the classification template is defined using the **ingress-class map** *class-map index* command. The classification template-specific details are defined in the template, and the template is attached to an interface using the **plim qos input class-map** command. The classification template can be deleted using the **no** command form. Each SIP supports 62 ingress classification templates. The total number of ingress classification templates that can be applied on Cisco ASR 1000 Series Router = number of carrier cards multiplied-by 62.

Note The classification template cannot be deleted if the template is being used by an interface.

Examples

The following example shows how to define a classification template using the **ingress-class-map** command:

```
Router# config
Router(config)# ingress-class-map 1
Router(config-ing-class-map)#
```

Related Commands

Command	Description
plim qos input class-map	Attaches the classification template to an interface.

ip header-compression disable-feedback

To disable the context-status feedback messages from the interface or link, use the **ip header-compression disable-feedback** command in interface configuration mode. To enable context-status feedback messages from the interface or link, use the **no** form of this command.

ip header-compression disable-feedback

no ip header-compression disable-feedback

Syntax Description

This command has no arguments or keywords.

Command Default

Context-status feedback messages are enabled by default.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.3(2)T	This command was introduced.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.

Usage Guidelines

The **ip header-compression disable-feedback** command is designed for use with satellite links where the path for the upward link is different from the path for the downward link. When the paths are different, context-status messages are not useful.

The **ip header-compression disable-feedback** command can be used with either Real-Time Transport Protocol (RTP) or TCP header compression.

Examples

The following example disables the context-status messages on serial interface 2/0:

```
Router> enable
Router# configure terminal
Router(config)# interface Serial2/0
Router(config-if)# ip header-compression disable-feedback
Router(config-if)# end
```

Related Commands

Command	Description
ip header-compression max-header	Specifies the maximum size of the compressed IP header.
ip header-compression max-period	Specifies the maximum number of compressed packets between full headers.
ip header-compression max-time	Specifies the maximum amount of time to wait before the compressed IP header is refreshed.

ip header-compression max-header

To specify the maximum amount of time to wait before the compressed IP header is refreshed, use the **ip header-compression max-header** command in interface configuration mode. To return the amount of time to wait before the compressed IP header is refreshed to the default value, use the **no** form of this command.

ip header-compression max-header *max-header-size*

no ip header-compression max-header *max-header-size*

Syntax Description

max-header-size	Size of the IP header, in bytes. The size of the IP header can be in the range of 20 to 168.

Defaults

168 bytes

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.3(2)T	This command was introduced.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.

Usage Guidelines

The *max-header-size* argument of the **ip header-compression max-header** command can be used to restrict the size of the header to be compressed.

Examples

The following example shows how to use the **ip header-compression max-header** command to specify the maximum IP header size of the packet to 100 bytes:

```
Router> enable
Router# configure terminal
Router(config)# interface Serial2/0
Router(config-if)# ip header-compression max-header 100
Router(config-if)# end
```

Related Commands

Command	Description
ip header-compression disable-feedback	Disables context-status feedback messages from the interface or link.
ip header-compression max-period	Specifies the maximum number of compressed packets between full headers.
ip header-compression max-time	Specifies the maximum amount of time to wait before the compressed IP header is refreshed.

ip header-compression max-period

To specify the maximum number of compressed packets between full headers, use the **ip header-compression max-period** command in interface configuration mode. To return the number of compressed packets to the default value, use the **no** form of this command.

ip header-compression max-period *number-of-packets*

no ip header-compression max-period *number-of-packets*

Syntax Description

number-of-packets	Specifies a number of packets between full headers. The number can be in the range of 0 to 65535.

Defaults

256 packets

Command Modes

Interface configuration

Command History

Release	Modification
12.3(2)T	This command was introduced.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.

Usage Guidelines

With the **ip header-compression max-period** command, full IP packet headers are sent in an exponentially increasing period after there has been a change in the context status. This exponential increase in the time period avoids the necessity of exchanging messages between the mechanism compressing the header and the mechanism decompressing the header.

By default, the **ip header-compression max-period** command operates on User Datagram Protocol (UDP) traffic only. However, if the **periodic refresh** keyword of either the **frame-relay ip rtp header-compression** command or the **frame-relay map ip rtp header-compression** command is configured, the **ip header-compression max-period** command operates on both UDP and Real-Time Transport Protocol (RTP) traffic.

Examples

In the following example, the **ip header-compression max-period** command is configured to specify the number of packets between full header packets. In this configuration, the packet number specified is 160.

```
Router> enable
Router# configure terminal
Router(config)# interface Serial2/0
Router(config-if)# ip header-compression max-period 160
Router(config-if)# end
```

Related Commands

Command	Description
frame-relay ip rtp header-compression	Enables RTP header compression for all Frame Relay maps on a physical interface.
frame-relay map ip rtp header-compression	Enables RTP header compression per DLCI.
ip header-compression disable-feedback	Disables context-status feedback messages from the interface or link.
ip header-compression max-header	Specifies the maximum size of the compressed IP header.
ip header-compression max-time	Specifies the maximum amount of time to wait before the compressed IP header is refreshed.

ip header-compression max-time

To specify the maximum amount of time to wait before the compressed IP header is refreshed, use the **ip header-compression max-time** command in interface configuration mode. To return to the default value, use the **no** form of this command.

ip header-compression max-time *length-of-time*

no ip header-compression max-time *length-of-time*

Syntax Description

length-of-time	Specifies a different amount of time (other than the default) in seconds to wait before the IP header is refreshed. The range is 0 to 65535.

Defaults

If not length of time is configured, the default value is 5 seconds.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.3(2)T	This command was introduced.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.

Usage Guidelines

The **ip header-compression max-time** command is designed to avoid losing too many packets if the context status of the receiver has been lost.

If a packet is to be sent and the maximum amount of time has elapsed since the last time the IP header was refreshed, a full header is sent.

By default, the **ip header-compression max-time** command operates on User Datagram Protocol (UDP) traffic only. However, if the **periodic refresh** keyword of either the **frame-relay ip rtp header-compression** command or the **frame-relay map ip rtp header-compression** command is configured, the **ip header-compression max-time** command operates on UDP and Real-Time Transport Protocol (RTP) traffic.

Examples

In the following example, the **ip header-compression max-time** command is configured to specify the maximum amount of time to wait before refreshing the compressed IP header. In this configuration the amount of time to wait is 30 seconds.

```
Router> enable
Router# configure terminal
Router(config)# interface Serial2/0
Router(config-if)# ip header-compression max-time 30
Router(config-if)# end
```

Related Commands

Command	Description
frame-relay ip rtp header-compression	Enables RTP header compression for all Frame Relay maps on a physical interface.
frame-relay map ip rtp header-compression	Enables RTP header compression per DLCI.
ip header-compression disable-feedback	Disables context-status feedback messages from the interface or link.
ip header-compression max-header	Specifies the maximum size of the compressed IP header.
ip header-compression max-period	Specifies the maximum number of compressed packets between full headers.

ip header-compression old-iphc-comp

To revert the IP Header Compression (IPHC) format of compression to the non-RFC-compliant format, use the **ip header-compression old-iphc-comp** command in interface configuration mode. To disable the IPHC format of compression, use the **no** form of this command.

ip header-compression old-iphc-comp

no ip header-compression old-iphc-comp

Syntax Description

This command has no arguments or keywords.

Command Default

IPHC format compression is not configured.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
15.1(3)T	This command was introduced.

Usage Guidelines

The **ip header-compression old-iphc-comp** command must be configured only when the IPHC format of compression or service-policy-based compression is configured.

Examples

The following example shows how to revert the IPHC format of compression to the non-RFC-compliant format:

```
Router> enable
Router# configure terminal
Router(config)# interface serial 0/0
Router(config-if)# ip header-compression old-iphc-comp
```

Related Commands

Command	Description
ip header-compression old-iphc-decomp	Reverts the IPHC format of decompression to the non-RFC-compliant format.

ip header-compression old-iphc-decomp

To revert the IP Header Compression (IPHC) format of decompression to the non-RFC-compliant format, use the **ip header-compression old-iphc-decomp** command in interface configuration mode. To retain the normal form of the IPHC format decompression, use the **no** form of this command.

ip header-compression old-iphc-decomp

no ip header-compression old-iphc-decomp

Syntax Description

This command has no arguments or keywords.

Command Default

IPHC format decompression is not configured.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
15.1(3)T	This command was introduced.

Usage Guidelines

The **ip header-compression old-iphc-decomp** command must be configured only when the IPHC format of compression or service-policy-based compression is configured.

Examples

The following example shows how to revert the IPHC format of decompression to the non-RFC-compliant format:

```
Router> enable
Router# configure terminal
Router(config)# interface serial 0/0
Router(config-if)# ip header-compression old-iphc-decomp
```

Related Commands

Command	Description
ip header-compression old-iphc-comp	Reverts the IPHC format of compression to the non-RFC-compliant format.

ip header-compression recoverable-loss

To enable Enhanced Compressed Real-Time Transport Protocol (ECRTP) on an interface, use the **ip header-compression recoverable-loss** command in interface configuration mode. To disable ECRTP on an interface, use the **no** form of this command.

ip header-compression recoverable-loss {**dynamic** | *packet-drops*}

no ip header-compression recoverable-loss

Syntax Description

dynamic	Dynamic recoverable loss calculation.
packet-drops	Maximum number of consecutive packet drops. Ranges from 1 to 8.

Defaults

When using the **dynamic** keyword, the default value is 4.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.3(11)T	This command was introduced.

Usage Guidelines

Enhanced CRTP reduces corruption by changing the way the compressor updates the context at the decompressor. The compressor sends changes multiple times to keep the compressor and decompressor synchronized. This method is characterized by the number of *packet-drops* that represent the quality of the link between the hosts. By repeating the updates, the probability of context corruption due to packet loss is minimized.

The value for the *packet-drops* argument is maintained independently for each context and is not required to be the same for all contexts.

Examples

The following example shows how to configure a serial interface with Point-to-Point Protocol (PPP) encapsulation and to enable ECRTP with dynamic loss recovery:

```
Router(config)# interface serial 2/0
Router(config-if)# encapsulation ppp
Router(config-if)# ip rtp header-compression ietf-format
Router(config-if)# ip header-compression recoverable-loss dynamic
Router(config-if)# end
```

Related Commands

Command	Description
debug ip rtp error	Displays RTP header compression errors.
debug ip rtp header-compression	Displays events specific to RTP header compression.
ip rtp header-compression	Enables RTP header compression.
show ip rtp header-compression	Displays RTP header compression statistics.

ip nbar custom

To extend the capability of network-based application recognition (NBAR) Protocol Discovery to classify and monitor additional static port applications or to allow NBAR to classify nonsupported static port traffic, use the **ip nbar custom** command in global configuration mode. To disable NBAR from classifying and monitoring additional static port application or classifying nonsupported static port traffic, use the **no** form of this command.

ip nbar custom *name* [*offset* [*format value*]] [**variable** *field-name field-length*] [*source* | *destination*] [**tcp** | **udp**] [**range** *start end* | *port-number*]

no ip nbar custom *name* [*offset* [*format value*]] [**variable** *field-name field-length*] [*source* | *destination*] [**tcp** | **udp**] [**range** *start end* | *port-number*]

Syntax Description

name	The name given to the custom protocol. This name is reflected wherever the name is used, including NBAR Protocol Discovery, the **match protocol** command, the **ip nbar port-map** command, and the NBAR Protocol Discovery MIB. The name must be no longer than 24 characters and can contain only lowercase letters (a-z), digits (0-9), and the underscore (_) character.
offset	(Optional) A digit representing the byte location for payload inspection. The offset function is based on the beginning of the payload directly after the TCP or User Datagram Protocol (UDP) header.
format value	(Optional) Defines the format of the value and the length of the value that is being inspected in the packet payload. Current format options are **ascii**, **hex**, and **decimal**. The length of the value is dependent on the chosen *format*. The length restrictions for each format are listed below: • **ascii**—Up to 16 characters can be searched. Regular expressions are not supported. • **hex**—Up to 4 bytes. • **decimal**—Up to 4 bytes.
variable *field-name field-length*	(Optional) When you enter the **variable** keyword, a specific portion of the custom protocol can be treated as an NBAR-supported protocol (for example, a specific portion of the custom protocol can be tracked using class-map statistics and can be matched using the **class-map** command). If you enter the **variable** keyword, you must defin the following fields: • *field-name*—Provides a name for the field to search in the payload. After you configure a custom protocol using a variable, you can use this *field-name* with up to 24 different values per router configuration. • *field-length*—Enters the field length in bytes. The field length can be up to 4 bytes, so you can enter **1**, **2**, **3**, or **4** as the *field-length* value.
source | *destination*	(Optional) Specifies the direction in which packets are inspected. If you do not specify source or destination, all packets traveling in either direction are monitored by NBAR.
tcp | **udp**	(Optional) Specifies the TCP or the UDP implemented by the application.

range *start end*	(Optional) Specifies a range of ports that the custom application monitors. The start is the first port in the range, and the end is the last port in the range. One range of up to 1000 ports can be specified for each custom protocol.
port-number	(Optional) The port that the custom application monitors. Up to 16 individual ports can be specified as a single custom protocol.

Defaults

If you do not specify a source or a destination, then traffic flowing in both directions is inspected if the custom protocol is enabled in NBAR.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.3(4)T	This command was introduced.
12.3(11)T	The **variable** *field-name field-length* keyword-argument group was introduced.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(17a)SX1	This command was integrated into Cisco IOS Release 12.2(17a)SX1.

Usage Guidelines

The first three characters of a custom protocol must be unique from any predefined protocol. Otherwise, you receive an ambiguous command error message.

You can create more than 30 custom protocols on a router.

NBAR can support up to 128 protocols total.

If you enter the **variable** keyword while you configure a custom protocol, traffic statistics for the variable appear in some NBAR class map **show** outputs.

Up to 24 variable values per custom protocol can be expressed in class maps. For instance, in the following configuration, 4 variables are used and 20 more “scid” values could be used.

```
Router(config)# ip nbar custom ftdd 23 variable scid 1 tcp range 5001 5005

Router(config)# class-map match-any active-craft
Router(config-cmap)# match protocol ftdd scid 0x15
Router(config-cmap)# match protocol ftdd scid 0x21

Router(config)# class-map match-any passive-craft
Router(config-cmap)# match protocol ftdd scid 0x11
Router(config-cmap)# match protocol ftdd scid 0x22
```

Examples

The following example shows how to configure the custom protocol app_sales1 to identify TCP packets that have a source port of 4567 and that contain the term SALES in the fifth byte of the payload:

```
Router(config)# ip nbar custom app_sales1 5 ascii SALES source tcp 4567
```

The following example shows how to set the custom protocol virus_home to identify UDP packets that have a destination port of 3000 and contain "0x56" in the seventh byte of the payload:

```
Router(config)# ip nbar custom virus_home 7 hex 0x56 destination udp 3000
```

The following example shows how set the custom protocol media_new to identify TCP packets that have a destination or source port of 4500 and have a value of 90 in the sixth byte of the payload:

```
Router(config)# ip nbar custom media_new 6 decimal 90 tcp 4500
```

The following example shows how to set the custom protocol msn1 to look for TCP packets that have a destination or source port of 6700:

```
Router(config)# ip nbar custom msn1 tcp 6700
```

The following example shows how to set the custom protocol mail_x to look for UDP packets that have a destination port of 8202:

```
Router(config)# ip nbar custom mail_x destination udp 8202
```

The following example shows how to configure the custom protocol mail_y to look for UDP packets that have destination ports between 3000 and 4000, inclusive:

```
Router(config)# ip nbar custom mail_y destination udp range 3000 4000
```

The following example shows how to create the custom protocol ftdd by using a variable. A class map matching this custom protocol based on the variable is also created. In this example, class map matchscidinftdd matches all traffic that has the value 804 at byte 23 entering or leaving TCP ports 5001 to 5005. The variable scid is 2 bytes in length:

```
Router(config)# ip nbar custom ftdd 23 variable scid 2 tcp range 5001 5005

Router(config)# class-map matchscidinftdd
Router(config-cmap)# match protocol ftdd scid 804
```

The same example above can also be done using hexadecimal values in the class map as follows:

```
Router(config)# ip nbar custom ftdd 23 variable scid 2 tcp range 5001 5005

Router(config)# class-map matchscidinftdd
Router(config-cmap)# match protocol ftdd scid 0x324
```

The following example shows how the **variable** keyword is used to create a custom protocol, and class maps are configured to classify different values within the variable field into different traffic classes. Specifically, in the example below, variable scid values 0x15, 0x21, and 0x27 are classified into class map active-craft while scid values 0x11, 0x22, and 0x25 are classified into class map passive-craft:

```
Router(config)# ip nbar custom ftdd 23 variable scid 1 tcp range 5001 5005

Router(config)# class-map match-any active-craft
Router(config-cmap)# match protocol ftdd scid 0x15
Router(config-cmap)# match protocol ftdd scid 0x21
Router(config-cmap)# match protocol ftdd scid 0x27

Router(config)# class-map match-any passive-craft
Router(config-cmap)# match protocol ftdd scid 0x11
Router(config-cmap)# match protocol ftdd scid 0x22
Router(config-cmap)# match protocol ftdd scid 0x25
```

ip nbar pdlm

To extend or enhance the list of protocols recognized by network-based application recognition (NBAR) through a Cisco-provided Packet Description Language Module (PDLM), use the **ip nbar pdlm** command in global configuration mode. To unload a PDLM previously loaded, use the **no** form of this command.

ip nbar pdlm *pdlm-name*

no ip nbar pdlm *pdlm-name*

Syntax Description

pdlm-name	URL at which the PDLM can be found on the flash card.

Command Default

No default behavior or values

Command Modes

Global configuration (config)

Command History

Release	Modification
12.0(5)XE2	This command was introduced.
12.1(1)E	This command was integrated into Cisco IOS Release 12.1(1)E.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.
12.1(13)E	This command was implemented on Catalyst 6000 family switches without FlexWAN modules.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(17a)SX1	This command was integrated into Cisco IOS Release 12.2(17a)SX1.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

The **ip nbar pdlm** command is used to extend the list of protocols recognized by a given version of NBAR or to enhance an existing protocol recognition capability. NBAR can be given an external PDLM at run time. In most cases, the PDLM enables NBAR to recognize new protocols without requiring a new Cisco IOS image or a router reload. Only Cisco can provide you with a new PDLM.

A list of the available PDLMs can be viewed online at Cisco.com.

Examples

The following example configures NBAR to load the citrix.pdlm PDLM from flash memory on the router:

```
ip nbar pdlm flash://citrix.pdlm
```

Related Commands

Command	Description
show ip nbar pdlm	Displays the current PDLM in use by NBAR.

ip nbar port-map

To configure network-based application recognition (NBAR) to search for a protocol or protocol name using a port number other than the well-known port, use the **ip nbar port-map** command in global configuration mode. To look for the protocol name using only the well-known port number, use the **no** form of this command.

ip nbar port-map *protocol-name* [**tcp** | **udp**] *port-number*

no ip nbar port-map *protocol-name* [**tcp** | **udp**] *port-number*

Syntax Description

protocol-name	Name of protocol known to NBAR.
tcp	(Optional) Specifies that a TCP port will be searched for the specified *protocol-name* argument.
udp	(Optional) Specifies that a User Datagram Protocol (UDP) port will be searched for the specified *protocol-name* argument.
port-number	Assigned port for named protocol. The *port-number* argument is either a UDP or a TCP port number, depending on which protocol is specified in this command line. Up to 16 *port-number* arguments can be specified in one command line. Port number values can range from 0 to 65535.

Command Default

No protocol is configured.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.0(5)XE2	This command was introduced.
12.1(1)E	This command was integrated into Cisco IOS Release 12.1(1)E.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.
12.1(13)E	This command was implemented on Catalyst 6000 family switches without FlexWAN modules.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(17a)SX1	This command was integrated into Cisco IOS Release 12.2(17a)SX1.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

Use the **ip nbar port-map** command to tell NBAR to look for the protocol or protocol name, using a port number or numbers other than the well-known Internet Assigned Numbers Authority (IANA)-assigned) port number. For example, use this command to configure NBAR to look for Telnet on a port other than 23. You can specify up to 16 ports with this command.

Some of the NBAR protocols look at the ports as well as follow the heuristic approach for traffic classification. If you apply different ports to a protocol using the **ip nbar port-map** command, the heuristic nature of the protocol does not change. The advantage to adding a port number is better performance.

You can remove well-known ports from a predefined port map only if you first set the predefined port map to a port not belonging to any existing port map. For example, if you want to define a custom port map X and also associate it with port 20, you get an error saying that it is not possible. However, if you associate port map A with another port first, such as port 100, and then remove its association with port 20, you can associate custom port map X with port 20.

Note For best results, do not configure the Citrix or BitTorrent protocols.

Examples

The following example configures NBAR to look for the protocol Structured Query Language (SQL)*NET on port numbers 63000 and 63001 instead of on the well-known port number:

```
Router(config)# ip nbar port-map sqlnet tcp 63000 63001
```

Related Commands

Command	Description
show ip nbar port-map	Displays the current protocol-to-port mappings in use by NBAR.

ip nbar protocol-discovery

To configure Network-Based Application Recognition (NBAR) to discover traffic for all protocols that are known to NBAR on a particular interface, use the **ip nbar protocol-discovery** command in interface configuration mode or VLAN configuration mode. To disable traffic discovery, use the **no** form of this command.

ip nbar protocol-discovery [**ipv4** | **ipv6**]

no ip nbar protocol-discovery

Syntax Description

ipv4	(Optional) Specifies protocol discovery only for IPv4 packets on the interface.
ipv6	(Optional) Specifies protocol discovery only for IPv6 packets on the interface.

Command Default

Traffic discovery is disabled.

Command Modes

Interface configuration (config-if)
VLAN configuration (config-vlan)—Catalyst switches only

Command History

Release	Modification
12.0(5)XE2	This command was introduced.
12.1(1)E	This command was integrated into Cisco IOS Release 12.1(1)E.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.
12.1(13)E	This command was implemented on Catalyst 6000 family switches without FlexWAN modules.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(17a)SX1	This command was integrated into Cisco IOS Release 12.2(17a)SX1.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(18)ZYA	This command was integrated into Cisco IOS Release 12.2(18)ZYA. Support for Layer 2 Etherchannels, Layer 3 Etherchannels, and VLAN configuration mode was provided (Catalyst switches only).
Cisco IOS XE Release 3.3S	This command was integrated into Cisco IOS XE Release 3.3S on the Cisco ASR 1000 Series Aggregation Services Routers. The **ipv6** keyword was added.

Usage Guidelines

Use the **ip nbar protocol-discovery** command to configure NBAR to keep traffic statistics for all protocols that are known to NBAR. Protocol discovery provides an easy way to discover application protocols passing through an interface so that QoS policies can be developed and applied. The protocol discovery feature discovers any protocol traffic supported by NBAR. Protocol discovery can be used to monitor both input and output traffic and may be applied with or without a service policy enabled.

In Cisco IOS XE Release 3.3S, L3 and L4 Internet Assigned Numbers Authority (IANA) protocols are supported for IPv4 and IPv6 packets.

Enter the **ipv4** keyword to enable protocol discovery statistics collection for IPv4 packets, or enter the **ipv6** keyword to enable protocol discovery statistics collection for IPv6 packets. Specifying either of these keywords enables the protocol discovery statistics collection for the specified IP version only. If neither keyword is specified, statistics collection is enabled for both IPv4 and IPv6. The **no** form of this command is not required to disable a keyword because the statistics collection is enabled for the specified keyword only.

Layer 2/3 Etherchannel Support

With Cisco IOS Release 12.2(18)ZYA, intended for use on the Cisco 6500 series switch that is equipped with a Supervisor 32/PISA, the **ip nbar protocol-discovery** command is supported on both Layer 2 and Layer 3 Etherchannels.

Examples

The following example shows how to configure protocol discovery for both IPv4 and IPv6 on an Ethernet interface:

```
Router> enable
Router# configure terminal
Router(config)# interface ethernet 2/4
Router(config-if)# ip nbar protocol-discovery
Router(config-if)# end
```

Related Commands

Command	Description
show ip nbar protocol-discovery	Displays the statistics gathered by the NBAR Protocol Discovery feature.

ip nbar protocol-pack

To load a protocol pack, use the **ip nbar protocol-pack** command in global configuration mode. To remove the loaded protocol pack, use the **no** form of this command.

ip nbar protocol-pack *protocol-pack* [**force**]

no ip nbar protocol-pack *protocol-pack*

Syntax Description

protocol-pack	Protocol pack file path and name.
force	(Optional) Loads a protocol pack of a lower version than the default protocol pack version.

Command Default

The default protocol pack is loaded.

Command Modes

Global configuration (config)

Command History

Release	Modification
Cisco IOS XE Release 3.3S	This command was introduced.

Usage Guidelines

The **ip nbar protocol pack** command provides an easy way to load a protocol pack, which is a single compressed file that contains multiple Protocol Description Language (PDL) files and a manifest file. Before this command was introduced, PDLs had to be loaded separately. Now a set of required protocols can be loaded, which helps network-based application recognition (NBAR) to recognize additional protocols for classification on your network.

Use the **force** keyword in the following situations:

- To load a specific protocol pack of a lower version than the default protocol pack version present in the Cisco IOS image.
- To retain the existing protocol pack version irrespective of upgrading to newer version or reverting to a protocol pack of lower version.
- To override the active protocol checks.

Examples

The following example shows how to load a protocol pack named defProtoPack from the harddisk:

```
Router# configure terminal
Router(config)# ip nbar protocol-pack harddisk:defProtoPack
```

The following example shows how to load a protocol pack of lower version using the **force** keyword:

```
Router# configure terminal
Router(config)# ip nbar protocol-pack harddisk:olddefProtoPack force
```

Related Commands

Command	Description
default ip nbar protocol-pack	Loads the base version of the protocol pack and removes all other loaded protocol packs.
show ip nbar protocol-pack	Displays protocol pack information.

ip nbar resources

The **ip nbar resources** command is replaced by the **ip nbar resources protocol** and the **ip nbar resources system** commands. See the **ip nbar resources protocol** and the **ip nbar resources system** commands for more information.

ip nbar resources protocol

To set the expiration time for network-based application recognition (NBAR) flow-link tables on a protocol basis, use the **ip nbar resources protocol** command in global configuration mode. To set the expiration time to its default value, use the **no** form of this command.

ip nbar resources protocol *link-age* [*protocol-name*]

no ip nbar resources protocol

Syntax Description

link-age	Time, in seconds, at which the links for a protocol are aged (expire). The range of values is from 1 to 1000000000. The default is 120. **Note** The *link-age* argument must be a multiple of the value currently set in the **ip nbar resources system** *system-link-age* command. For example, if you set the *system-link-age* argument to 30, then the range of values for the *link-age* argument is 30, 60, 90, 120, and so on.
protocol-name	(Optional) Name of the protocol as registered in a loaded Protocol Description Language (PDL) module. **Note** To display a list of supported protocols, enter the **match protocol ?** or the **show ip nbar port-map** commands.

Command Default

The default link age for all protocols is 120 seconds upon NBAR activation.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.4(6)T	This command was introduced.

Usage Guidelines

You must enter a value for the *link-age* argument that is a multiple of the *system-link-age* value that you set using the **ip nbar resources system** command. In other words, the protocol link age is dependent upon the system link age.

The system link age defaults to 30 seconds, and each protocol defaults to 120 seconds. Internally, each protocol then has a link age value of 4 seconds; that is, 120/30. If you change the system link age, the protocol link age becomes whatever the new system link age is times 4. For example, if the system link age is 30 and each protocol is set to 240, the internal protocol link age is 8; that is, 240/30. Then if you change the system link age, the protocol link age becomes whatever the new system link age is times 8.

If you enter an invalid value for the *link-age* argument, the following error message displays:

```
%NBAR ERROR: protocol link age entered must be an even multiple of the system link age,
<system link age>
```

The **no** form of this command must include the *link-age* value to set the link age of the specific protocol. If you do not include the *link-age* value, the link age timer of all protocols is set to 120 seconds.

If you omit the optional protocol name, all protocols update to the specified link age value.

If you enter a protocol name that does not exist, the following error message displays:

```
%NBAR ERROR: <entered string> is not a valid protocol
```

In addition to resetting the link age in all state nodes associated with a specified protocol, the protocol name along with its link age is saved in NVRAM for potential router system resets.

Examples

In the following example, the link age for the kazaa2 protocol is set to 180 seconds:

```
Router# configure terminal
Router(config)# ip nbar resources protocol 180 kazaa2
```

In the following example, the link age for all protocols is set to 360 seconds:

```
Router# configure terminal
Router(config)# ip nbar resources protocol 360
```

Related Commands

Command	Description
ip nbar resources system	Sets the expiration time and memory requirements for NBAR flow-link tables on a systemwide basis.

ip nbar resources system

To set the expiration time and memory requirements for network-based application recognition (NBAR) flow-link tables on a systemwide basis, use the **ip nbar resources system** command in global configuration mode. To remove the active links, use the **no** form of this command.

ip nbar resources system *system-link-age initial-memory exp-memory*

no ip nbar resources system

Syntax Description

system-link-age	Time, in seconds, at which the links for a system are aged (expire). The range is from 10 to 86400. The default is 30.
initial-memory	Size of memory, in kilobytes, allocated for the links at initialization. The range is from 1 to 30000. The default is 10 percent of the total amount of free memory at system initialization and varies from platform to platform.
exp-memory	Size of memory, in kilobytes, that can be expanded if NBAR detects that more space is needed for the links. The range is from 0 to 112. The default is 112. **Note** The default is based on the size of an internal NBAR structure and may change in future releases.

Command Default

The default system link age is 30 seconds upon NBAR activation.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.4(6)T	This command was introduced.

Usage Guidelines

Because the **ip nbar resources system** command affects NBAR on a systemwide basis, you should not change the parameters arbitrarily. Doing so may cause NBAR to perform inefficiently or incorrectly. The default values are effective in most instances.

Examples

In the following example, the system link age is 30 seconds, the initial memory is 200 kilobytes, and the expanded memory is 112 kilobytes:

```
Router# configure terminal
Router(config)# ip nbar resources system 30 200 112
```

Related Commands

Command	Description
ip nbar resources protocol	Sets the expiration time for NBAR flow-link tables on a protocol basis.

ip options

To drop or ignore IP options packets that are sent to the router, use the **ip options** command in global configuration mode. To disable this functionality and allow all IP options packets to be sent to the router, use the **no** form of this command.

ip options {**drop** | **ignore**}

no ip options {**drop** | **ignore**}

Syntax Description

drop	Router drops all IP options packets that it receives.
ignore	Router ignores all options and treats the packets as though they did not have any IP options. (The options are not removed from the packet—just ignored.) **Note** This option is not available on the Cisco 10000 series router.

Defaults

This command is not enabled.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.0(23)S	This command was introduced.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.
12.3(19)	This command was integrated into Cisco IOS Release 12.3(19).
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2 for the PRE3.

Usage Guidelines

The **ip options** command allows you to filter IP options packets, mitigating the effects of IP options on the router, and on downstream routers and hosts.

Drop and ignore modes are mutually exclusive; that is, if the drop mode is configured and you configure the ignore mode, the ignore mode overrides the drop mode.

Cisco 10720 Internet Router

The **ip options ignore** command is not supported. Only drop mode (the **ip options drop** command) is supported.

Cisco 10000 Series Router

This command is only available on the PRE3. The PRE2 does not support this command.

The **ip options ignore** command is not supported. The router supports only the **ip options drop** command.

Examples

The following example shows how to configure the router (and downstream routers) to drop all options packets that enter the network:

```
ip options drop

% Warning:RSVP and other protocols that use IP Options packets may not function in drop or
ignore modes.
end
```

ip rsvp admission-control compression predict

To configure Resource Reservation Protocol (RSVP) admission control compression prediction, use the **ip rsvp admission-control compression predict** command in interface configuration mode. To disable compression prediction, use the **no** form of this command.

ip rsvp admission-control compression predict [**method** {**rtp** | **udp**} [**bytes-saved** *N*]]

no ip rsvp admission-control compression predict [**method** {**rtp** | **udp**} [**bytes-saved** *N*]]

Syntax Description

method	(Optional) Type of compression used.
rtp | **udp**	Real-Time Transport Protocol (RTP) or User Data Protocol (UDP) compression schemes.
bytes-saved *N*	(Optional) Predicted number of bytes saved per packet when RSVP predicts that compression will occur using the specified method. Values for *N* for RTP are 1 to 38; for UDP, 1 to 26.

Defaults

This command is enabled by default. The default value of bytes saved for RTP is 36; for UDP, 20.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(15)T	This command was introduced.

Usage Guidelines

Use the **ip rsvp admission-control compression predict** command to disable or enable the RSVP prediction of compression for a specified method or all methods if neither **rtp** nor **udp** is selected. You can adjust the default compressibility parameter that RSVP uses to compute the compression factor for each flow.

If you use the **ip rsvp admission-control compression predict** command to change the compression method or the number of bytes saved per packet, these values affect only new flows, not existing ones.

There are two approaches to compression—conservative and aggressive. When you predict compression conservatively, you assume savings of fewer bytes per packet, but receive a higher likelihood of guaranteed quality of service (QoS). You are allowed more bandwidth per call, but each link accommodates fewer calls. When you predict compression aggressively, you assume savings of more bytes per packet, but receive a lower likelihood of guaranteed QoS. You are allowed less bandwidth per call, but each link accommodates more calls.

Examples

The following example shows how to set the compressibility parameter for flows using the RTP method to 30 bytes saved per packet:

```
Router(config-if)# ip rsvp admission-control compression predict method rtp bytes-saved 30
```

The following example shows how to set the compressibility parameter for flows using the UDP method to 20 bytes saved per packet:

```
Router(config-if)# ip rsvp admission-control compression predict method udp bytes-saved 20
```

The following example shows how to disable RTP header compression prediction:

```
Router(config-if)# no ip rsvp admission-control compression predict method rtp
```

The following shows how to disable UDP header compression prediction:

```
Router(config-if)# no ip rsvp admission-control compression predict method udp
```

Note Disabling the compressibility parameter affects only those flows using the specified method.

Related Commands

Command	Description
show ip rtp header-compression	Displays statistics about RTP header compression.

ip rsvp aggregation ip

To enable Resource Reservation Protocol (RSVP) aggregation on a router, use the **ip rsvp aggregation ip** command in global configuration mode. To disable RSVP aggregation, use the **no** form of this command.

ip rsvp aggregation ip

no ip rsvp aggregation ip

Syntax Description

This command has no arguments or keywords.

Command Default

RSVP aggregation is disabled.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(33)SRC	This command was introduced.
Cisco IOS XE Release 2.6	This command was integrated into Cisco IOS XE Release 2.6.

Usage Guidelines

When you enable aggregation on a router, the router can act as an aggregator, a deaggregator, or an interior router. To perform aggregator and deaggregator functions, the RSVP process must see messages with the RSVP-E2E-IGNORE protocol type (134) on a router; otherwise, the messages are forwarded as data by the router's data plane. The **ip rsvp aggregation ip** command enables RSVP to identify messages with the RSVP-E2E-IGNORE protocol. You then configure additional commands to specify the aggregation and deaggregation behavior of end-to-end (E2E) reservations.

The **ip rsvp aggregation ip** command registers a router to receive RSVP-E2E-IGNORE messages. It is not necessary to issue this command on interior routers because they are only processing RSVP aggregate reservations. If you do so, you may decrease performance because the interior router will then unnecessarily process all the RSVP-E2E-IGNORE messages.

Note If you enable RSVP aggregation globally on an interior router, then you should configure all interfaces as interior. Otherwise, interfaces default to exterior and discard RSVP-E2E-IGNORE packets.

Examples

The following example shows how to enable RSVP aggregation on a router:

```
Router(config)# ip rsvp aggregation ip
```

Related Commands

Command	Description
show ip rsvp aggregation ip	Displays RSVP summary aggregation information.

ip rsvp aggregation ip map

To configure Resource Reservation Protocol (RSVP) aggregation rules that tell a router how to map end-to-end (E2E) reservations onto aggregate reservations, use the **ip rsvp aggregation ip map** command in global configuration mode. To disable RSVP aggregation mapping rules, use the **no** form of this command.

ip rsvp aggregation ip map {**access-list** {*acl-number*} | **any**} **dscp** *value*

no ip rsvp aggregation ip map {**access-list** {*acl-number*} | **any**}

Syntax Description

access-list	Specifies an Access Control List (ACL).
acl-number	Number of the ACL. Values are 1 to 199.
any	Indicates the match criteria used if all reservations between an aggregator and a deaggregator are to be aggregated onto a single DSCP.
dscp *value*	Specifies the differentiated services code point (DSCP). Values can be the following: • 0 to 63—Numerical DSCP values. The default value is 0. • af1 to af43—Assured forwarding (AF) DSCP values. • cs1 to cs7—Type of service (ToS) precedence values. • default—Default DSCP value. • ef—Expedited forwarding (EF) DSCP values.

Command Default

No aggregation mapping rules are configured.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(33)SRC	This command was introduced.
Cisco IOS XE Release 2.6	This command was integrated into Cisco IOS XE Release 2.6.

Usage Guidelines

Use the **ip rsvp aggregation ip map** command to configure a single global rule for mapping E2E reservations onto aggregates.

Before using the **ip rsvp aggregation ip map** command, you should configure an ACL to define a group of RSVP endpoints whose reservations are to be aggregated onto a single DSCP. The ACL can be a standard or extended ACL and matches as follows:

Standard ACLs

- IP address matches the RSVP PATH message sender template or RSVP RESV message filter spec; this is the IP source address or the RSVP sender.

Extended ACLs

The ACLs used within the **ip rsvp aggregation ip map** command match the RSVP message objects as follows for an extended ACL:

- Source IP address and port match the RSVP PATH message sender template or RSVP RESV message filter spec; this is the IP source or the RSVP sender.
- Destination IP address and port match the RSVP PATH/RESV message session object IP address; this is the IP destination address or the RSVP receiver.
- Protocol matches the RSVP PATH/RESV message session object protocol; if protocol = IP, then it matches the source or destination address as above.

Note In classic (unaggregated) RSVP, a session is identified in the reservation message session object by the destination IP address and protocol information. In RSVP aggregation, a session is identified by the destination IP address and DSCP within the session object of the aggregate RSVP message. E2E reservations are mapped onto a particular aggregate RSVP session identified by the E2E reservation session object alone or a combination of the session object and sender template or filter spec.

Examples

In the following example, access list 1 is defined for all RSVP messages whose RSVP PATH message session object destination address is in the 10.1.0.0 subnet so that the deaggregator maps those reservations onto an aggregate reservation for the DSCP associated with the AF41 per hop behavior:

```
Router(config)# access-list 1 permit host 10.1.0.0 0.0.255.255
Router(config)# ip rsvp aggregation ip map access-list 1 dscp af41
```

In the following example, all reservations between an aggregator and a deaggregator are to be aggregated onto a single DSCP:

```
Router(config)# ip rsvp aggregation ip map any dscp af41
```

Related Commands

Command	Description
ip rsvp aggregation ip	Enables RSVP aggregation on a router.
show ip rsvp aggregation ip	Displays RSVP summary aggregation information.

ip rsvp aggregation ip reservation dscp

To configure Resource Reservation Protocol (RSVP) aggregate reservation attributes (also called token bucket parameters) on a per-differentiated services code point (DSCP) basis, use the **ip rsvp aggregation ip reservation dscp** command in global configuration mode. To remove aggregation reservation attributes, use the **no** form of this command.

ip rsvp aggregation ip reservation dscp *value* [**aggregator** *agg-ip-address*] **traffic-params static rate** *data-rate* [**burst** *burst-size*] [**peak** *peak-rate*]

no ip rsvp aggregation ip reservation dscp *value* [**aggregator** *agg-ip-address*] **traffic-params static rate** *data-rate* [**burst** *burst-size*] [**peak** *peak-rate*]

Syntax Description

value	The DSCP value for aggregate reservations. Values can one of the following: • 0 to 63—Numerical DSCP values. The default value is 0. • af11 to af43—Assured forwarding (AF) DSCP values. • cs1 to cs7—Type of service (ToS) precedence values. • default—Default DSCP value. • ef—Expedited forwarding (EF) DSCP values.
aggregator *agg-ip-address*	(Optional) Specifies the IP address of the aggregator for which the data-rate, burst-size, and peak-rate traffic parameters apply. **Note** If omitted, all aggregate reservations to a deaggregator use the same token bucket parameters.
traffic-params	Specifies the traffic parameter attributes.
static	Specifies the static traffic parameter attributes.
rate *data-rate*	Specifies the average data rate, in kilobits per second. Range is from 1 to 10000000.
burst *burst-size*	(Optional) Specifies the maximum data burst size, in kilobytes. Range is from 1 to 8192. **Note** If omitted, this value is equal to the aggregate rate value.
peak *peak-rate*	(Optional) Specifies the peak data rate, in kilobits per second. Range is from 1 to 10000000. **Note** If omitted, this value is equal to the aggregate rate value.

Command Default

No aggregation reservation attributes (token bucket parameters) are configured.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(33)SRC	This command was introduced.
Cisco IOS XE Release 2.6	This command was integrated into Cisco IOS XE Release 2.6.

Usage Guidelines

You can use the **ip rsvp aggregation ip reservation dscp** command to configure the token bucket parameters statically.

The *data-rate*, *burst-size*, and *peak-rate* arguments are required on deggregators to help construct the flowspec object for aggregate RESV messages. Existing RSVP procedures specify that the size of a reservation established for a flow is set to the minimum of the PATH sender_tspec and the RESV flowspec. So if the aggregate PATH sender_tspec *data-rate*, *burst-size*, or *peak-rate* arguments are greater than the *data-rate*, *burst-size*, or *peak-rate* arguments configured on the deaggregator, the aggregate RESV flowspec object will contain the minimum of *data-rate*, *burst-size*, and *peak-rate* from the PATH message and the configured values.

When the aggregate reservation size is changed to a value less strict than the total bandwidth of the end-to-end (E2E) reservations mapped to the aggregate, preemption may occur.

When the aggregate bandwidth is lowered, if preemption is required and has not been enabled by issuing the **ip rsvp policy preempt** command, then the change is rejected and the following messages may appear:

```
RSVP:AGG: Command not accepted.
RSVP-AGG: This change requires some E2E reservations to be removed and
RSVP:AGG: preemption is not enabled. Issue 'ip rsvp policy preempt'
RSVP:AGG: in order to make this change.
```

Examples

The following example shows how to configure an aggregate RESV message for an aggregate reservation established with aggregator 10.10.10.10, for DSCP = AF11, including a flowspec that requests an average rate and peak rate of 10 kbps and a burst size of 8 KB:

```
Router(config)# ip rsvp aggregation ip reservation dscp af11 aggregator 10.10.10.10
traffic-params static rate 10 burst 8 peak 10
```

Related Commands

Command	Description
ip rsvp aggregation ip	Enables RSVP aggregation on a router.
ip rsvp policy preempt	Redistributes bandwidth from lower-priority reservations to high-priority reservations.
show ip rsvp aggregation ip	Displays RSVP summary aggregation information.

ip rsvp aggregation ip role interior

To configure Resource Reservation Protocol (RSVP) aggregation on aggregator and deaggregator interior routers facing an aggregation region, use the **ip rsvp aggregation ip role interior** command in interface configuration mode. To disable RSVP aggregation on aggregator and deaggregator routers, use the **no** form of this command.

ip rsvp aggregation ip role interior

no ip rsvp aggregation ip role interior

Syntax Description

This command has no arguments or keywords.

Command Default

RSVP aggregation is not configured on aggregator and deaggregator interior routers.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(33)SRC	This command was introduced.
Cisco IOS XE Release 2.6	This command was integrated into Cisco IOS XE Release 2.6.

Usage Guidelines

This command does not have any effect on a router until end-to-end (E2E) messages arrive on an interface.

If a router is an interior node for all E2E flows, you do not have to configure any aggregation commands. RSVP will not get notifications on any of the RSVP-E2E-IGNORE messages that are forwarded as IP datagrams; however, because the router is loaded with an image that supports aggregation, the router will process aggregate signaling messages correctly.

If you enable aggregation on an interior node, all its interfaces must be configured as interior. Otherwise, all the interfaces have the exterior role, and any E2E Path (E2E-IGNORE) messages arriving at the router are discarded.

In summary, there are two options for an interior router:

- No RSVP aggregation configuration commands are entered.
- Aggregation is enabled and all interfaces are configured as interior.

If the interior role of an interface is unconfigured, all aggregate and E2E reservations installed on that interface are brought down.

Additional Required Configuration Commands

If you enable aggregation on any RSVP interface on an aggregator or deaggregator as well as interfaces of interior routers, you must also configure the following commands:

- **ip rsvp resource-provider none**

- **ip rsvp data-packet classification none**

The reason for configuring these commands is because Cisco IOS Release 12.2(33)SRC and Cisco IOS XE Release 2.6 support control plane aggregation only. The RSVP data packet classifier does not support aggregation. Data plane aggregation must be achieved by using the RSVP Scalability Enhancements feature.

Examples

The following example shows how to configure the Ethernet 0/0 interface on an aggregator or deaggregator interior router:

```
Router(config)# interface Ethernet0/0
Router(config-if)# ip rsvp aggregation ip role interior
```

Related Commands

Command	Description
ip rsvp aggregation ip	Enables RSVP aggregation on a router.
ip rsvp data-packet classification none	Disables RSVP data packet classification.
ip rsvp resource-provider none	Configures a resource provider for an aggregate flow.
show ip rsvp aggregation ip	Displays RSVP summary aggregation information.

ip rsvp atm-peak-rate-limit

To set a limit on the peak cell rate (PCR) of reservations for all newly created Resource Reservation Protocol (RSVP) switched virtual circuits (SVCs) established on the current interface or any of its subinterfaces, use the **ip rsvp atm-peak-rate-limit** command in interface configuration mode. To remove the current peak rate limit, in which case the reservation peak rate is limited by the line rate, use the **no** form of this command.

ip rsvp atm-peak-rate-limit *limit*

no ip rsvp atm-peak-rate-limit

Syntax Description

limit	The peak rate limit of the reservation specified, in KB. The minimum value allowed is 1 KB; the maximum value allowed is 2 GB.

Command Default

The peak rate of a reservation defaults to the line rate.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.0(3)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Each RSVP reservation corresponds to an ATM SVC with a certain peak cell rate (PCR), sustainable cell rate (SCR), and maximum burst size. The PCR, also referred to as the peak rate, can be configured by the user or allowed to default to the line rate.

RSVP controlled-load reservations do not define any peak rate for the data. By convention, the allowable peak rate in such reservations is taken to be infinity, which is usually represented by a very large number. Under these circumstances, when a controlled-load reservation is converted to an ATM SVC, the PCR for the SVC becomes correspondingly large and may be out of range for the switch. You can use the **ip rsvp atm-peak-rate-limit** command to limit the peak rate.

The following conditions determine the peak rate limit on the RSVP SVC:

- The peak rate defaults to the line rate.
- If the peak rate is greater than the configured peak rate limiter, the peak rate is lowered to the peak rate limiter.
- The peak rate cannot be less than the reservation bandwidth. If this is the case, the peak rate is raised to the reservation bandwidth.

Note Bandwidth conversions applied to the ATM space from the RSVP space are also applied to the peak rate.

The peak rate limit is local to the router; it does not affect the normal messaging of RSVP. Only the SVC setup is affected. Large peak rates are sent to the next host without modification.

For RSVP SVCs established on subinterfaces, the peak rate limit applied to the subinterface takes effect on all SVCs created on that subinterface. If a peak rate limit is applied to the main interface, the rate limit has no effect on SVCs created on a subinterface of the main interface even if the limit value on the main interface is lower than the limit applied to the subinterface.

For a given interface or subinterface, a peak rate limit applied to that interface affects only new SVCs created on the interface, not existing SVCs.

Note This command is available only on interfaces that support the **ip rsvp svc-required** command.

Use the **show ip rsvp atm-peak-rate-limit** command to determine the peak rate limit set for an interface or subinterface, if one is configured.

Examples

The following configuration sample sets the peak rate limit for ATM interface 2/0/0.1 to 100 KB:

```
interface atm2/0/0.1
 ip rsvp atm-peak-rate-limit 100
```

Related Commands

Command	Description
ip rsvp svc-required	Enables creation of an SVC to service any new RSVP reservation made on the interface or subinterface.
show ip rsvp interface	Displays RSVP-related interface information.

ip rsvp authentication

To activate Resource Reservation Protocol (RSVP) cryptographic authentication, use the **ip rsvp authentication** command in interface configuration mode. To deactivate authentication, use the **no** form of this command.

ip rsvp authentication

no ip rsvp authentication

Syntax Description

This command has no arguments or keywords.

Command Default

RSVP cryptographic authentication is deactivated.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.

Usage Guidelines

Use the **ip rsvp authentication** command to deactivate and then reactivate RSVP authentication without reentering the other RSVP authentication configuration commands. You should not enable authentication unless you have previously configured a key. If you issue this command before the **ip rsvp authentication key** command, you get a warning message indicating that RSVP discards all messages until you specify a key. The **no ip rsvp authentication** command disables RSVP cryptographic authentication. However, the command does not automatically remove any other authentication parameters that you have configured. You must issue a specific **no ip rsvp authentication** command; for example, **no ip rsvp authentication key**, **no ip rsvp authentication type**, or **no ip rsvp authentication window-size**, if you want to remove them from the configuration.

The **ip rsvp authentication** command is similar to the **ip rsvp neighbor** command. However, the **ip rsvp authentication** command provides better authentication and performs system logging.

Examples

The following command activates authentication on an interface:

```
Router(config-if)# ip rsvp authentication
```

The following command deactivates authentication on an interface:

```
Router(config-if)# no ip rsvp authentication
```

Related Commands

Command	Description
ip rsvp authentication key	Specifies the key (string) for the RSVP authentication algorithm.
ip rsvp authentication type	Specifies the algorithm used to generate cryptographic signatures in RSVP messages.
ip rsvp authentication window-size	Specifies the maximum number of RSVP authenticated messages that can be received out of order.
ip rsvp neighbor	Enables neighbors to request a reservation.

ip rsvp authentication challenge

To make Resource Reservation Protocol (RSVP) perform a challenge-response handshake with any new RSVP neighbors on a network, use the **ip rsvp authentication challenge** command in interface configuration mode. To disable the challenge-response handshake, use the **no** form of this command.

ip rsvp authentication challenge

no ip rsvp authentication challenge

Syntax Description

This command has no arguments or keywords.

Command Default

The challenge-response handshake initiated by this command is disabled.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.

Usage Guidelines

The **ip rsvp authentication challenge** command requires RSVP to perform a challenge-response handshake with any new RSVP neighbors that are discovered on a network. Such a handshake allows the router to thwart RSVP message replay attacks while booting, especially if there is a long period of inactivity from trusted RSVP neighbors following the reboot. If messages from trusted RSVP neighbors arrive very quickly after the router reboots, then challenges may not be required because the router will have reestablished its security associations with the trusted nodes before the untrusted nodes can attempt replay attacks.

If you enable RSVP authentication globally on an interface over which a Multiprotocol Label Switching (MPLS) Traffic Engineering (TE) label switched path (LSP) travels and the router on which authentication is enabled experiences a stateful switchover (SSO), the following occurs:

- If challenges are disabled (you did not specify the **ip rsvp authentication challenge** command), the LSP recovers properly.
- If challenges are enabled (you specified the **ip rsvp authentication challenge** command), more RSVP signaling messages are required and the LSP takes longer to recover or the forwarding state may time out and the LSP does not recover. If a timeout occurs, data packet forwarding is interrupted while the headend router signals a new LSP.

If you enable RSVP authentication challenges, you should consider enabling RSVP refresh reduction by using the **ip rsvp signalling refresh reduction** command. While a challenge handshake is in progress, the receiving router that is initiating the handshake discards all RSVP messages from the node that is being challenged until the handshake-initiating router receives a valid challenge response.

Note If a neighbor does not reply to the first challenge message after 1 second, the Cisco IOS software sends another challenge message and waits 2 seconds. If no response is received to the second challenge, the Cisco IOS software sends another and waits 4 seconds. If no response to the third challenge is received, the Cisco IOS software sends a fourth challenge and waits 8 seconds. If there is no response to the fourth challenge, the Cisco IOS software stops the current challenge to that neighbor, logs a system error message, and does not create a security association for that neighbor. This kind of exponential backoff is used to recover from challenges dropped by the network or busy neighbors.

Activating refresh reduction enables the challenged node to resend dropped messages more quickly once the handshake has completed. This causes RSVP to reestablish reservation state faster when the router reboots.

Enable authentication challenges wherever possible to reduce the router's vulnerability to replay attacks.

Examples

The following example shows how to enable RSVP to perform a challenge-response handshake:

```
Router(config-if)# ip rsvp authentication challenge
```

Related Commands

Command	Description
ip rsvp signalling refresh reduction	Enables RSVP refresh reduction.

ip rsvp authentication key

To specify the key (string) for the Resource Reservation Protocol (RSVP) authentication algorithm, use the **ip rsvp authentication key** command in interface configuration mode. To disable the key, use the **no** form of this command.

ip rsvp authentication key *pass-phrase*

no ip rsvp authentication key

Syntax Description

pass-phrase	Phrase that ranges from 8 to 40 characters. See "Usage Guidelines" for additional information.

Command Default

No key is specified.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.

Usage Guidelines

Use the **ip rsvp authentication key** command to select the key for the authentication algorithm. This key is a passphrase of 8 to 40 characters. It can include spaces; quotes are not required if spaces are used. The key can consist of more than one word. We recommend that you make the passphrase as long as possible. This key must be the same for all RSVP neighbors on this interface. As with all passwords, you should choose them carefully so that attackers cannot easily guess them.

Here are some guidelines:

- Use a mixture of upper- and lowercase letters, digits, and punctuation.
- If using just a single word, do not use a word contained in any dictionary of any language, spelling lists, or other lists of words.
- Use something easily remembered so you do not have to write it down.
- Do not let it appear in clear text in any file or script or on a piece of paper attached to a terminal.

By default, RSVP authentication keys are stored in clear text in the router configuration file, but they can optionally be stored as encrypted text in the configuration file. To enable key encryption, use the global configuration **key config-key 1** *string* command. After you enter this command, the passphrase parameter of each **ip rsvp authentication key** command is encrypted with the Data Encryption Standard (DES) algorithm when you save the configuration file. If you later issue a **no key config-key 1** *string* command, the RSVP authentication key is stored in clear text again when you save the configuration.

The *string* argument is not stored in the configuration file; it is stored only in the router's private NVRAM and will not appear in the output of a **show running-config** or **show config** command. Therefore, if you copy the configuration file to another router, any encrypted RSVP keys in that file will not be successfully decrypted by RSVP when the router boots and RSVP authentication will not operate correctly. To recover from this, follow these steps on the new router:

1. For each RSVP interface with an authentication key, issue a **no ip rsvp authentication key** command to clear the old key.
2. For that same set of RSVP interfaces, issue an **ip rsvp authentication key** command to reconfigure the correct clear text keys.
3. Issue a global **key config-key 1** *string* command to reencrypt the RSVP keys for the new router.
4. Save the configuration.

Examples

The following command shows how to set the passphrase to 11223344 in clear text:

```
Router(config-if)# ip rsvp authentication key 11223344
```

The following command shows how to encrypt the authentication key:

```
Router# configure terminal
Router(config)# key config-key 1 11223344
Router(config)# end
```

Related Commands

Command	Description
key config-key	Defines a private DEF key for the router.

ip rsvp authentication key-chain

To specify a list of keys for the Resource Reservation Protocol (RSVP) neighbors, use the **ip rsvp authentication key-chain** command in global configuration mode. To disable the key chain, use the **no** form of this command. To set the key chain to its default, use the **no** form of this command.

ip rsvp authentication key-chain *string*

no ip rsvp authentication key-chain

Syntax Description

string	Name of key chain. The range is from 1 to 2147483647 keys.

Command Default

No key chain is specified.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.0(29)S	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
15.0(1)M	This command was integrated into a release earlier than Cisco IOS Release 15.0(1)M.

Usage Guidelines

Use the **ip rsvp authentication key-chain** command to select the key chain.

Note You cannot use the **ip rsvp authentication key** and the **ip rsvp authentication key-chain** commands on the same router interface. The commands supersede each other; however, no error message is generated.

Examples

The following example shows how to set the global default key chain to RSVPkey:

```
Router(config)# ip rsvp authentication key-chain RSVPkey
```

Related Commands

Command	Description
ip rsvp authentication key	Specifies the interface key (string) for the RSVP authentication algorithm.
show key chain	Displays authentication key information.

ip rsvp authentication lifetime

To control how long Resource Reservation Protocol (RSVP) maintains security associations with other trusted RSVP neighbors, use the **ip rsvp authentication lifetime** command in interface configuration mode. To disable the lifetime setting, use the **no** form of this command.

ip rsvp authentication lifetime *hh*:*mm*:*ss*

no ip rsvp authentication lifetime *hh*:*mm*:*ss*

Syntax Description

hh:*mm*:*ss*	Hours: minutes: seconds that RSVP maintains security associations with other trusted RSVP neighbors. The range is 1 second to 24 hours. The default is 30 minutes. The colons are required in the syntax.

Command Default

If you do not specify a security association lifetime setting, 30 minutes is used.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.

Usage Guidelines

Use the **ip rsvp authentication lifetime** command to indicate when to end security associations with RSVP trusted neighbors. If an association's lifetime expires, but at least one valid, RSVP authenticated message was received in that time period, RSVP resets the security association's lifetime to this configured value. When a neighbor stops sending RSVP signaling messages (that is, the last reservation has been torn down), the memory used for the security association is freed as well as when the association's lifetime period ends. The association can be re-created if that RSVP neighbor resumes its signaling. Setting the lifetime to shorter periods allows memory to be recovered faster when the router is handling a lot of short-lived reservations. Setting the lifetime to longer periods reduces the workload on the router when establishing new authenticated reservations.

Use the **clear ip rsvp authentication** command to free security associations before their lifetimes expire.

Examples

The following command sets the lifetime period for 30 minutes and 5 seconds:

```
Router(config-if)# ip rsvp authentication lifetime 00:30:05
```

Related Commands

Command	Description
clear ip rsvp authentication	Eliminates RSVP security associations before their lifetimes expire.

ip rsvp authentication neighbor

To activate Resource Reservation Protocol (RSVP) cryptographic authentication for a neighbor, use the **ip rsvp authentication neighbor** command in global configuration mode. To deactivate authentication for a neighbor, use the **no** form of this command.

ip rsvp authentication neighbor {**access-list** *acl-name-or-number* | **address** *address*} [**challenge**] [**key-chain** *name*] [**type** {**md5** | **sha-1**}] [**window-size** *number-of-messages*]

no ip rsvp authentication neighbor {**access-list** *acl-name-or-number* | **address** *address*} [**challenge**] [**key-chain** *name*] [**type** {**md5** | **sha-1**}] [**window-size** *number-of-messages*]

Syntax Description

access-list *acl-name-or-number*	Specifies a standard numbered or named IP access list that describes the set of neighbor IP addresses that share this key.
address *address*	Specifies a single IP address for a specific neighbor; usually one of the neighbor's physical or logical (loopback) interfaces.
challenge	(Optional) Requires RSVP to perform a challenge-response handshake with an RSVP neighbor for which RSVP does not have an existing security association in memory.
key-chain *name*	(Optional) Specifies the name of a key chain that contains the set of keys to be used to communicate with the neighbor.
type	(Optional) Specifies the algorithm to generate cryptographic signatures in RSVP messages.
md5	(Optional) Specifies the RSA Message Digest 5 (md5) algorithm.
sha-1	(Optional) Specifies the National Institute of Standards and Technologies (NIST) Secure Hash Algorithm-1; it is newer and more secure than **md5**.
window-size *number-of-messages*	(Optional) Specifies the maximum number of authenticated messages that can be received out of order. The range is from 1 to 64. The default value is 1.

Command Default

Neighbor cryptographic authentication is disabled.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.0(29)S	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
15.0(1)M	This command was integrated into a release earlier than Cisco IOS Release 15.0(1)M.

Usage Guidelines

If you omit the optional keywords, the **ip rsvp authentication neighbor** command enables RSVP cryptographic authentication for a neighbor. Using the optional keywords inherits the global defaults.

In order to enable per-neighbor authentication, you must issue the **ip rsvp authentication neighbor** command (or the **no ip rsvp authentication neighbor** command to disable authentication). If you issue the **ip rsvp authentication** command without **neighbor**, then this command enables authentication for all neighbors and interfaces, regardless of whether there are any per-neighbor or per-interface keys defined. If you issue the **ip rsvp authentication neighbor** command, then authentication is enabled only for that neighbor.

Access Control Lists

A single ACL can describe all the physical and logical interfaces that one neighbor can use to receive RSVP messages from a router; this can be useful when multiple routes exist between two neighbors. One ACL could also specify a number of different neighbors who, along with your router, will share the same key(s); however, this is generally not considered to be good network security practice.

If numbered, the ACL must be in the 1 to 99 range or the 1300 to 1999 range, giving a total of 798 numbered ACLs that can be used to configure neighbor keys (assuming some of them are not being used for other purposes). There is no enforced limit on the number of standard named IP ACLs. The IP addresses used in the ACL should contain at least the neighbor's physical interface addresses; router ID addresses can be added if necessary, especially when using Multi-Protocol Label Switching (MPLS) Traffic Engineering (TE).

The existing **ip access-list standard** command must be used for creating named or numbered standard IP ACLs for RSVP neighbors because standard ACLs deal with just source or destination addresses while extended ACLs deal with five tuples and are more complex to configure. The RSVP CLI returns an error message if any type of ACL other than standard is specified:

```
Router(config)# ip rsvp authentication neighbor access-list 10 key-chain wednesday

% Invalid access list name.
RSVP error: unable to find/create ACL
```

Named standard IP ACLs are also recommended because you can include the neighbor router's hostname as part of the ACL name, thereby making it easy to identify the per-neighbor ACLs in your router configuration.

The RSVP CLI displays an error message if a valid named or numbered ACL is specified, but a nonexistent or invalid key chain has not been associated with it, since the lack of a key chain could cause RSVP messages to or from that neighbor to be dropped:

```
Router(config)# ip rsvp authentication neighbor access-list myneighbor key-chain xyz

RSVP error: Invalid argument(s)
```

Key Chains

In the key-chain parameter, the keys are used in order of ascending expiration deadlines. The only restriction on the name is that it cannot contain spaces. The key-chain parameter is optional; that is, you could omit it if you were trying to change other optional authentication parameters for the RSVP neighbor. However, when searching for a key, RSVP ignores any **ip rsvp authentication neighbor access-list** command that does not include a key-chain parameter that refers to a valid key chain with at least one unexpired key.

Error and Warning Conditions

The RSVP CLI returns an error if any of the key IDs in the chain are duplicates of key IDs in any other chains already assigned to RSVP; for example,

```
Router(config)# ip rsvp authentication neighbor access-list myneighbor key-chain abc
```

```
RSVP error: key chains abc and xyz contain duplicate key ID 1
RSVP error: Invalid argument(s)
```

The RSVP CLI returns an error if the specified key chain does not exist or does not contain at least one unexpired key.

If a key chain is properly defined and RSVP later tries to send a message to that neighbor, but cannot find a valid, unexpired per-neighbor or per-interface key, RSVP generates the RSVP_AUTH_NO_KEYS_LEFT system message indicating that a key could not be obtained for that neighbor.

If the key chain contains keys with finite expiration times, RSVP generates the RSVP_AUTH_ONE_KEY_EXPIRED message to indicate when each key has expired.

If RSVP receives a message from a neighbor with the wrong digest type, it generates the RSVP_MSG_AUTH_TYPE_MISMATCH system message indicating that there is a digest type mismatch with that neighbor.

If RSVP receives a message that is a duplicate of a message already in the window or is outside the window, RSVP logs the BAD_RSVP_MSG_RCVD_AUTH_DUP or the BAD_RSVP_MSG_RCVD_AUTH_WIN error message indicating that the message sequence number is invalid.

If a challenge of a neighbor fails or times out, RSVP generates the BAD_RSVP_MSG_RCVD_AUTH_COOKIE system message or the RSVP_MSG_AUTH_CHALLENGE_TIMEOUT message, indicating that the specified neighbor failed to respond successfully to a challenge.

Examples

The following example shows how to create an access list and a key chain for neighbors V, Y, and Z enable authentication globally using inheritance for all other authentication parameters:

```
Router# configure terminal
Router(config)# ip access-list standard neighbor_V
Router(config-std-nacl)# permit 10.0.0.2
Router(config-std-nacl)# permit 10.1.16.1
Router(config-std-nacl)# exit
Router(config)# ip access-list standard neighbor_Y
Router(config-std-nacl)# permit 10.0.1.2
Router(config-std-nacl)# permit 10.16.0.1
Router(config-std-nacl)# exit
Router(config)# ip access-list standard neighbor_Z
Router(config-std-nacl)# permit 10.16.0.2
Router(config-std-nacl)# permit 10.1.0.2
Router(config-std-nacl)# permit 10.0.1.2
Router(config-std-nacl)# exit
Router(config)# ip rsvp authentication neighbor access-list neighbor_V key-chain
neighbor_V
Router(config)# ip rsvp authentication neighbor access-list neighbor_Y key-chain
neighbor_Y
Router(config)# ip rsvp authentication neighbor access-list neighbor_Z key-chain
neighbor_Z
Router(config)# ip rsvp authentication
Router(config)# end
```

The following example shows how to create an access list and a key chain for neighbors V, Y, and Z and and enable the authentication explicitly for each neighbor:

```
Router(config)# ip rsvp authentication neighbor access-list neighbor_V key-chain
neighbor_V
Router(config)# ip rsvp authentication neighbor access-list neighbor_V
```

```
Router(config)# ip rsvp authentication neighbor access-list neighbor_Y key-chain
neighbor_Y
Router(config)# ip rsvp authentication neighbor access-list neighbor_Y
Router(config)# ip rsvp authentication neighbor access-list neighbor_Z key-chain
neighbor_Z
Router(config)# ip rsvp authentication neighbor access-list neighbor_Z
Router(config)# end
```

Related Commands

Command	Description
ip rsvp authentication	Activates RSVP cryptographic authentication.

ip rsvp authentication type

To specify the type of algorithm used to generate cryptographic signatures in Resource Reservation Protocol (RSVP) messages, use the **ip rsvp authentication type** command in interface configuration or global configuration mode. To specify that no type of algorithm is used, use the **no** form of this command. To remove the type from your configuration, use the **default** form of this command.

Note Before you use the **no ip rsvp authentication type** command, see the "Usage Guidelines" section for more information.

Syntax for T Releases

ip rsvp authentication type {**md5** | **sha-1**}

no ip rsvp authentication type

default ip rsvp authentication type

Syntax for 12.0S and 12.2S Releases

ip rsvp authentication type {**md5** | **sha-1**}

default ip rsvp authentication type

Syntax Description

md5	RSA Message Digest 5 algorithm.
sha-1	National Institute of Standards and Technologies (NIST) Secure Hash Algorithm-1; it is newer and more secure than MD5.

Command Default

If no algorithm is specifed, **md5** is used.

Command Modes

Interface configuration (config-if)
Global configuration (config)

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.0(29)S	This command was introduced in global configuration mode for all neighbors. A **default** form of the command was added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.

Usage Guidelines

Use the **ip rsvp authentication type** command to specify the algorithm to generate cryptographic signatures in RSVP messages. If you do not specify an algorithm, **md5** is used.

If you use the **ip rsvp authentication type** command rather than the **ip rsvp authentication neighbor type** command, the global default for type changes.

The **no ip rsvp authentication type** command is not supported in Cisco IOS Releases 12.0S and 12.2S because every security association must have a digest type, and you cannot disable it. Use the **default ip rsvp authentication type** command to remove the authentication type from a configuration and force the type to its default.

Although the **no ip rsvp authentication type** command is supported in Cisco IOS T releases, the **default ip rsvp authentication type** command is recommended to remove the authentication type from a configuration and force the type to its default.

Examples

T Releases Example

The following example shows how to set the type to sha-1 for interface authentication:

```
Router(config-if)# ip rsvp authentication type sha-1
```

12.0S and 12.2S Releases Examples

The following examples show how to set the type to sha-1 for neighbor authentication:

```
Router(config)# ip rsvp authentication neighbor address 10.1.1.1 type sha-1
```

or

```
Router(config)# ip rsvp authentication neighbor access-list 1 type sha-1
```

The following example shows how to set the global default type to sha-1 for authentication:

```
Router(config)# ip rsvp authentication type sha-1
```

Default Command Example

The following example shows how to remove the type from your configuration and forces the type to its default:

```
Router(config)# default ip rsvp authentication type
```

Related Commands

Command	Description
ip rsvp authentication key	Specifies the key (string) for the RSVP authentication algorithm.
ip rsvp authentication neighbor type	Sets the type for a specific neighbor.

ip rsvp authentication window-size

To specify the maximum number of Resource Reservation Protocol (RSVP) authenticated messages that can be received out of order, use the **ip rsvp authentication window-size** command in interface configuration mode. To disable the window size (or to use the default value of 1), use the **no** form of this command.

ip rsvp authentication window-size [*number-of-messages*]

no ip rsvp authentication window-size

Syntax Description

number-of-messages	(Optional) Maximum number of authenticated messages that can be received out of order. The range is 1 to 64; the default value is 1.

Command Default

If no window size is specified, a value of 1 is used.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.

Usage Guidelines

Use the **ip rsvp authentication window-size** command to specify the maximum number of RSVP authenticated messages that can be received out of order. All RSVP authenticated messages include a sequence number that is used to prevent replays of RSVP messages.

With a default window size of one message, RSVP rejects any duplicate authenticated messages because they are assumed to be replay attacks. However, sometimes bursts of RSVP messages become reordered between RSVP neighbors. If this occurs on a regular basis, and you can verify that the node sending the burst of messages is trusted, you can use the **ip rsvp authentication window-size** command option to allow for the burst size such that RSVP will not discard such reordered bursts. RSVP will still check for duplicate messages within these bursts.

Examples

The following example shows how to set the window size to 2:

```
Router(config-if)# ip rsvp authentication window-size 2
```

Related Commands

Command	Description
ip rsvp authentication	Activates RSVP cryptographic authentication.

ip rsvp bandwidth

To enable Resource Reservation Protocol (RSVP) for IP on an interface, use the **ip rsvp bandwidth** command in interface configuration mode. To disable RSVP completely, use the **no** form of this command.

Syntax for Cisco IOS Release 15.1(2)T and Later Releases

ip rsvp bandwidth [*interface-bandwidth* [**percent** *percent-bandwidth* | [*single-flow-bandwidth*] [**sub-pool** *bandwidth*]] [**ingress** [*ingress-bandwidth* | **percent** *percent-bandwidth* [*maximum-ingress-bandwidth* | **percent** *percent-bandwidth*]]]]

no ip rsvp bandwidth

Syntax for Cisco IOS Releases 12.0S and 12.2S, Cisco IOS XE Release 2.6, and Later Releases

ip rsvp bandwidth [**rdm** [**bc0** *interface-bandwidth*] [[*single-flow-bandwidth* [**bc1** *bandwidth* | **sub-pool** *bandwidth*]]] [*interface-bandwidth* [*single-flow-bandwidth* [**bc1** *bandwidth* | **sub-pool** *bandwidth*]] | **mam max-reservable-bw** [*interface-bandwidth* [*single-flow-bandwidth*] [**bc0** *interface-bandwidth* [**bc1** *bandwidth*]]] | **percent** *percent-bandwidth* [*single-flow-bandwidth*]]

no ip rsvp bandwidth [**rdm** [**bc0** *interface-bandwidth*] [[*single-flow-bandwidth* [**bc1** *bandwidth* | **sub-pool** *bandwidth*]]] [*interface-bandwidth* [*single-flow-bandwidth* [**bc1** *bandwidth* | **sub-pool** *bandwidth*]] | **mam max-reservable-bw** [*interface-bandwidth* [*single-flow-bandwidth*] [**bc0** *bc0-pool* [**bc1** *bandwidth*]]] | **percent** *percent-bandwidth* [*single-flow-bandwidth*]]

Syntax Description

interface-bandwidth	(Optional) Maximum amount of bandwidth, in kb/s, that can be allocated by RSVP flows. The range is from 1 to 10000000.
percent *percent-bandwidth*	(Optional) Specifies a percentage of interface bandwidth. The range is from 1 to 1000. • When used with the **ingress** keyword, the **percent** keyword specifies the percentage of interface bandwidth to be configured as RSVP ingress bandwidth.
single-flow-bandwidth	(Optional) Maximum amount of bandwidth, in kb/s, that may be allocated to a single flow. The range is from 1 to 10000000. **Note** This value is ignored by the Diffserve-aware Multiprotocol Label Switching (MPLS) traffic engineering feature.
sub-pool *bandwidth*	(Optional) Amount of bandwidth, in kb/s, on the interface that is to be reserved to a portion of the total. The range is from 1 to the value of the smaller of the *interface-bandwidth* and **rdm** *bandwidth* arguments. This keyword and argument pair is used in the traditional (pre-Internet Engineering Task Force (IETF)-Standard) implementation of Diffserv-aware traffic engineering (DS-TE).
ingress	(Optional) Configures the RSVP ingress reservable bandwidth.
ingress-bandwidth	(Optional) Ingress reservable bandwidth, in kb/s. The range is from 1 to 10000000.

maximum-ingress-bandwidth	(Optional) Maximum amount of ingress bandwidth, in kb/s, that can be allocated to a single flow. The range is from 1 to 10000000; however, the amount you can configure depends on how much bandwidth remains in the pool.
rdm	(Optional) Specifies the Russian Doll Model for DS-TE.
bc0 *interface-bandwidth*	(Optional) Specifies the amount of bandwidth, in kb/s, on the interface to be reserved to the total (formerly called "global pool"). The range is from 1 to the value of the **max-reservable-bw** *interface-bandwidth* keyword and argument pair.
bc1 *bandwidth*	(Optional) Specifies the same bandwidth portion as **bc0** *interface-bandwidth*; namely, the amount of bandwidth, in kb/s, on the interface that is to be reserved to a portion of the total.
mam	(Optional) Specifies the Maximum Allocation Model for DS-TE.
max-reservable-bw	(Optional) Specifies the maximum reservable bandwidth sets a limit on the size of the total pool.
bc1 *bandwidth*	(Optional) Specifies the amount of bandwidth, in kb/s, on the interface to be reserved to a portion of the total. (Formerly, this portion was called the "subpool".) The range is from 1 to the value of the **max-reservable-bw** *interface-bandwidth* keyword and argument.

Command Default

RSVP is disabled by default.
If you enter the **ip rsvp bandwidth** command without any bandwidth values (for example, **ip rsvp bandwidth** followed by pressing the Enter key), a default bandwidth value (that is, 75 percent of the link bandwidth) is assumed for both the *interface-bandwidth* and *single-flow-bandwidth* arguments.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
11.2	This command was introduced.
12.0(11)ST	This command was integrated into Cisco IOS Release 12.0(11)ST. The **sub-pool** keyword was added.
12.2(4)T	This command was integrated into Cisco IOS Release 12.2(4)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(18)SXD	This command was integrated into Cisco IOS Release 12.2(18)SXD.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SRB	This command was modified. The IETF Standard for DS-TE was added through the **rdm** and **mam** keywords, and their subsidiary arguments.
Cisco IOS XE Release 2.6	This command was integrated into Cisco IOS XE Release 2.6.
15.1(2)T	This command was modified. The **percent** *percent-bandwidth* keyword and argument pair was added.

Release	Modification
15.(1)3T	This command was modified. The **ingress** keyword, the *ingress-bandwidth* argument, and the *maximum-ingress-bandwidth* argument were added.
15.1(1)S	This command was integrated into Cisco IOS Release 15.1(1)S.

Usage Guidelines

RSVP cannot be configured with distributed Cisco Express Forwarding.

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.

When using this command for DS-TE in IETF Standard mode, you must use either **rdm** and its arguments or **mam** and its arguments; you cannot use both. For more details about each alternative, see *Russian Dolls Bandwidth Constraints Model for Diffserv-aware MPLS Traffic Engineering* by F. Le Faucheur (RFC 4127) and *Maximum Allocation Bandwidth Constraints Model for Diffserv-aware MPLS Traffic Engineering* by F. Le Faucheur and W. Lai (RFC 4125).

To eliminate only the subpool portion of the bandwidth, use the **no** form of this command with the **sub-pool** keyword.

You can use the **ip rsvp bandwidth ingress** command to enable the ingress call admission control (CAC) functionality. You can use the **no ip rsvp bandwidth** command to disable the ingress CAC functionality on an interface. However, this command also disables RSVP on the interface. To disable only the ingress functionality on the interface, use the **ip rsvp bandwidth** *interface-bandwidth single-flow-bandwidth* command.

Examples

The following example shows a T1 (1536 kb/s) link configured to permit RSVP reservation of up to 1158 kb/s, but no more than 100 kb/s 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 (WFQ)	Enables WFQ for an interface.
ip rsvp neighbor	Enables neighbors to request a reservation.
ip rsvp reservation	Enables a router to behave like it is receiving and forwarding RSVP RESV messages.
ip rsvp sender	Enables a router to behave like it is receiving and forwarding RSVP PATH messages.
ip rsvp udp-multicasts	Instructs the router to generate UDP-encapsulated RSVP multicasts whenever it generates an IP-encapsulated multicast packet.
random-detect (interface)	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 bandwidth ignore

To ignore the Resource Reservation Protocol (RSVP) tunnel bandwidth configuration, use the **ip rsvp bandwidth ignore** command in interface configuration mode.

ip rsvp bandwidth ignore

Syntax Description

This command has no arguments or keywords.

Command Default

The RSVP tunnel bandwidth configuration is used.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
15.1(2)T	This command was introduced.
15.1(1)S	This command was integrated into Cisco IOS Release 15.1(1)S.

Usage Guidelines

You can use the **ip rsvp bandwidth ignore** command to ignore any RSVP bandwidth configuration on the tunnel. If you need to reconfigure the RSVP bandwidth, use the **ip rsvp bandwidth** or **ip rsvp bandwidth percent** command.

Examples

The following example shows how to ignore the RSVP bandwidth configuration on a tunnel interface:

```
Router(config)# interface tunnel 1
Router(config-if)# ip rsvp bandwidth ignore
```

Related Commands

Command	Description
ip rsvp bandwidth	Enables RSVP for IP on an interface.
ip rsvp bandwidth percent	Enables RSVP for IP on an interface and specifies a percentage of the total interface bandwidth as available in the RSVP bandwidth pool.
show ip rsvp interface detail	Displays the hello configuration for all interfaces.

ip rsvp bandwidth percent

To enable Resource Reservation Protocol (RSVP) for IP on an interface and to configure percentages of bandwidth available for RSVP and single flow bandwidth pools, use the **ip rsvp bandwidth percent** command in interface configuration mode. To disable RSVP on an interface, use the **no** form of this command.

ip rsvp bandwidth percent *interface-bandwidth* [*max-flow-bw* | **percent** *flow-bandwidth*]

no ip rsvp bandwidth

Syntax Description

interface-bandwidth	Percentage of interface bandwidth configured for RSVP. The range is from 1 to 1000.
max-flow-bw	(Optional) Maximum amount of bandwidth, in kb/s, configured for a single flow. The range is from 1 to 10000000; however, the amount you can configure depends on how much bandwidth remains in the pool.
percent *flow-bandwidth*	(Optional) Specifies the percentage of the bandwidth to be used as flow bandwidth. The range is from 1 to 1000.

Command Default

RSVP is disabled by default; therefore, no percentage of bandwidth is set.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(33)SRB	This command was introduced.
15.1(2)T	This command was modified. The **percent** and *flow-bandwidth* keyword and argument combination was added.

Usage Guidelines

RSVP cannot be configured with distributed Cisco Express Forwarding.

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.

Use the **ip rsvp bandwidth percent** command to set the RSVP bandwidth pool to a specified percentage of interface bandwidth. When you issue the **ip rsvp bandwidth percent** command, the RSVP bandwidth pool adjusts dynamically whenever the bandwidth of the interface changes.

You can use the **ip rsvp bandwidth percent** *percent-bandwidth* **percent** *flow-bandwidth* command to configure a percentage of interface bandwidth as RSVP bandwidth. The RSVP bandwidth is used to perform RSVP Connection Admission Control (CAC). This command allows oversubscription. That is, you can configure more than 100 percent of the interface bandwidth to be used as RSVP bandwidth and per flow bandwidth.

You can choose to configure an absolute value as the amount of bandwidth used for RSVP by using the **ip rsvp bandwidth** *rsvp-bandwidth* command on the member links of a bundle. If you use the **ip rsvp bandwidth percent** *rsvp-bandwidth* command, then the RSVP bandwidth changes in parallel with the

change in the interface bandwidth. The RSVP bandwidth of the bundle depends only on the bundle interface's bandwidth, which in turn depends on the interface bandwidth of the member link and not on the RSVP bandwidth of member link.

The **ip rsvp bandwidth percent** command is blocked on interfaces on which dynamic update of RSVP bandwidth is not supported. A debug message appears if an RSVP client attempts to configure the **ip rsvp bandwidth percent** command on an unsupported interface.

In Cisco IOS Release 15.1(2)T, the **ip rsvp bandwidth percent** command is supported on Multilevel Precedence and Preemption (MLPP) and Multilink Frame Relay (MFR) interfaces.

Examples

The following example shows a serial link configured to permit an RSVP reservation of up to 90 percent of interface bandwidth but no more than 1000 kb/s for any given flow on serial interface 0:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# interface serial 0
Router(config-if)# ip rsvp bandwidth percent 90 1000
```

The following example shows a multilink configured to permit 50 percent of the interface bandwidth as the RSVP bandwidth and 10 percent of the interface bandwidth as the flow bandwidth for any given multilink interface 2:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# interface multilink 2
Router(config-if)# ip rsvp bandwidth percent 50 percent 10
Router(config-if)# exit
```

Related Commands

Command	Description
fair-queue (WFQ)	Enables WFQ for an interface.
ip rsvp bandwidth	Enables RSVP for IP on an interface.
ip rsvp neighbor	Enables neighbors to request a reservation.
ip rsvp reservation	Enables a router to behave as though it were receiving and forwarding RSVP RESV messages.
ip rsvp sender	Enables a router to behave as though it were receiving and forwarding RSVP PATH messages.
ip rsvp udp-multicasts	Instructs the router to generate UDP-encapsulated RSVP multicasts whenever it generates an IP-encapsulated multicast packet.
random-detect (interface)	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 burst policing

To configure a burst factor within the Resource Reservation Protocol (RSVP) token bucket policer on a per-interface basis, use the **ip rsvp burst policing** command in interface configuration mode. To return to the default value, enter the **no** form of this command.

ip rsvp burst policing [*factor*]

no ip rsvp burst policing

Syntax Description

factor	(Optional) Indicates a burst factor value as a percentage of the requested burst of the receiver.

Command Default

The default value is 200; the minimum value is 100, and the maximum value is 700.

Command Modes

Interface configuration

Command History

Release	Modification
12.1(3)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

You configure the burst police factor per interface, not per flow. The burst factor controls how strictly or loosely the traffic of the sender is policed with respect to burst.

The burst factor applies to all RSVP flows installed on a specific interface. You can configure each interface independently for burst policing.

Examples

The following example shows the **ip rsvp burst policing** command with a burst factor of 200:

```
ip rsvp burst policing 200
```

ip rsvp data-packet classification none

To turn off (disable) Resource Reservation Protocol (RSVP) data packet classification, use the **ip rsvp data-packet classification none** command in interface configuration mode. To turn on (enable) data-packet classification, use the **no** form of this command.

ip rsvp data-packet classification none

no ip rsvp data-packet classification none

Syntax Description

This command has no arguments or keywords.

Command Default

RSVP data packet classification is disabled.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(2)T	This command was introduced.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(18)SXF2	This command was integrated into Cisco IOS Release 12.2(18)SXF2.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.
Cisco IOS XE Release 2.6	This command was integrated into Cisco IOS XE Release 2.6.

Usage Guidelines

Use the **ip rsvp data-packet classification none** command when you do not want RSVP to process every packet. Configuring RSVP so that not every packet is processed eliminates overhead and improves network performance and scalability.

Examples

This section contains two examples of the **ip rsvp data-packet classification none** command. The first example shows how to turn off (disable) data packet classification:

```
Router# configure terminal
Router(config)# interface atm 6/0
Router(config-if)# ip rsvp data-packet classification none
```

The following example shows how to turn on (enable) data packet classification:

```
Router# configure terminal
Router(config)# interface atm 6/0
Router(config-if)# no ip rsvp data-packet classification none
```

Related Commands

Command	Description
show ip rsvp interface	Displays RSVP-related interface information.

ip rsvp dsbm candidate

To configure an interface as a Designated Subnetwork Bandwidth Manager (DSBM) candidate, use the **ip rsvp dsbm candidate** command in interface configuration mode. To disable DSBM on an interface, which exempts the interface as a DSBM candidate, use the **no** form of this command.

ip rsvp dsbm candidate [*priority*]

no ip rsvp dsbm candidate

Syntax Description

priority	(Optional) A value in the range from 64 to 128. Among contenders for the DSBM, the interface with the highest priority number wins the DSBM election process.

Command Default

An interface is not configured as a DSBM contender by default. If you use this command to enable the interface as a DSBM candidate and you do not specify a priority, the default priority of 64 is assumed.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.0(5)T	This command was introduced.
12.1(1)T	This command was integrated into Cisco IOS Release 12.1(1)T.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

SBM protocol entities, any one of which can manage resources on a segment, can reside in Layer 2 or Layer 3 devices. Many SBM-capable devices may be attached to a shared Layer 2 segment. When more than one SBM exists on a given segment, one of the SBMs is elected to be the DSBM. The elected DSBM is responsible for exercising admission control over requests for resource reservations on a segment, which, in the process, becomes a managed segment. A managed segment includes those interconnected parts of a shared LAN that are not separated by DSBMs. In all circumstances, only one, if any, DSBM exists for each Layer 2 segment.

You can configure an interface to have a DSBM priority in the range from 64 to 128. You can exempt an interface from participation in the DSBM election on a segment but still allow the system to interact with the DSBM if a DSBM is present on the segment. In other words, you can allow a Resource Reservation Protocol (RSVP)-enabled interface on a router connected to a managed segment to be managed by the DSBM even if you do not configure that interface to participate as a candidate in the DSBM election process. To exempt an interface from DSBM candidacy, do not issue the **ip rsvp dsbm candidate** command on that interface.

RSVP cannot be configured with Versatile Interface Processor (VIP)-distributed Cisco Express Forwarding (dCEF).

Examples

The following example shows how to configure Ethernet interface 2 as a DSBM candidate with a priority of 100:

```
interface Ethernet2
 ip rsvp dsbm candidate 100
```

Related Commands

Command	Description
debug ip rsvp	Displays information about SBM message processing, the DSBM election process, and standard RSVP enabled message processing information.
debug ip rsvp detail	Displays detailed information about RSVP and SBM.
debug ip rsvp detail sbm	Displays detailed information about SBM messages only, and SBM and DSBM state transitions.
ip rsvp dsbm non-resv-send-limit	Configures the NonResvSendLimit object parameters.
show ip rsvp sbm	Displays information about an SBM configured for a specific RSVP-enabled interface or for all RSVP-enabled interfaces on the router.

ip rsvp dsbm non-resv-send-limit

To configure the NonResvSendLimit object parameters, use the **ip rsvp dsbm non-resv-send-limit** command in interface configuration mode. To use the default NonResvSendLimit object parameters, use the **no** form of this command.

ip rsvp dsbm non-resv-send-limit {**rate** *kbps* | **burst** *kilobytes* | **peak** *kbps* | **min-unit** *bytes* | **max-unit** *bytes*}

no **ip rsvp dsbm non-resv-send-limit** {**rate** *kbps* | **burst** *kilobytes* | **peak** *kbps* | **min-unit** *bytes* | **max-unit** *bytes*}

Syntax Description

rate *kbps*	The average rate, in kbps, for the Designated Subnetwork Bandwidth Manager (DSBM) candidate. The average rate is a number from 1 to 2147483.
burst *kilobytes*	The maximum burst size, in kb, for the DSBM candidate. The maximum burst size is a number from 1 to 2147483.
peak *kbps*	The peak rate, in kBps, for the DSBM candidate. The peak rate is a number from 1 to 2147483.
min-unit *bytes*	The minimum policed unit, in bytes, for the DSBM candidate. The minimum policed unit is a number from 1 to 2147483647.
max-unit *bytes*	The maximum packet size, in bytes, for the DSBM candidate. The maximum packet size is a number from 1 to 2147483647.

Command Default

The default for the **rate**, **burst**, **peak**, **min-unit**, and **max-unit** keywords is unlimited; all traffic can be sent without a valid Resource Reservation Protocol (RSVP) reservation.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.1(1)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

To configure the per-flow limit on the amount of traffic that can be sent without a valid RSVP reservation, configure the **rate**, **burst**, **peak**, **min-unit**, and **max-unit** values for finite values greater than 0.

To allow all traffic to be sent without a valid RSVP reservation, configure the **rate**, **burst**, **peak**, **min-unit**, and **max-unit** values for unlimited traffic. To configure the parameters for unlimited traffic, you can either omit the command, or enter the **no** form of the command (for example, **no ip rsvp dsbm non-resv-send-limit rate**). Unlimited is the default value.

The absence of the NonResvSendLimit object allows any amount of traffic to be sent without a valid RSVP reservation.

RSVP cannot be configured with VIP-distributed Cisco Express Forwarding (dCEF).

Examples

The following example configures Ethernet interface 2 as a DSBM candidate with a priority of 100, an average rate of 500 kBps, a maximum burst size of 1000 KB, a peak rate of 500 kBps, and unlimited minimum and maximum packet sizes:

```
interface Ethernet2
 ip rsvp dsbm candidate 100
 ip rsvp dsbm non-resv-send-limit rate 500
 ip rsvp dsbm non-resv-send-limit burst 1000
 ip rsvp dsbm non-resv-send-limit peak 500
```

Related Commands

Command	Description
ip rsvp dsbm candidate	Configures an interface as a DSBM candidate.
show ip rsvp sbm	Displays information about an SBM configured for a specific RSVP-enabled interface or for all RSVP-enabled interfaces on the router.

ip rsvp flow-assist

To enable Resource Reservation Protocol (RSVP) to integrate with the Cisco Express Forwarding (CEF) path for flow classification, policing, and marking, use the **ip rsvp flow-assist** command in interface configuration mode. To disable integration of RSVP with CEF for this purpose, use the **ip rsvp data-packet classification none** command.

ip rsvp flow-assist

Syntax Description

This command has no arguments or keywords.

Command Default

This command is on by default; RSVP integrates with CEF for classification, policing, and marking of data packets.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.0(3)T	This command was introduced.
12.4	The behavior of this command was modified. See the "Usage Guidelines" section for additional information.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

To police and mark data packets of a reserved flow, RSVP must interact with the underlying packet forwarding mechanism, which is CEF.

In Cisco IOS Release 12.4, the **no** form of the **ip rsvp flow-assist** command is no longer supported since you can use the existing **ip rsvp data-packet classification none** command to disable RSVP from integrating with any mechanism for handling data packets.

Examples

The following example shows how to enable RSVP on ATM interface 2/0/0:

```
interface atm2/0/0
 ip rsvp flow-assist
```

Related Commands

Command	Description
ip rsvp data-packet classification none	Avoids integrating RSVP with the data plane.
ip rsvp precedence	Allows you to set the IP Precedence values to be applied to packets that either conform to or exceed the RSVP flowspec.
ip rsvp svc-required	Enables creation of an SVC to service any new RSVP reservation made on the interface or subinterface.
ip rsvp tos	Allows you to set the ToS values to be applied to packets that either conform to or exceed the RSVP flowspec.
show ip rsvp interface	Displays RSVP-related interface information.

ip rsvp layer2 overhead

To control the overhead accounting performed by Resource Reservation Protocol (RSVP)/weighted fair queueing (WFQ) when a flow is admitted onto an ATM permanent virtual circuit (PVC), use the **ip rsvp layer2 overhead** command in interface configuration mode. To disable the overhead accounting, use the **no** form of this command.

ip rsvp layer2 overhead [*h c n*]

default ip rsvp layer2 overhead

no ip rsvp layer2 overhead [*h c n*]

Syntax Description

h	(Optional) Layer 2 encapsulation header plus trailer size applied to each Layer 3 packet in bytes. Valid sizes are numbers from 0 to 65535.
c	(Optional) Layer 2 cell header size applied to each Layer 2 cell in bytes. Valid sizes are numbers from 0 to 65535.
n	(Optional) Layer 2 payload size in bytes. Valid sizes are numbers from 0 to 65534.

Defaults

This command is enabled by default on ATM interfaces that are running RSVP and WFQ. You can also use this command on non-ATM interfaces.

The default version of the command, **default ip rsvp layer2 overhead**, or by omitting the parameters (*h*, *c*, and *n*) and entering the **ip rsvp layer2 overhead** command causes RSVP to determine the overhead values automatically, based on the interface/PVC encapsulation. (Currently, RSVP recognizes ATM Adaptation Layer 5 (AAL5) subnetwork access protocol (SNAP) and MUX (multiplexer) encapsulations.)

On non-ATM/PVC interfaces, the configured *h*, *c*, and *n* parameters determine the values that RSVP uses for its overhead.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(2)T	This command was introduced.

Usage Guidelines

When an IP flow traverses a link, the overhead of Layer 2 encapsulation can increase the amount of bandwidth that the flow requires to exceed the advertised (Layer 3) rate.

In many cases, the additional bandwidth a flow requires because of Layer 2 overhead is negligible and can be transmitted as part of the 25 percent of the link, which is unreservable and kept for routing updates and Layer 2 overhead. This situation typically occurs when the IP flow uses large packet sizes or when the Layer 2 encapsulation allows for frames of variable size (such as in Ethernet and Frame Relay encapsulations).

However, when a flow's packet sizes are small and the underlying Layer 2 encapsulation uses fixed-size frames, the Layer 2 encapsulation overhead can be significant, as is the case when Voice Over IP (VoIP) flows traverse ATM links.

To avoid oversubscribing ATM PVCs, which use AAL5 SNAP or AAL5 MUX encapsulations, RSVP automatically accounts for the Layer 2 overhead when admitting a flow. For each flow, RSVP determines the total amount of bandwidth required, including Layer 2 overhead, and uses this value for admission control with the WFQ bandwidth manager.

Note The **ip rsvp layer2 overhead** command does not affect bandwidth requirements of RSVP flows on ATM switched virtual circuits (SVCs).

Examples

In the following example, the total amount of bandwidth reserved with WFQ appears:

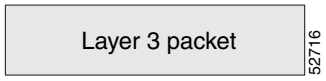
```
Router# show ip rsvp installed detail

RSVP:ATM6/0 has the following installed reservations
RSVP Reservation. Destination is 10.1.1.1, Source is 10.1.1.1,
  Protocol is UDP, Destination port is 1000, Source port is 1000
  Reserved bandwidth:50K bits/sec, Maximum burst:1K bytes, Peak rate:50K bits/sec
  Min Policed Unit:60 bytes, Max Pkt Size:60 bytes
  Resource provider for this flow:
    WFQ on ATM PVC 100/101 on AT6/0: PRIORITY queue 40.  Weight:0, BW 89 kbps
  Conversation supports 1 reservations
  Data given reserved service:0 packets (0M bytes)
  Data given best-effort service:0 packets (0 bytes)
  Reserved traffic classified for 9 seconds
  Long-term average bitrate (bits/sec):0M reserved, 0M best-effort
```

In the preceding example, the flow's advertised Layer 3 rate is 50 kbps. This value is used for admission control with the **ip rsvp bandwidth** value. The actual bandwidth required, inclusive of Layer 2 overhead, is 89 kbps. WFQ uses this value for admission control.

Typically, you should not need to configure or disable the Layer 2 overhead accounting. RSVP uses the advertised Layer 3 flow rate, minimum packet size, and maximum unit size in conjunction with the Layer 2 encapsulation characteristics of the ATM PVC to compute the required bandwidth for admission control. However, you can disable or customize the Layer 2 overhead accounting (for any link type) with the **ip rsvp layer2 overhead** command. The parameters of this command are based on the following steps that show how a Layer 3 packet is fragmented and encapsulated for Layer 2 transmission.

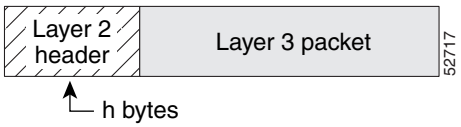
Step 1 Start with a Layer 3 packet, as shown in Figure 1, which includes an IP header and a payload.

Figure 1 Layer 3 Packet



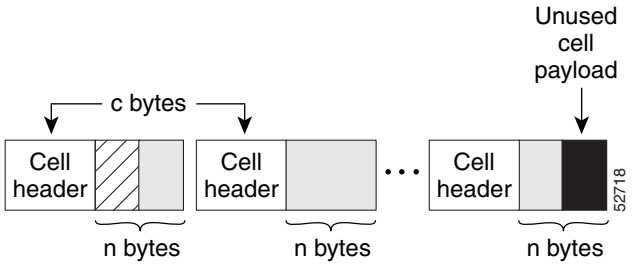
Step 2 Add an encapsulation header or trailer, as shown in Figure 2, of size *h*.

Figure 2 Layer 3 Packet with Layer 2 Header



Step 3 Segment the resulting packet into fixed-sized cells, as shown in Figure 3, with a cell header of c bytes and a cell payload of n bytes.

Figure 3 Segmented Packet



Step 4 Transmit the resulting Layer 2 cells.

More Configuration Examples

In the following example, Layer 2 overhead accounting is disabled for all reservations on the interface and its PVCs:

```
Router(config-if)# no ip rsvp layer2 overhead
```

In the following example, Layer 2 overhead accounting is configured with ATM AAL5 SNAP encapsulation:

```
Router(config-if)# no ip rsvp layer2 overhead 8 5 48
```

In the following example, Layer 2 overhead accounting is configured with ATM AAL5 MUX encapsulation:

```
Router(config-if)# ip rsvp layer2 overhead 0 5 48
```

In the following example, Layer 2 overhead accounting is configured with Ethernet V2.0 encapsulation (including 8-byte preamble, 6-byte source-active (SA) messages, 6-byte destination-active (DA) messages, 2-byte type, and 4-byte frame check sequence (FCS) trailer):

```
Router(config-if)# ip rsvp layer2 overhead 26 0 1500
```

Related Commands

Command	Description
show ip rsvp installed	Displays RSVP-related installed filters and corresponding bandwidth information.

ip rsvp listener

To configure a Resource Reservation Protocol (RSVP) router to listen for PATH messages, use the **ip rsvp listener** command in global configuration mode. To disable listening, use the **no** form of this command.

ip rsvp listener [**vrf** *vrf-name*] *destination-ip*{**udp** | **tcp** | **any** | *number*} {**any** | *destination-port*} {**announce** | **reply** | **reject**}

no ip rsvp listener [**vrf** *vrf-name*] *destination-ip*{**udp** | **tcp** | **any** | *number*} {**any** | *destination-port*} {**announce** | **reply** | **reject**}

Syntax Description

vrf *vrf-name*	(Optional) Specifies the Virtual routing and forwarding (VRF) instance name.
destination-ip	IP address of the receiving interface.
udp	Specifies the UDP for the receiving interface.
tcp	Specifies the TCP for the receiving interface.
any	Specifies that any protocol can be used for the receiving interface.
number	Source port number from 0 to 255; the protocol is IP.
any	Specifies that any destination port can be used for the receiving interface.
destination-port	Port number for the receiving interface. Range is from 0 to 65535.
announce	Receiver announces the arrival of the flow at its destination, but does not send a RESV message in response.
reply	Sender requests a reply when the flow is received and sends a RESV message when a matching PATH message arrives.
reject	Router sends a PATHERROR (reject) message in response to an incoming PATH message that matches specified listener parameters.

Command Default

This command is disabled by default; therefore, no listeners are configured.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(13)T	This command was introduced.
12.4(6)T	This command was modified. Support for the RSVP application identity (ID) was added.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.
15.0(1)M	This command was modified. The optional **vrf** *vrf-name* keyword and argument combination was added.
Cisco IOS XE Release 2.6	This command was integrated into Cisco IOS Release XE 2.6.

Usage Guidelines

Note The syntax of the command depends on your platform and release. The **vrf** *vrf-name* keyword and argument combination is not supported on ASR 1000 Series Aggregation Services Routers.

Use the **ip rsvp listener** command to allow a router to send a matching RESV message when a PATH message arrives with the desired destination address, port, and protocol. This command copies the application ID and preemption priority value, if present, from the PATH message and includes them in the RESV message.

Use the **ip rsvp listener vrf** *vrf-name* command to create a listener in the context of the routing domain as defined by VRF. You should be aware of the hierarchy of listener configuration. If you configure a listener for the VRF without specifying the IP address and other fields, then subsequent configuration for a more specific listener configuration with a VRF, an IP address, and a port is not accepted.

This command is similar to the **ip rsvp reservation** and **ip rsvp reservation-host** commands. However, they do not allow you to specify more than one port or protocol per command; so you may have to enter many commands to proxy for a set of ports and protocols. In contrast, the **ip rsvp listener** command allows you to use a wildcard for a set of ports and protocols by using just that one command.

You can use the **debug ip rsvp api** command to look for a matching PATH message, but no RESV message will be sent.

Examples

In the following example, the sender is requesting that the receiver reply with a RESV message for the flow if the PATH message destination is 192.168.2.1:

```
Router# configure terminal
Router(config)# ip rsvp listener 192.168.2.1 any any reply
```

The following example creates a listener in the VRF routing domain:

```
Router# configure terminal
Router(config)# ip rsvp listener vrf vpn1 10.10.10.10 any any reply
```

Related Commands

Command	Description
ip rsvp reservation	Enables a router to simulate receiving and forwarding RSVP RESV messages.
ip rsvp reservation-host	Enables a router to simulate a host generating RSVP RESV messages.
show ip rsvp listeners	Displays configured RSVP listeners.

ip rsvp listener outbound

To configure a Resource Reservation Protocol (RSVP) router to listen for PATH messages sent through a specified interface, use the **ip rsvp listener outbound** command in interface configuration mode. To disable listening, use the **no** form of this command.

ip rsvp listener outbound {**reply** | **reject**}

no ip rsvp listener outbound {**reply** | **reject**}

Syntax Description

reply	For a PATH message exiting from a specified interface, the router does the following: • Installs local PATH state for the message. • Terminates the PATH message and does not forward it downstream. • Generates and sends a RESV (reply) message upstream on behalf of the PATH message with the following: – The objects in the RESV message are the same as those in the PATH message. – The policy objects, such as preemption and application IDs, are echoed back. – Shared explicit style is used.
reject	For a PATH message exiting from a specified interface, the router does the following: • Terminates the PATH message and does not forward it downstream. • Generates and sends a PATHERROR (reject) message upstream. • Does not install local PATH state and discards the PATH message.

Command Default

This command is disabled by default; therefore, no listeners are configured.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(18)SFX5	This command was introduced.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
Cisco IOS XE Release 2.6	This command was integrated into Cisco IOS XE Release 2.6.

Usage Guidelines

Use the **ip rsvp listener outbound** command to match all PATH messages that are being sent from a specified interface.

When you configure an interface-based receiver proxy to reply, RSVP performs Call Admission Control (CAC) on the outbound (or egress) interface for the flow. If CAC fails, the reservation is not generated. This is the same behavior for the global RSVP receiver proxy command.

The outbound interface that a flow uses is determined when the flow is set up, and the interface-based receiver proxy is consulted at that time. The interface-based receiver proxy is not consulted if there is a change in routing for an existing flow.

If the interface-based receiver proxy receives a RESVERR message with an admission control failure error or a policy reject error, the interface-based receiver proxy generates a PATHERR message with the same error to provide explicit notification to the sender of the reservation failure.

Examples

In the following example, PATH messages sent through Ethernet interface 3/0 are rejected and PATHERROR messages are generated:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# interface Ethernet3/0
Router(config-if)# ip rsvp listener outbound reject
```

Related Commands

Command	Description
ip rsvp listener	Configures an RSVP router to listen for PATH messages.
ip rsvp reservation	Enables a router to simulate receiving and forwarding RSVP RESV messages.
ip rsvp reservation-host	Enables a router to simulate a host generating RSVP RESV messages.
show ip rsvp listeners	Displays configured RSVP listeners.

ip rsvp msg-pacing

Note Effective with Cisco IOS Release 12.2(13)T, the **ip rsvp msg-pacing** command is replaced by the **ip rsvp signalling rate-limit** command. See the **ip rsvp signalling rate-limit** command for more information.

To configure the transmission rate for Resource Reservation Protocol (RSVP) messages, use the **ip rsvp msg-pacing** command in global configuration mode. To disable this feature, use the **no** form of this command.

ip rsvp msg-pacing [**period** *ms* [**burst** *msgs* [**maxsize** *qsize*]]]

no rsvp msg-pacing

Syntax Description

period *ms*	(Optional) Length of the interval, in milliseconds, during which a router can send the number of RSVP messages specified in the **burst** keyword. The value can be from 1 to 1000 milliseconds.
burst *msgs*	(Optional) Maximum number of RSVP messages that a router can send to an output interface during each interval specified in the *period* keyword. The value can be from 1 to 2000.
maxsize *qsize*	(Optional) Size of per-interface output queues in the sending router. Valid values are from 1 to 2000.

Command Default

RSVP messages are not paced.
If you enter the command without the optional **burst** keyword, the transmission rate for RSVP messages is limited to 200 messages per second per outgoing interface.
The default output queue size, specified in the **maxsize** keyword, is 500.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.0(14)ST	This command was introduced.
12.2(11)S	This command was integrated into Cisco IOS Release 12.2(11)S.
12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
12.2(13)T	This command was replaced with the **ip rsvp signalling rate-limit** command.

Usage Guidelines

You can use this command to prevent a burst of RSVP traffic engineering signaling messages from overflowing the input queue of a receiving router. Overflowing the input queue with signaling messages results in the router dropping some messages. Dropped messages substantially delay the completion of signaling for LSPs for which messages have been dropped.

If you enter the **ip rsvp msg-pacing** command without the optional **burst** keyword, the transmission rate for RSVP messages is limited to 200 messages per second per outgoing interface. The default output queue size, specified in the **maxsize** keyword, is 500.

Examples

The following example shows how to configure a router to send a maximum of 150 RSVP traffic engineering signaling messages in 1 second to a neighbor, and the size of the output queue is 750:

```
Router(config)# ip rsvp msg-pacing period 1 burst 150 maxsize 750
```

Related Commands

Command	Description
clear ip rsvp msg-pacing	Clears the RSVP message pacing output from the **show ip rsvp neighbor** command.

ip rsvp neighbor

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

ip rsvp neighbor *access-list-number*

no ip rsvp neighbor *access-list-number*

Syntax Description

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

Command Default

The router accepts messages from any neighbor.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
11.2	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Use this command to allow only specific Resource Reservation Protocol (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.

RSVP cannot be configured with Versatile Interface Processor (VIP)-distributed Cisco Express Forwarding (dCEF).

Examples

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

```
interface ethernet 0
 ip rsvp neighbor 1
```

Related Commands

Command	Description
fair-queue (WFQ)	Enables WFQ for an interface.
ip rsvp bandwidth	Enables RSVP for IP on an interface.
ip rsvp reservation	Enables a router to simulate receiving and forwarding RSVP RESV messages.

Command	Description
ip rsvp sender	Enables a router to simulate receiving and forwarding RSVP PATH messages.
ip rsvp udp-multicasts	Instructs the router to generate UDP-encapsulated RSVP multicasts whenever it generates an IP-encapsulated multicast packet.
random-detect (interface)	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 policy cops minimal

To lower the load of the Common Open Policy Service (COPS) server and to improve latency times for messages on the governed router, use the **ip rsvp policy cops minimal** command in global configuration mode to restrict the COPS RSVP policy to adjudicate only PATH and RESV messages. To turn off the restriction, use the **no** form of this command.

ip rsvp policy cops minimal

no ip rsvp policy cops minimal

Syntax Description

This command has no arguments or keywords.

Command Default

The default state is OFF, causing all adjudicable RSVP messages to be processed by the configured COPS policy.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.1(1)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

When this command is used, COPS does not attempt to adjudicate PATHERROR and RESVERROR messages. Instead, those messages are all accepted and forwarded.

Examples

The following example shows how COPS authentication is restricted to PATH and RESV messages:

```
ip rsvp policy cops minimal
```

The following example shows how to remove that restriction:

```
no ip rsvp policy cops minimal
```

ip rsvp policy cops report-all

To enable a router to report on its success and failure with outsourcing decisions, use the **ip rsvp policy cops report-all** command in global configuration mode. To return the router to its default, use the **no** form of this command.

ip rsvp policy cops report-all

no ip rsvp policy cops report-all

Syntax Description

This command has no arguments or keywords.

Command Default

The default state of this command is to send reports to the Policy Decision Point (PDP) about configuration decisions only.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.1(1)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

In the default state, the router reports to the PDP when the router has succeeded or failed to implement Resource Reservation Protocol (RSVP) configuration decisions.

A *configuration decision* contains at least one of the following:

- A RESV ALLOC context (with or without additional contexts)
- A stateless or named decision object

A decision that does not contain at least one of those elements is an *outsourcing decision.*

Some brands of policy server might expect reports about RSVP messaging, which the default state of the Cisco Common Open Policy Service (COPS) for RSVP does not issue. In such cases, use the **ip rsvp policy cops report-all** command to ensure interoperability between the router and the policy server. Doing so does not adversely affect policy processing on the router.

Unicast FF reservation requests always stimulate a report from the router to the PDP, because those requests contain a RESV ALLOC context (combined with an IN CONTEXT and an OUT CONTEXT).

Examples

In order to show the Policy Enforcement Point (PEP)-to-PDP reporting process, the **debug cops** command in the following example already is enabled when a new PATH message arrives at the router:

```
Router(config)# ip rsvp policy cops report-all
```

```
00:02:48:COPS:** SENDING MESSAGE **
Contents of router's request to PDP:
 COPS HEADER:Version 1, Flags 0, Opcode 1 (REQ), Client-type:1, Length:216
 HANDLE (1/1) object. Length:8.    00 00 02 01
 CONTEXT (2/1) object. Length:8.   R-type:5.     M-type:1
 IN_IF (3/1) object. Length:12.   Address:10.1.2.1.    If_index:4
 OUT_IF (4/1) object. Length:12.   Address:10.33.0.1.    If_index:3 CLIENT SI (9/1)
object. Length:168.   CSI data:
 [A 27-line Path message omitted here]
00:02:48:COPS:Sent 216 bytes on socket,
00:02:48:COPS:Message event!
00:02:48:COPS:State of TCP is 4
00:02:48:In read function
00:02:48:COPS:Read block of 96 bytes, num=104 (len=104)
00:02:48:COPS:** RECEIVED MESSAGE **
Contents of PDP's decision received by router:
 COPS HEADER:Version 1, Flags 1, Opcode 2 (DEC), Client-type:1, Length:104
 HANDLE (1/1) object. Length:8.    00 00 02 01
 CONTEXT (2/1) object. Length:8.   R-type:1.     M-type:1
 DECISION (6/1) object. Length:8.   COMMAND cmd:1, flags:0
 DECISION (6/3) object. Length:56.   REPLACEMENT
 [A 52-byte replacement object omitted here]
 CONTEXT (2/1) object. Length:8.   R-type:4.     M-type:1
 DECISION (6/1) object. Length:8.   COMMAND cmd:1, flags:0
00:02:48:Notifying client (callback code 2)
00:02:48:COPS:** SENDING MESSAGE **
Contents of router's report to PDP:
 COPS HEADER:Version 1, Flags 1, Opcode 3 (RPT), Client-type:1, Length:24
 HANDLE (1/1) object. Length:8.    00 00 02 01
 REPORT (12/1) object. Length:8.   REPORT type COMMIT (1)
00:02:48:COPS:Sent 24 bytes on socket,
```

ip rsvp policy cops servers

To specify that Resource Reservation Protocol (RSVP) should use Common Open Policy Service (COPS) policy for remote adjudication, use the **ip rsvp policy cops servers** command in global configuration mode. To turn off the use of COPS for RSVP, use the **no** form of this command.

ip rsvp policy cops [*acl*] **servers** *server-ip* [*server-ip*]

no ip rsvp policy cops [*acl*] **servers**

Syntax Description

acl	(Optional) Specifies the access control list (ACL) whose sessions will be governed by the COPS policy.
server-ip	(Optional) Specifies the IP addresses of the servers governing the COPS policy. As many as eight servers can be specified, with the first being treated as the primary server.

Command Default

If no ACL is specified, the default behavior is for all reservations to be governed by the specified policy servers.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.1(1)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

If more than one server is specified, the first server is treated by RSVP as the primary serer, and functions as such for *all* ACLs specified.

All servers in the list must have the same policy configuration.

If the connection of the router to the server breaks, the router tries to reconnect to that same server. If the reconnection attempt fails, the router then obeys the following algorithm:

If the connection to the Policy Decision Point (PDP) is closed (either because the PDP closed the connection, a TCP/IP error occurred, or the keepalives failed), the Policy Enforcement Point (PEP) issues a CLIENT-CLOSE message and then attempts to reconnect to the same PDP. If the PEP receives a CLIENT-CLOSE message containing a PDP redirect address, the PEP attempts to connect to the redirected PDP.

Note the following points:

- If either attempt fails, the PEP attempts to connect to the PDPs previously specified in the **ip rsvp policy cops servers** configuration command, obeying the sequence of servers given in that command, always starting with the first server in that list.
- If the PEP reaches the end of the list of servers without connecting, it waits a certain time (called the *reconnect delay*) before trying again to connect to the first server in the list. This reconnect delay is initially 30 seconds, and doubles each time the PEP reaches the end of the list without having connected, until the reconnect delay becomes its maximum of 30 minutes. As soon as a connection is made, the delay is reset to 30 seconds.

The **no** form of this command need not contain any server IP addresses, but it must contain *all* the previously specified access lists (see the last example in the following section).

Examples

This first example applies the COPS policy residing on server 172.27.224.117 to all reservations passing through router-9. It also identifies the backup COPS server for this router as the one at address 172.27.229.130:

```
Router(config)# ip rsvp policy cops servers 172.27.224.117 172.27.229.130
```

The next example applies the COPS policy residing on server 172.27.224.117 to reservations passing through router-9 only if they match access lists 40 and 160. Other reservations passing through that router will not be governed by this server. The command statement also identifies the backup COPS server for that router to be the one at address 172.27.229.130:

```
Router(config)# ip rsvp policy cops 40 160 servers 172.27.224.117 172.27.229.130
```

The following example turns off COPS for the previously specified access lists 40 and 160 (you cannot turn off just one of the previously specified lists):

```
Router(config)# no ip rsvp policy cops 40 160 servers
```

ip rsvp policy cops timeout

To configure the amount of time the Policy Enforcement Point (PEP) router will retain policy information after losing connection with the Common Open Policy Service (COPS) server, use the **ip rsvp policy cops timeout** command in global configuration mode. To restore the router to the default value (5 minutes), use the **no** form of this command.

ip rsvp policy cops timeout *policy-timeout*

no ip rsvp policy cops timeout

Syntax Description

policy-timeout	Duration of timeout, from 1 to 10,000 seconds.

Command Default

Timeout default is 300 seconds (5 minutes).

Command Modes

Global configuration (config)

Command History

Release	Modification
12.1(1)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Examples

The following example shows how to configure the router to time out all policy information relating to a lost server in 10 minutes:

```
ip rsvp policy cops timeout 600
```

The following example shows how to reset the timeout to the default value:

```
no ip rsvp policy cops timeout
```

ip rsvp policy default-reject

To reject all messages that do not match the policy access control lists (ACLs), use the **ip rsvp policy default-reject** command in global configuration mode. To restore the default behavior, which passes along all messages that do not match the ACLs, use the **no** form of this command.

ip rsvp policy default-reject

no ip rsvp policy default-reject

Syntax Description

This command has no arguments or keywords.

Command Default

Without this command, the default behavior of Resource Reservation Protocol (RSVP) is to accept, install, or forward all unmatched RSVP messages. Once this command is invoked, all unmatched RSVP messages are rejected.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.1(1)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

If COPS is configured without an ACL, or if any policy ACL is configured to use the **permit ip any any** command, the behavior of that ACL will take precedence, and no session will go unmatched.

Note This command makes one exception to its blocking of unmatched messages. It forwards RESVERROR and PATHERROR messages that were generated by its own rejection of RESV and PATH messages. That is done to ensure that the default-reject operation does not remain totally hidden from network managers.

Caution Be extremely careful with this command. It will shut down *all* RSVP processing on the router if access lists are too narrow or if no Common Open Policy Service (COPS) server has been specified. (Use the **ip rsvp policy cops servers** command to specify a COPS server.)

Examples

The following example shows how to configure RSVP to reject all unmatched reservations:

```
ip rsvp policy default-reject
```

The following example shows how to configure RSVP to accept all unmatched reservations:

```
no ip rsvp policy default-reject
```

ip rsvp policy identity

To define Resource Reservation Protocol (RSVP) application identities (IDs), use the **ip rsvp policy identity** command in global configuration mode. To delete RSVP application IDs, use the **no** form of this command.

ip rsvp policy identity *alias* **policy-locator** *locator*

no ip rsvp policy identity *alias* [**policy-locator** *locator*]

Syntax Description

alias	String used within the router to reference the identity in RSVP configuration commands and **show** displays. The string can have as many as 64 printable characters (in the range 0x20 to 0x7E). **Note** If you use the " " or ? characters as part of the alias or locator string itself, you must type the CTRL-V key sequence before entering the embedded " "or ? characters. The alias is never transmitted to other routers.
policy-locator *locator*	Specifies string that is signaled in RSVP messages and contains application IDs in X.500 Distinguished Name (DN) format. (See the "Usage Guidelines" section for detailed information.)

Command Default

This command is disabled by default; therefore, no RSVP application identities are defined.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.4(6)T	This command was introduced.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.
Cisco IOS XE Release 2.6	This command was integrated into Cisco IOS XE Release 2.6.

Usage Guidelines

You can use RSVP identities as criteria for matching RSVP PATH and RESV messages to local policies. Identities can also be used to configure static senders and receivers. When you use an RSVP identity as the match criterion for a local policy, RSVP treats the policy locator string as a type of pattern-matching string known as a regular expression. Regular expressions allow you to configure a single identity for use with a local policy that can match multiple X.500 DNs. Regular expressions, by default, are not exact matches unless you add appropriate control characters to the expression to force it to be an exact match.

In Cisco IOS and Cisco IOX XE software, the locator is the primary piece of information that the router uses to find the correct policy to apply to RSVP messages that contain application IDs. This string assumes the format of an X.500 DN and includes the following attributes as recommended in RFC 2872:

- APP = Application identifier, a required attribute.
- VER = Version number of the application, a required attribute.

- SAPP = Subapplication identifier, an optional attribute. An arbitrary number of subapplication elements can be included.
- GUID = Global unique identifier, an optional attribute.

Here are some examples:

- APP = CCM, VER = 1.1, SAPP = Voice
- GUID = http://www.cisco.com/apps, APP = VideoConference, VER = 1.2.3

You can create a maximum of 100 identities on a router. If you attempt to create more, the command fails and the following error message is generated: "RSVP error: maximum number of identities already created".

When you use the **ip rsvp policy identity** command, be aware of the following behavior:

- If you specify alias or locator strings that are empty or invalid, the command is rejected and an error message is generated.
- Cisco IOS software automatically adds quotes to the alias or locator strings in the configuration if quotes are required.
- If you specify the optional **policy-locator** keyword in the **no** form of this command, the command is rejected if the locator does not match the configured locator string for the alias being deleted.
- If you specify an alias that is missing, empty, or contains invalid characters, the command is rejected and an error message is generated.
- RSVP does not check the locator string for a valid X.500 DN; therefore, the locator string can be anything that you want.

Command Restrictions

- User identities are not supported in Cisco IOS Release 12.4(6)T.
- You cannot configure a single router with more than 100 identities at a time.

Examples

Exact Application ID Match

The following example shows an application ID for RSVP messages containing a locator string whose contents are the exact string "APP=Voice":

```
Router# configure terminal
Router(config)# ip rsvp policy identity "rsvp-voice" policy-locator "^APP=Voice$"
Router(config-rsvp-id)# end
```

Wildcard (or Partial) Application ID Match

The following example shows an application ID that is a partial match for RSVP messages containing a locator string with the substring "APP=Voice" anywhere in the signaled application ID:

```
Router# configure terminal
Router(config)# ip rsvp policy identity "rsvp-voice" policy-locator ".*APP=Voice.*"
Router(config-rsvp-id)# end
```

Related Commands

Command	Description
ip rsvp policy local	Creates a local procedure that determines the use of RSVP resources in a network.
show ip rsvp policy identity	Displays selected RSVP identities in a router configuration.
show ip rsvp policy local	Displays selected local policies that have been configured.

ip rsvp policy local

To determine how to perform authorization on Resource Reservation Protocol (RSVP) requests and enter local policy configuration mode, use the **ip rsvp policy local** command in global configuration or interface configuration mode. To disable this function, use the **no** form of this command.

ip rsvp policy local {**acl** *acl1* [*acl2...acl8*] | **dscp-ip** *value1* [*value2...value8*] | **default** | **identity** *alias1* [*alias2...alias4*] | **origin-as** *as1* [*as2...as8*]}

no ip rsvp policy local {**acl** *acl1* [*acl2...acl8*] | **dscp-ip** *value1* [*value2...value8*] | **default** | **identity** *alias1* [*alias2...alias4*] | **origin-as** *as1* [*as2...as8*]}

Syntax Description

acl *acl1* [*acl2...acl8*]	Specifies an access control list (ACL). Values for each ACL are 1 to 199. **Note** You must associate at least one ACL with an ACL-based policy. However, you can associate as many as eight ACLs with an ACL-based policy.
dscp-ip *value1* [*value2...value8*]	Specifies the differentiated services code point (DSCP) for matching aggregate reservations. Values can be the following: • 0 to 63—Numerical DSCP values. The default value is 0. • af11 to af43—Assured forwarding (AF) DSCP values. • cs1 to cs7—Type of service (ToS) precedence values. • default—Default DSCP value. • ef—Expedited forwarding (EF) DSCP values. **Note** You must associate at least one DSCP with a DSCP-based policy. However, you can associate as many as eight DSCP values with a DSCP-based policy.
default	Specifies a default when an RSVP message does not match any ACL, DSCP, identity, or autonomous system.
identity *alias1* [*alias2...alias4*]	Specifies an application ID alias for an application ID previously configured using the **ip rsvp policy identity** command. **Note** You must associate at least one alias with an application-ID-based policy. However, you can associate as many as four.
origin-as *as1* [*as2...as8*]	Specifies an autonomous system. Values for each autonomous system are 1 to 65535. **Note** You must associate at least one autonomous system with an autonomous-system-based policy. However, you can associate as many as eight.

Command Default

This command is disabled by default; therefore, no local policies are configured.

Command Modes

Global configuration (config)
Interface configuration (config-if)

Command History

Release	Modification
12.2(13)T	This command was introduced.
12.0(29)S	This command was modified. The **origin-as** *as* keyword and argument combination and new submode commands were added.
12.0(30)S	This command was modified. You can no longer use 0 as the protocol when you configure an ACL.
12.4(4)T	This command was integrated into Cisco IOS Release 12.4(4)T.
12.4(6)T	The command was modified. The following changes were made: • Interface configuration mode was added to support per-interface local policies. • The **identity** *alias* keyword and argument combination was added. • The **maximum** submode command was changed to support RESV messages.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
12.2(33)SRC	This command was modified. The **dscp-ip** *value* keyword and argument combination was added.
Cisco IOS XE Release 2.6	This command was integrated into Cisco IOS XE Release 2.6.

Usage Guidelines

Use the **ip rsvp policy local** command to determine how to perform authorization on RSVP requests.

Note When you enter the **origin-as** *as* keyword and argument combination, an RSVP warning message appears stating that the autonomous-system-based policy will be ineffective until BGP is running.

You can use all types of match criteria with non-Traffic-Engineering (TE) reservations. You can use all types of match criteria except application ID with TE reservations because TE PATH and RESV messages sent by Cisco routers do not contain application IDs.

There are five types of local policies—one default local policy, one or more ACL-based policies, one or more autonomous-system-based policies, one or more application-ID-based policies, and one or more DSCP-based policies. The default policy is used when an RSVP message does not match any ACL-, autonomous-system-, application-ID-, or DSCP-based policies.

You can configure a mixture of local policy types including ACL, autonomous system, application ID, DSCP, or default on the same interface or globally. Policies have the following priority (from highest to lowest):

- Nondefault interface policies
- Default interface policy
- Nondefault global policies
- Global default policy

Note If you configure an ACL to use with a TE tunnel, do not use 0 as the protocol because RSVP cannot accept any messages since they do not match the ACL.

Policy-Match Criteria

Note You cannot specify a policy-match criteria more than once using the **ip rsvp policy local** command.

An ACL-based policy must have at least one ACL associated with it, but it can optionally have up to eight ACLs. The ACLs can be standard or extended IP ACLs. They are matched against source/destination addresses/ports based on RSVP objects inside RSVP signaling messages as described below.

- ACL source address—Matched against the source address in the SENDER_TEMPLATE object in RSVP messages. If this object is not present, the source address in the IP header is used.
- ACL destination address—Matched against the destination address in the SESSION object in RSVP messages. If this object is not present, the destination address in the IP header is used.
- ACL source port—Matched against the source port in the SENDER_TEMPLATE object in RSVP messages. If this object is not present, the source port of 0 is used.
- ACL destination port—Matched against the destination port in the SESSION object in RSVP messages. If this object is not present, the destination port of 0 is used.
- ACL IP protocol—Matched against the IP protocol in the SESSION object in RSVP messages. If this object is not present, the IP protocol of 0 is used. If the IP protocol is for a TE session, then the ACL IP protocol should be UDP.
- ACL differentiated services code point (DSCP) values—Matched against the DSCP value in the IP header of the RSVP message.

Note The same policy-match criteria apply when you create ACLs for the **debug ip rsvp filter** command except that the command does not use DSCP and the protocol is ignored for TE sessions.

An autonomous-system-based policy must have at least one autonomous system associated with it, but it can optionally have up to eight autonomous systems. They are matched against the incoming interface/source IP address contained in RSVP objects inside RSVP signaling messages, not on the IP headers of the RSVP messages.

An application-ID-based policy must have at least one application ID associated with it, but it can optionally have up to four application IDs. They are matched against the incoming interface/source IP address contained in RSVP objects inside RSVP signaling messages, not on the IP headers of the RSVP messages.

A DSCP-based policy must have at least one DSCP associated with it, but it can optionally have up to four DSCPs. RSVP extracts the DSCP from the aggregate message SESSION object and applies the local policy that matches the DSCP criteria.

Command Restrictions

- You cannot configure more than 300 local policies per router. This limit is independent of policy location (global or per interface) or match criteria such as application IDs, ACLs, or autonomous systems.
- You cannot configure a single local policy with more than four RSVP identities.

CLI Submodes

Once you type the **ip rsvp policy local** command, you enter the local policy CLI submode where you define the properties of the local policy that you are creating.

Note The local policy that you create automatically rejects all RSVP messages unless you enter a submode command that instructs RSVP on the types of messages to accept or forward.

The submode commands are as follows:

- **accept**—Accepts, but does not forward RSVP messages.

  accept {**all** | **path** | **path-error** | **resv** | **resv-error**}

  - **all**—Accepts all incoming RSVP messages.
  - **path**—Accepts incoming PATH messages that meet the match criteria for this policy, which includes ACL(s), autonomous system(s), application ID(s), or default(s). If you omit this command, incoming PATH messages that meet the policy-match criteria are rejected and a PATHERROR message is sent in reply. However, the PATHERROR reply is also subject to local policy.
  - **path-error**—Accepts incoming PATHERROR messages that meet the match criteria for this policy. If you omit this command, incoming, including locally-generated, PATHERROR messages that meet the policy-match criteria are rejected.
  - **resv**—Accepts incoming RESV messages that meet the match criteria for this policy and performs any required admission control. If you omit this command, incoming RESV messages that meet the policy-match criteria are rejected and a RESVERROR message is sent in reply. However, the RESVERROR reply is also subject to local policy.

    The default bandwidth for a policy is unlimited. Therefore, if the policy has no configured bandwidth, a RESV message is always accepted by the local policy because any bandwidth request is less than or equal to unlimited. However, the RESV message may subsequently fail admission control if there is insufficient bandwidth in the RSVP pool on the input interface to which the RESV message applies. (See the **ip rsvp bandwidth** command for more information.) If the bandwidth requested by the RESV messages is too large, a RESVERROR message that is also subject to local policy is transmitted to the RESV sender.
  - **resv-error**—Accepts incoming RESVERROR messages that meet the policy-match criteria for this policy. If you omit this command, the incoming, including locally-generated, RESVERROR messages that meet the policy-match criteria are rejected.
- **default**—Sets a command to its defaults.
- **exit**—Exits local policy configuration mode.
- **fast-reroute**—Allows TE LSPs that request Fast Reroute service. The default value is accept.
- **forward**—Accepts and forwards RSVP messages.

  forward {**all** | **path** | **path-error** | **resv** | **resv-error**}

  - **all**—Accepts and forwards all RSVP messages.
  - **path**—Accepts and forwards PATH messages that meet the match criteria for this policy. If you omit this command, PATH messages that meet the policy-match criteria are not forwarded to the next (downstream) hop.
  - **path-error**—Accepts and forwards PATHERROR messages that meet the match criteria for this policy. If you omit this command, the PATHERROR messages that meet the match criteria are not forwarded to the previous (upstream) hop. You may want to reject outbound PATHERROR messages if you are receiving PATH messages from an untrusted node because someone could

be trying to port-scan for RSVP. If you reply with a PATHERROR message, the untrusted node knows that you support RSVP and your IP address. Such information could be used to attempt RSVP-based attacks.

  - **resv**—Accepts and forwards RESV messages that meet the match criteria for this policy. If you omit this command, RESV messages that meet the match criteria are not forwarded to the previous (upstream) hop.
  - **resv-error**—Accepts and forwards RESVERROR messages that meet the match criteria for this policy. If you omit this command, the RESVERROR messages that meet the match criteria are not forwarded to the next (downstream) hop. You may want to reject outbound RESVERROR messages if you are receiving RESV messages from an untrusted node because someone could be trying to port-scan for RSVP. If you reply with a RESVERROR message, then the untrusted node knows that you support RSVP and your IP address. Such information could be used to attempt RSVP-based attacks.

- **local-override**—Overrides any other policy sources by enforcing this local policy. Finalizes any decisions by this policy. If local-override is omitted, RSVP holds onto the local policy decision to see if another local or remote policy exists that will make a decision on the RSVP message, and only if there is no other policy decision will the local policy decision be enforced.
- **maximum** [**bandwidth** [**group** *x*] [**single** *y*] | **senders** *n*]—Sets the limits for resources.
  - **bandwidth** [**group** *x*] [**single** *y*]—Indicates bandwidth limits for RSVP reservations. The **group** keyword specifies the amount of bandwidth that can be requested by all reservations covered by this policy. The **single** keyword specifies the maximum bandwidth that can be requested by any specific RSVP reservation covered by this policy. The *x* and *y* values are in kilobits per second and can range from 1 to 10,000,000 (similar in concept to the existing interface mode **ip rsvp bandwidth** command). Absence of a bandwidth command implies that there is no policy limit on bandwidth requests.

    Previously, the **maximum bandwidth** command applied only to PATH messages. However, as part of the application ID enhancement, this command now applies only to RESV messages. This change has the following benefits:

    Allows the local policy bandwidth limit to be used by RSVP's admission control process for both shared and nonshared reservations. Previous releases that performed group bandwidth checks on PATH messages could not account for bandwidth sharing, and, as a result, you had to account for sharing by creating a larger maximum group bandwidth for the policy.

    Allows a local policy to trigger preemption during the admission control function if there is insufficient policy bandwidth to meet the needs of an incoming RESV message.
  - **senders** *n*—Limits the number of RSVP senders affected by this policy that can be active at the same time on this router. The value for *n* ranges from 1 to 50,000 with a default of 1000.

Note If you do not configure the **ip rsvp policy preempt** command, the **maximum** command may be rejected, resulting in the following error message: "RSVP error: insufficient preemptable bandwidth" if there are reservations admitted against the policy, and you try to reduce the group bandwidth to less than the amount of admitted bandwidth on the policy.

- **no**—Negates a command or sets its defaults.

- **preempt-priority** [**traffic-eng** *x*] *setup-priority* [*hold-priority*]—Specifies the RSVP QoS priorities to be inserted into PATH and RESV messages if they were not signaled from an upstream or downstream neighbor or local client application, and the maximum setup or hold priority that RSVP QoS or MPLS/TE sessions can signal. A PATHERROR, RESVERROR, or local application error is returned if these limits are exceeded.

  The *x* value indicates the upper limit of the priority for TE reservations. The range of *x* values is 0 to 7 in which the smaller the number, the higher the reservation's priority. For non-TE reservations, the range of *x* values is 0 to 65535 in which the higher the number, the higher the reservation's priority.

  The *setup-priority* argument indicates the priority of a reservation when it is initially installed. The optional *hold-priority* argument indicates the priority of a reservation after it has been installed; if omitted, it defaults to the *setup-priority*. Values for the *setup-priority* and *hold-priority* arguments range from 0 to 7 where 0 is considered the highest priority.

  If the incoming message has a preemption priority that requests a priority higher than the policy allows, the message is rejected. Use the **tunnel mpls traffic-eng priority** command to configure preemption priority for TE tunnels.

  A single policy can contain a **preempt-priority traffic-eng** and a **preempt-priority** command, which may be useful if the policy is bound to an ACL that identifies a subnet containing a mix of TE and non-TE endpoints or midpoints.

Note If you exit local policy configuration mode without entering any submode commands, the policy that you have created rejects *all* RSVP messages.

Per-Interface Local Policies

All the local policy submode commands are also supported on a per-interface basis. You simply enter Cisco IOS interface configuration mode for the selected interface and type in any number and mix of the submode commands.

Per-interface local policies take precedence over global local policies. However, if there is a default local policy configured for an interface, the router does not try to match any RSVP messages arriving on that interface to any of the global local policies. Policies have the following priority (from highest to lowest):

- Nondefault interface policies
- Default interface policy
- Nondefault global policies
- Global default policy

There are some important points to note about per-interface local policies:

- Per-interface local policies do not take the place of the **ip rsvp bandwidth** command. The **ip rsvp bandwidth** command indicates if RSVP is enabled on an interface as well as the size of the RSVP bandwidth pool. The **ip rsvp bandwidth** pool is used by the admission control function of RSVP; per-interface policies are used by the policy control function of RSVP. Policy control is the third phase of RSVP message processing, which consists of validation, authentication, policy control (authorization), and admission control.
- The sum of the group bandwidth of all the local policies assigned to an interface can be greater than the maximum total bandwidth configured in the **ip rsvp bandwidth** command. However, the **ip rsvp bandwidth** command makes the final decision as to whether there is sufficient bandwidth to admit the reservation.

Examples

ACL-, Default-, and Autonomous-System-Based Policies

In the following example, any RSVP nodes in the 192.168.101.0 subnet can initiate or respond to reservation requests, but all other nodes can respond to reservation requests only. This means that any 192.168.101.x node can send and receive PATH, PATHERROR, RESV, or RESVERROR messages. All other nodes can send only RESV or RESVERROR messages, and all reservations for autonomous system 1 are rejected.

```
Router# configure terminal
Router(config)# access-list 104 permit ip 192.168.101.0 0.0.0.255 any
Router(config)# ip rsvp policy local acl 104
Router(config-rsvp-policy-local)# forward all
Router(config-rsvp-policy-local)# exit
Router(config)# ip rsvp policy local default
Router(config-rsvp-policy-local)# forward resv
Router(config-rsvp-policy-local)# forward resverror
Router(config-rsvp-policy-local)# exit
Router(config)# ip rsvp policy local origin-as 1
Router(config-rsvp-policy-local)# end
```

Application-ID-Based Policy

RSVP matches incoming RSVP messages with IDs to configured IDs and policies. The following example configures a global RSVP local policy that limits voice calls to 200 kbps for the whole router regardless of which interface the RSVP signaling occurs on:

```
Router# configure terminal
Router(config)# ip rsvp policy local identity rsvp-voice policy-locator
"GUID=www.cisco.com, APP=Voice"
Router(config)# ip rsvp policy local identity rsvp-voice
Router(config-rsvp-local-policy)# forward all
Router(config-rsvp-local-policy)# maximum bandwidth group 200
Router(config-rsvp-local-policy)# end
```

Per-Interface Application ID-Based Policy

The following example configures a local policy that limits all RSVP voice calls on serial interface 2/0/0 to a total of 200 kbps:

```
Router# configure terminal
Router(config)# ip rsvp policy local identity rsvp-voice policy-locator APP=Voice
Router(config)# interface serial2/0/0
Router(config-if)# ip rsvp policy local identity rsvp-voice
Router(config-rsvp-local-policy)# forward all
Router(config-rsvp-local-policy)# maximum bandwidth group 200
Router(config-rsvp-local-policy)# exit
Router(config-if)# ip rsvp policy local default
Router(config-rsvp-local-policy)# forward all
Router(config-rsvp-local-policy)# maximum bandwidth group 50
Router(config-rsvp-local-policy)# end
```

DSCP-Based Policy

The following example configures a local policy to match RSVP aggregation reservations with an RSVP session object DSCP value of 46 and sets the preempt-priority with a setup and hold priority equal to 5.

```
Router# configure terminal
Router(config)# ip rsvp policy local dscp-ip 46
Router(config-rsvp-local-policy)# forward all
Router(config-rsvp-local-policy)# preempt-priority 5 5
Router(config-rsvp-local-policy)# end
```

Related Commands

Command	Description
debug ip rsvp filter	Displays debug messages for RSVP debug message filter.
ip rsvp policy preempt	Enables RSVP to redistribute bandwidth from lower-priority reservations to new, higher-priority reservations.
show ip rsvp policy	Displays the configured local policies.
show ip rsvp policy cops	Displays the policy server addresses, ACL IDs, and current state of the router's TCP connections to COPS servers.
show ip rsvp policy local	Displays selected local policies that have been configured.
tunnel mpls traffic-eng priority	Configures the setup and reservation priority for an MPLS traffic engineering tunnel.

ip rsvp policy preempt

To enable Resource Reservation Protocol (RSVP) to take bandwidth from lower-priority reservations and give it to new, higher-priority reservations, use the **ip rsvp policy preempt** command in global configuration mode. To disable this function, use the **no** form of this command.

ip rsvp policy preempt

no ip rsvp policy preempt

Syntax Description

This command has no arguments or keywords.

Command Default

RSVP does not reassign bandwidth from lower-priority reservations to higher-priority reservations.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(13)T	This command was introduced.

Usage Guidelines

Use the **ip rsvp policy preempt** command to enable or disable the preemption parameter for all configured local and remote policies without setting the preemption parameter for each policy individually. This command allows you to give preferential quality of service (QoS) treatment to one group of RSVP hosts or applications over another.

Examples

The following example shows how to enable preemption:

```
Router(config)# ip rsvp policy preempt
```

The following example shows how to disable preemption:

```
Router(config)# no ip rsvp policy preempt
```

Related Commands

Command	Description
show ip rsvp policy	Displays the configured local policies.

ip rsvp policy vrf

To configure a Resource Reservation Protocol (RSVP) policy for a virtual routing and forwarding (VRF) instance, use the **ip rsvp policy vrf** command in global configuration mode. To remove a VRF-specific policy, use the **no** form of this command.

ip rsvp policy vrf *vrf-name* {**identity** *alias* **policy-locator** *regular-expression* | **local** {**acl** *acl1* [*acl2...acl8*] | **default** | **identity** *alias1* [*alias2...alias4*] | **origin-as** *as1* [*as2...as8*]}}

no ip rsvp policy vrf *vrf-name* {**identity** *alias* **policy-locator** *regular-expression* | **local** {**acl** *acl1* [*acl2...acl8*] | **default** | **identity** *alias1* [*alias2...alias4*] | **origin-as** *as1* [*as2...as8*]}}

Syntax Description

vrf-name	Name of a specified VRF.
identity	Unique information that is conveyed in the POLICY-DATA object for RSVP messages.
alias	A string used within the router to reference the identity in RSVP configuration commands and show displays. The string can have as many as 64 printable characters (in the range 0x20 to 0x7E). **Note** If you use the " " or ? characters as part of the alias or locator string itself, you must type the CTRL/V key sequence before entering the embedded " " or ? characters. The alias is never transmitted to other routers.
policy-locator	A string that is signaled in RSVP messages and contains application IDs in X.500 Distinguished Name (DN) format.
regular-expression	A type of pattern-matching string that allows you to configure a single identity for use with a local policy that can match multiple X.500 DNs.
local	A local policy.
acl	Access control list (ACL) for the local policy.
acl1 [*acl2...acl8*]	An ACL. Values for each ACL are 1 to 199. **Note** You must associate at least one ACL with an ACL-based policy. However, you can associate as many as eight.
default	The policy used when an RSVP message does not match any ACL, identity, or autonomous system.
identity	An application ID.
alias1 [*alias2...alias4*]	An application ID alias for an application ID previously configured using the **ip rsvp policy identity** command. **Note** You must associate at least one alias with an application-ID-based policy. However, you can associate as many as four.
origin-as	An autonomous system (AS).
as1 [*as2...as8*]	An AS. Values for each autonomous system are 1 to 65535. **Note** You must associate at least one autonomous system with an autonomous-system-based policy. However, you can associate as many as eight.

Command Default

No policies for VRFs are configured.

Command Modes Global configuration (config)

Command History

Release	Modification
15.0(1)M	This command was introduced.

Usage Guidelines If you enter a VRF that does not exist, the following error message appears:

```
RSVP error: VRF: myvrf doesn't exist.First create this VRF.
```

To delete the error message, create the VRF called myvrf and issue the command again.

If you configure some VRF-specific policies on a router and the VRF has been removed from the router, then all the policies configured for that VRF are also removed from the configurations.

Examples The following example shows how to configure a local default policy for the VRF called myvrf after it has been created:

```
Router(config)# ip rsvp policy vrf myvrf local default
```

Related Commands

Command	Description
ip rsvp policy identity	Defines RSVP application IDs.
ip rsvp policy local	Defines an RSVP local policy.

ip rsvp pq-profile

To specify the criteria for Resource Reservation Protocol (RSVP) to use to determine which flows to direct into the priority queue (PQ) within weighted fair queueing (WFQ), use the **ip rsvp pq-profile** command in global configuration mode. To disable the specified criteria, use the **no** form of this command.

ip rsvp pq-profile [*voice-like* | *r'* [*b'*[*p-to-r'* | *ignore-peak-value*]]

no ip rsvp pq-profile

Syntax Description

voice-like	(Optional) Indicates pq-profile parameters sufficient for most voice flows. The default values for r', b', and p-to-r' are used. These values should cause all voice flows generated from Cisco IOS applications and most voice flows from other RSVP applications, such as Microsoft NetMeeting, to be directed into the PQ.
r'	(Optional) Indicates maximum rate of a flow in bytes per second. Valid range is from 1 to 1048576 bytes per second.
b'	(Optional) Indicates maximum burst of a flow in bytes. Valid range is from 1 to 8192 bytes.
p-to-r'	(Optional) Indicates maximum ratio of peak rate to average rate as a percentage. Valid range is from 100 to 4000 percent.
ignore-peak-value	(Optional) Indicates that the peak rate to average rate ratio of the flow is not evaluated when RSVP identifies flows.

Command Default

The default value for r' is 12288 bytes per second.

The default value for b' is 592 bytes.

The default value for p-to-r' is 110 percent.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.1(3)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Use this command to define the profile of RSVP flows to be placed in the PQ within the WFQ system. You can have only one profile in effect at a time. Changes to this configuration affect only new flows, not existing flows.

This command applies only on interfaces that are running RSVP and WFQ.

RSVP recognizes voice flows based upon the r, b, and p values within the flowspec of a receiver. A reserved flow is granted to the PQ as long as the flowspec parameters of a receiver meet the following default criteria:

(r <= r') AND (b <= b') AND (p/r <= p-to-r')

Examples

The following example shows how to put voice-like flows (with the default criteria for voice) into the PQ:

```
Router(config)# ip rsvp pq-profile
Router(config)# ip rsvp pq-profile voice-like
Router(config)# ip rsvp pq-profile 12288 592 110
Router(config)# default ip rsvp pq-profile
Router# show running-config | include pq-profile
```

The following example shows how to put all flows matching the voice criteria into the PQ:

```
Router(config)# ip rsvp pq-profile 10240 512 100
Router# show running-config | include pq-profile

ip rsvp pq-profile 10240 512 100
```

The following example shows how to define that no flows are put into the PQ:

```
Router(config)# no ip rsvp pq-profile
Router# show running-config | include pq-profile

no ip rsvp pq-profile
```

The following example shows how to put flows with the criteria given for r' and b' and the default value for p-to-r' into the PQ:

```
Router(config)# ip rsvp pq-profile 9000 300
Router# show running-config | include pq-profile

ip rsvp pq-profile 9000 300 110
```

The following example shows how to put flows with the criteria given for r' and b' and ignoring the peak value of the flow into the PQ:

```
Router(config)# ip rsvp pq-profile 9000 300 ignore-peak-value
Router# show running-config | include pq-profile

ip rsvp pq-profile 9000 300 ignore-peak-value
```

The following example shows how to put Microsoft NetMeeting voice flows with G.711 or adaptive differential pulse code modulation (ADPCM) codecs into the PQ:

```
Router(config)# ip rsvp pq-profile 10200 1200
```