send qdm message through show atm bundle svc statistics

send qdm message

To send a text message to all Quality Device Manager (QDM) clients, use the **sendqdmmessage**command in EXEC mode.

send qdm [**client** *client-id*] **message** *message-text*

Syntax Description

client	(Optional) Specifies a QDM client to receive the message.
client-id	(Optional) Specifies the QDM identification of the client that will receive the text message.
message	Specifies that a message will be sent.
message-text	The actual text of the message.

Command Default

No text messages are sent.

Command Modes

EXEC

Command History

Release	Modification
12.1(1)E	This command was introduced.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)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

Use the **sendqdm**command to send a message to a specific QDM client. For example, entering the**sendqdmclient9messagehello** command will send the message “hello” to client ID 9.

Use the **sendqdmmessage***message-text* command to send a message to all QDM clients. For example, entering the **sendqdmmessagehello** command sends the message “hello” to all open QDM clients.

Examples

The following example sends the text message “how are you?” to client ID 12:

```
send qdm client 12 message how are you?
```

The following example sends the text message “how is everybody?” to all QDM clients connected to the router:

```
send qdm message how is everybody?
```

Related Commands

Command	Description
show qdm status	Displays the status of connected QDM clients.

service-group

To create a service group, use the service-group command in global configuration mode. To remove a service group, use the **no** form of this command.

service-group service-group-identifier

no service-group service-group-identifier

Syntax Description

service-group-identifier	Service-group number. A valid entry is a number between 1 and the maximum number of groups that can be supported by the router. For more information, use the question mark (?) online help function and see "Usage Guidelines."

Command Default

A service group is not created.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(33)SRE	This command was introduced.

Usage Guidelines

The maximum number of service groups that are supported on a router is determined by the router at system-startup time. For the Cisco 7600 series router, the valid entry range for the *service-group-identifier* argument is 1 to 32768.

Examples

In the following example, service group 750 is created.

```
Router> enable
Router# configure terminal
Router(config)# service-group 750
Router(config)# end
```

service-policy

To attach a policy map to an input interface, a virtual circuit (VC), an output interface, or a VC that will be used as the service policy for the interface or VC, use the **service-policy** command in the appropriate configuration mode. To remove a service policy from an input or output interface or from an input or output VC, use the **no** form of this command.

service-policy [**type access-control**] {**input| output**} *policy-map-name*

no service-policy [**type access-control**] {**input| output**} *policy-map-name*

Cisco 10000 Series and Cisco 7600 Series Routers

service-policy [**history**| {**input| output**} *policy-map-name*| **type control** *control-policy-name*]

no service-policy [**history**| {**input| output**} *policy-map-name*| **type control** *control-policy-name*]

Syntax Description

type access-control	(Optional) Determines the exact pattern to look for in the protocol stack of interest.
input	Attaches the specified policy map to the input interface or input VC.
output	Attaches the specified policy map to the output interface or output VC.
policy-map-name	The name of a service policy map (created using the **policy-map** command) to be attached. The name can be a maximum of 40 alphanumeric characters in length.
history	(Optional) Maintains a history of quality of service (QoS) metrics.
type control *control-policy-name*	(Optional) Creates a Class-Based Policy Language (CPL) control policy map that is applied to a context.

Command Default

No service policy is specified. A control policy is not applied to a context. No policy map is attached.

Command Modes

ATM VC bundle configuration (config-atm-bundle)

ATM PVP configuration (config-if-atm-l2trans-pvp)

ATM VC configuration mode (config-if-atm-vc)

Ethernet service configuration (config-if-srv)

Global configuration (config)

Interface configuration (config-if)

Static maps class configuration (config-map-class)

ATM PVC-in-range configuration (cfg-if-atm-range-pvc)

Subinterface configuration (config-subif)

Command History

Release	Modification
12.0(5)T	This command was introduced.
12.0(5)XE	This command was integrated into Cisco IOS Release 12.0(5)XE.
12.0(7)S	This command was integrated into Cisco IOS Release 12.0(7)S.
12.0(17)SL	This command was implemented on the Cisco 10000 series routers.
12.1(1)E	This command was integrated into Cisco IOS Release 12.1(1)E.
12.1(2)T	This command was modified to enable low latency queueing (LLQ) on Frame Relay VCs.
12.2(14)SX	Support for this command was implemented on Cisco 7600 series routers. Support was added for output policy maps.
12.2(15)BX	This command was implemented on the ESR-PRE2.
12.2(17d)SXB	This command was implemented on the Supervisor Engine 2 and integrated into Cisco IOS Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.4(2)T	This command was modified. Support was added for subinterface configuration mode and for ATM PVC-in-range configuration mode to extend policy map functionality on an ATM VC to the ATM VC range.
12.4(4)T	The **type stack** and **type control** keywords were added to support flexible packet matching (FPM).
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB and implemented on the Cisco 10000 series router.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.3(7)XI2	This command was modified to support subinterface configuration mode and ATM PVC-in-range configuration mode for ATM VCs on the Cisco 10000 series router and the Cisco 7200 series router.
12.2(18)ZY	The **type stack** and **type control** keywords were integrated into Cisco IOS Release 12.2(18)ZY on the Catalyst 6500 series of switches equipped with the Programmable Intelligent Services Accelerator (PISA).

Release	Modification
12.2(33)SRC	Support for this command was enhanced on Cisco 7600 series routers.
12.2(33)SB	This command was modified. The command was implemented on the Cisco 10000 series router for the PRE3 and PRE4.
Cisco IOS XE Release 2.3	This command was modified to support ATM PVP configuration mode.
12.4(18e)	This command was modified to prevent simultaneous configuration of legacy traffic-shaping and Cisco Modular QoS CLI (MQC) shaping on the same interface.
Cisco IOS XE Release 3.3S	This command was modified to support Ethernet service configuration mode.
Cisco IOS XE Release 3.5S	This command was modified. An error displays if you try to configure the **service-policy input** or **service-policy output** command when the **ip subscriber interface** command is already configured on the interface.
15.2(1)S	This command was modified to allow simultaneous nonqueueing policies to be enabled on subinterfaces.

Usage Guidelines

The table below shows which configuration mode to choose based on the intended use of the command.

Table 1: Configuration Modes Based on Command Application

Application	Mode
Standalone VC	ATM VC submode
ATM VC bundle members	ATM VC Bundle configuration
A range of ATM PVCs	Subinterface configuration
Individual PVC within a PVC range	ATM PVC-in-range configuration
Frame Relay VC	Static maps class configuration
Ethernet services, Ethernet VCs (EVCs)	Ethernet service configuration

You can attach a single policy map to one or more interfaces or to one or more VCs to specify the service policy for those interfaces or VCs.

A service policy specifies class-based weighted fair queueing (CBWFQ). The class policies that make up the policy map are then applied to packets that satisfy the class map match criteria for the class.

Before you can attach a policy map to an interface or ATM VC, the aggregate of the configured minimum bandwidths of the classes that make up the policy map must be less than or equal to 75 percent (99 percent on the Cisco 10008 router) of the interface bandwidth or the bandwidth allocated to the VC.

Before you can enable low latency queueing (LLQ) for Frame Relay (priority queueing [PQ]/CBWFQ), you must first enable Frame Relay traffic shaping (FRTS) on the interface using the **frame-relay traffic-shaping** command in interface configuration mode. You then attach an output service policy to the Frame Relay VC using the **service-policy** command in Static maps class configuration mode.

To attach a policy map to an interface or ATM VC, the aggregate of the configured minimum bandwidths of the classes that make up the policy map must be less than or equal to 75 percent of the interface bandwidth or the bandwidth allocated to the VC. For a Frame Relay VC, the total amount of bandwidth allocated must not exceed the minimum committed information rate (CIR) configured for the VC less any bandwidth reserved by the **frame-relay voice bandwidth** or **frame-relay ip rtp priority** Static maps class configuration mode commands. If these values are not configured, the minimum CIR defaults to half of the CIR.

Configuring CBWFQ on a physical interface is possible only if the interface is in the default queueing mode. Serial interfaces at E1 (2.048 Mbps) and below use weighted fair queueing (WFQ) by default. Other interfaces use first-in first-out (FIFO) by default. Enabling CBWFQ on a physical interface overrides the default interface queueing method. Enabling CBWFQ on an ATM permanent virtual circuit (PVC) does not override the default queueing method.

When you attach a service policy with CBWFQ enabled to an interface, commands related to fancy queueing such as those pertaining to fair queueing, custom queueing, priority queueing, and Weighted Random Early Detection (WRED) are available using the modular quality of service CLI (MQC). However, you cannot configure these features directly on the interface until you remove the policy map from the interface.

Note Beginning in Cisco IOS Release 12.4(18e), you cannot configure the traffic-shape rate and MQC shaping on the same interface at the same time. You must remove the traffic-shape rate configured on the interface before you attach the service policy. For example, if you try to enter the **service-policy** {**input** | **output**} *policy-map-name* command when the **traffic-shape rate** command is already in effect, this message is displayed:

```
Remove traffic-shape rate configured on the interface before attaching the service-policy.
```

If the MQC shaper is attached first, and you enter the legacy **traffic-shape rate** command on the same interface, the command is rejected and an error message is displayed.

You can modify a policy map attached to an interface or VC, changing the bandwidth of any of the classes that make up the map. Bandwidth changes that you make to an attached policy map are effective only if the aggregate of the bandwidth amount for all classes that make up the policy map, including the modified class bandwidth, is less than or equal to 75 percent of the interface bandwidth or the VC bandwidth. If the new aggregate bandwidth amount exceeds 75 percent of the interface bandwidth or VC bandwidth, the policy map is not modified.

After you apply the **service-policy** command to set a class of service (CoS) bit to an Ethernet interface, the policy remains active as long as there is a subinterface that is performing 8021.Q or Inter-Switch Link (ISL) trunking. Upon reload, however, the service policy is removed from the configuration with the following error message:

```
Process "set" action associated with class-map voip failed: Set cos supported only with
IEEE 802.1Q/ISL interfaces.
```

Note The **service-policy input** and **service-policy output** commands cannot be configured if the **ip subscriber interface** command is already configured on the interface; these commands are mutually exclusive.

Simultaneous Nonqueueing QoS Policies

Beginning in Cisco IOS Release 15.2(1)S, you can configure simultaneous nonqueueing QoS policies on an ATM subinterface and ATM PVC, or on a Frame Relay (FR) subinterface and data-link connection identifier (DLCI). However, simultaneous queueing policies are still not allowed, because they create hierarchical queueing framework layer contention. If you try to configure simultaneous queueing policies, the policies are rejected and the router displays an error message.

Note If both the PVC or DLCI and subinterface policies are applied under the same subinterface, the policy under the PVC or DLCI takes precedence and the subinterface policy has no effect.

Cisco 10000 Series Router Usage Guidelines

The Cisco 10000 series router does not support applying CBWFQ policies to unspecified bit rate (UBR) VCs.

To attach a policy map to an interface or a VC, the aggregate of the configured minimum bandwidth of the classes that make up the policy map must be less than or equal to 99 percent of the interface bandwidth or the bandwidth allocated to the VC. If you attempt to attach a policy map to an interface when the sum of the bandwidth assigned to classes is greater than 99 percent of the available bandwidth, the router logs a warning message and does not allocate the requested bandwidth to all of the classes. If the policy map is already attached to other interfaces, it is removed from them.

The total bandwidth is the speed (rate) of the ATM layer of the physical interface. The router converts the minimum bandwidth that you specify to the nearest multiple of 1/255 (ESR-PRE1) or 1/65,535 (ESR-PRE2) of the interface speed. When you request a value that is not a multiple of 1/255 or 1/65,535, the router chooses the nearest multiple.

The bandwidth percentage is based on the interface bandwidth. In a hierarchical policy, the bandwidth percentage is based on the nearest parent shape rate.

By default, a minimum bandwidth guaranteed queue has buffers for up to 50 milliseconds of 256-byte packets at line rate, but not less than 32 packets.

For Cisco IOS Release 12.0(22)S and later releases, to enable LLQ for Frame Relay (priority queueing (PQ)/CBWFQ) on the Cisco 10000 series router, first create a policy map and then assign priority to a defined traffic class using the **priority** command. For example, the following sample configuration shows how to configure a priority queue with a guaranteed bandwidth of 8000 kb/s. In the example, the Business class in the policy map named “map1” is configured as the priority queue. The map1 policy also includes the Non-Business class with a minimum bandwidth guarantee of 48 kb/s. The map1 policy is attached to serial interface 2/0/0 in the outbound direction.

```
class-map Business
 match ip precedence 3
policy-map map1
 class Business
 priority
 police 8000
 class Non-Business
 bandwidth 48
interface serial 2/0/0
 frame-relay encapsulation
 service-policy output map1
```

On the PRE2, you can use the **service-policy** command to attach a QoS policy to an ATM subinterface or to a PVC. However, on the PRE3, you can attach a QoS policy only to a PVC.

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The **output** keyword is not supported on Cisco 7600 series routers that are configured with a Supervisor Engine 2.

Do not attach a service policy to a port that is a member of an EtherChannel.

Although the CLI allows you to configure QoS based on policy feature cards (PFCs) on the WAN ports on the OC-12 ATM optical services modules (OSM) and on the WAN ports on the channelized OSMs, PFC-based QoS is not supported on the WAN ports on these OSMs. OSMs are not supported on Cisco 7600 series routers that are configured with a Supervisor Engine 32.

PFC QoS supports the optional **output** keyword only on VLAN interfaces. You can attach both an input policy map and an output-policy map to a VLAN interface.

Cisco 10000 Series Routers Control Policy Maps

Activate a control policy map by applying it to a context. A control policy map can be applied to one or more of the following types of contexts, which are listed in order of precedence:

1 Global

2 Interface

3 Subinterface

4 Virtual template

5 VC class

6 PVC

In general, control policy maps that are applied to more specific contexts take precedence over policy maps applied to more general contexts. In the list, the context types are numbered in order of precedence. For example, a control policy map that is applied to a permanent virtual circuit (PVC) takes precedence over a control policy map that is applied to an interface.

Control policies apply to all sessions hosted on the context. Only one control policy map can be applied to a given context.

Abbreviated Form of the service-policy Command

In Cisco IOS Release 12.2(33)SB and later releases, the router does not accept the abbreviated form (ser) of the **service-policy** command. Instead, you must spell out the command name **service-** before the router accepts the command. For example, the following error message displays when you attempt to use the abbreviated form of the **service-policy** command:

```
interface GigabitEthernet1/1/0
 ser out ?
% Unrecognized command
 ser ?
% Unrecognized command
```

As shown in the following example, when you enter the command as **service-** followed by a space, the router parses the command as **service-policy**. Entering the question mark causes the router to display the command options for the **service-policy** command.

```
service- ?
input Assign policy-map to the input of an interface
output Assign policy-map to the output of an interface
type Configure CPL Service Policy
```

In releases prior to Cisco IOS Release 12.2(33)SB, the router accepts the abbreviated form of the **service-policy** command. For example, the router accepts the following commands:

```
interface GigabitEthernet1/1/0
 ser out test
```

Examples

The following example shows how to attach a policy map to a Fast Ethernet interface:

```
interface fastethernet 5/20
 service-policy input pmap1
```

The following example shows how to attach the service policy map named “policy9” to DLCI 100 on output serial interface 1 and enables LLQ for Frame Relay:

```
interface Serial1/0.1 point-to-point
 frame-relay interface-dlci 100
 class fragment
 map-class frame-relay fragment
 service-policy output policy9
```

The following example shows how to attach the service policy map named “policy9” to input serial interface 1:

```
interface Serial1
 service-policy input policy9
```

The following example attaches the service policy map named “policy9” to the input PVC named “cisco”:

```
pvc cisco 0/34
service-policy input policy9
vbr-nt 5000 3000 500
precedence 4-7
```

The following example shows how to attach the policy named “policy9” to output serial interface 1 to specify the service policy for the interface and enable CBWFQ on it:

```
interface serial1
 service-policy output policy9
```

The following example attaches the service policy map named “policy9” to the output PVC named "cisco":

```
pvc cisco 0/5
service-policy output policy9
vbr-nt 4000 2000 500
precedence 2-3
```

Examples

The following example shows how to attach the service policy named “userpolicy” to DLCI 100 on serial subinterface 1/0/0.1 for outbound packets:

```
interface serial 1/0/0.1 point-to-point
 frame-relay interface-dlci 100
 service-policy output userpolicy
```

Note You must be running Cisco IOS Release 12.0(22)S or a later release to attach a policy to a DLCI in this way. If you are running a release prior to Cisco IOS Release 12.0(22)S, attach the service policy as described in the previous configuration examples using the legacy Frame Relay commands, as shown in the example “how to attach the service policy map named “policy9” to DLCI 100 on output serial interface 1 and enable LLQ for Frame Relay”.

The following example shows how to attach a QoS service policy named “map2” to PVC 0/101 on the ATM subinterface 3/0/0.1 for inbound traffic:

```
interface atm 3/0/0
 atm pxf queueing
interface atm 3/0/0.1
 pvc 0/101
 service-policy input map2
```

Note The **atm pxf queueing** command is not supported on the PRE3 or PRE4.

The following example shows how to attach a service policy named “myQoS” to physical Gigabit Ethernet interface 1/0/0 for inbound traffic. VLAN 4, configured on Gigabit Ethernet subinterface 1/0/0.3, inherits the service policy of physical Gigabit Ethernet interface 1/0/0.

```
interface GigabitEthernet 1/0/0
 service-policy input myQoS
interface GigabitEthernet 1/0/0.3
 encapsulation dot1q 4
```

The following example shows how to apply the policy map named “policy1” to the virtual template named “virtual-template1” for all inbound traffic. In this example, the virtual template configuration also includes Challenge Handshake Authentication Protocol (CHAP) authentication and PPP authorization and accounting.

```
interface virtual-template1
 ip unnumbered Loopback1
 no peer default ip address
 ppp authentication chap vpn1
 ppp authorization vpn1
 ppp accounting vpn1
 service-policy input policy1
```

The following example shows how to attach the service policy map named “voice” to ATM VC 2/0/0 within a PVC range of a total of three PVCs and enable subinterface configuration mode where a point-to-point subinterface is created for each PVC in the range. Each PVC created as part of the range has the voice service policy attached to it.

```
configure terminal
 interface atm 2/0/0
 range pvc 1/50 1/52
 service-policy input voice
```

The following example shows how to attach the service policy map named “voice” to ATM VC 2/0/0 within a PVC range, where every VC created as part of the range has the voice service policy attached to it. The exception is PVC 1/51, which is configured as an individual PVC within the range and has a different service policy named “data” attached to it in ATM PVC-in-range configuration mode.

```
configure terminal
 interface atm 2/0/0
 range pvc 1/50 1/52
 service-policy input voice
 pvc-in-range 1/51
 service-policy input data
```

The following example shows how to configure a service group named “PREMIUM-SERVICE” and apply the input policy named “PREMIUM-MARK-IN” and the output policy named “PREMIUM-OUT” to the service group:

```
policy-map type service PREMIUM-SERVICE
 service-policy input PREMIUM-MARK-IN
 service-policy output PREMIUM-OUT
```

The following example shows a policy map and interface configuration that supported simultaneous nonqueueing policies:

```
Policy-map p-map
class c-map
set mpls experimental imposition 4

interface ATM1/0/0.1 multipoint
no atm enable-ilmi-trap
xconnect 10.1.1.1 100001 encapsulation mpls
service-policy input p-map
pvc 1/41 l2transport
no epd
!
pvc 1/42 l2transport
no epd
!
pvc 1/43 l2transport
no epd
interface ATM1/0/0.101 multipoint
no atm enable-ilmi-trap
pvc 9/41 l2transport
xconnect 10.1.1.1 1001011 encapsulation mpls
service-policy input p-map
!
pvc 10/41 l2transport
xconnect 10.1.1.1 1001012 encapsulation mpls
!
```

The following example shows how to attach simultaneous nonqueueing QoS policies on an ATM subinterface and ATM PVC:

```
interface atm 1/0/0.101
pvc 9/41
service-policy input p-map
```

Related Commands

Command	Description
class-map	Accesses QoS class-map configuration mode to configure QoS class maps.
frame-relay ip rtp priority	Reserves a strict priority queue on a Frame Relay PVC for a set of RTP packet flows belonging to a range of UDP destination ports,
frame-relay traffic-shaping	Enables both traffic shaping and per-virtual-circuit queueing for all PVCs and SVCs on a Frame Relay interface.
frame-relay voice bandwidth	Specifies the amount of bandwidth to be reserved for voice traffic on a specific DLCI.
ip subscriber interface	Creates an ISG IP interface session.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
priority	Gives priority to a class of traffic belonging to a policy map.

Command	Description
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.
show policy-map interface	Displays the configuration of all classes configured for all service policies on the specified interface or displays the classes for the service policy for a specific PVC on the interface.
traffic-shape rate	Enables traffic shaping for outbound traffic on an interface.

service-policy (class-map)

To attach a policy map to a class, use the **service-policy**command in class-map configuration mode. To remove a service policy from a class, use the **no** form of this command.

service-policy *policy-map*

no service-policy

Syntax Description

policy-map	The name of a service policy map (created using the **policy-map** command) to be attached. The name can be a maximum of 40 alphanumeric characters.

Command Default

No service policy is specified.

Command Modes

Class-map configuration

Command History

Release	Modification
12.1(2)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 can attach a single policy map to one or more classes to specify the service policy for those classes. This command is only available for the output interface, which is assumed.

Examples

In the following example, three policy maps are defined--cust1-classes, cust2-classes, and cust-policy. The policy maps cust1-classes and cust2-classes have three classes defined--gold, silver, and bronze.

For cust1-classes, gold is configured to use 50 percent of the bandwidth. Silver is configured to use 20 percent of the bandwidth, and bronze is configured to use 15 percent of the bandwidth.

For cust2-classes, gold is configured to use 30 percent of the bandwidth. Silver is configured to use 15 percent of the bandwidth, and bronze is configured to use 10 percent of the bandwidth.

The policy map cust-policy specifies average rate shaping of 384 kbps and assigns the service policy called cust1-classes to the policy map called cust1-classes. The policy map called cust-policy specifies peak rate shaping of 512 kbps and assigns the service policy called cust2-classes to the policy map called cust2-classes.

To configure classes for cust1-classes, use the following commands:

```
Router(config)# policy-map cust1-classes
Router(config-pmap)# class gold
Router(config-pmap-c)# bandwidth percent 50
Router(config-pmap-c)# exit
Router(config-pmap)# class silver
Router(config-pmap-c)# bandwidth percent 20
Router(config-pmap-c)# exit
Router(config-pmap)# class bronze
Router(config-pmap-c)# bandwidth percent 15
```

To configure classes for cust2, use the following commands:

```
Router(config)# policy-map cust2-classes
Router(config-pmap)# class gold
Router(config-pmap-c)# bandwidth percent 30
Router(config-pmap-c)# exit
Router(config-pmap)# class silver
Router(config-pmap-c)# bandwidth percent 15
Router(config-pmap-c)# exit
Router(config-pmap)# class bronze
Router(config-pmap-c)# bandwidth percent 10
```

To define the customer policy with cust1-classes and cust2-classes and QoS features, use the following commands:

```
Router(config)# policy-map cust-policy
Router(config-pmap)# class cust1
Router(config-pmap-c)# shape average 38400
Router(config-pmap-c)# service-policy cust1-classes
Router(config-pmap-c)# exit
Router(config-pmap)# class cust2
Router(config-pmap-c)# shape peak 51200
Router(config-pmap-c)# service-policy cust2-classes
Router(config-pmap-c)# interface Serial 3/2
Router(config-pmap-c)# exit
Router(config-pmap)# exit
Router(config)# exit
Router(config)# interface serial0/0
Router(config-if)# service out cust-policy
```

Related Commands

Command	Description
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.

service-policy (control-plane)

To attach a policy map to a control plane for aggregate or distributed control plane services, use the **service-policy** command in control-plane configuration mode. To remove a service policy from a control plane, use the **no** form of this command.

service-policy {**input**| **output**} *policy-map-name*

no service-policy {**input**| **output**} *policy-map-name*

Syntax Description

input	Applies the specified service policy to packets that are entering the control plane.
output	Applies the specified service policy to packets that are exiting the control plane, and enables the router to silently discard packets.
policy-map-name	Name of a service policy map (created using the **policy-map** command) to be attached. The name can be a maximum of 40 alphanumeric characters.

Command Default

No service policy is specified.

Command Modes

Control-plane configuration (config-cp)

Command History

Release	Modification
12.2(18)S	This command was introduced.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T, and support for the **output** keyword was added.
12.0(29)S	This command was integrated into Cisco IOS Release 12.0(29)S.
12.2(18)SXD1	This command was integrated into Cisco IOS Release 12.2(18)SXD1.
12.2(25)S	Support for the **output** keyword was integrated into Cisco IOS Release 12.2(25)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.
Cisco IOS XE Release 2.2	This command was implemented on Cisco ASR 1000 series routers.

Usage Guidelines

After entering the **control-plane** command, use the **service-policy** command to configure a quality of service (QoS) policy. This policy is attached to the control plane interface for aggregate or distributed control plane services and controls the number or rate of packets that are going to the process level.

When you configure output policing on control-plane traffic, using the **service-policyoutput***policy-map-name* command, a router is automatically enabled to silently discard packets. Output policing is supported as follows:

- Supported only in:
  - Cisco IOS Release 12.2(25)S and later Cisco IOS 12.2S releases.
  - Cisco IOS Release 12.3(4)T and later Cisco IOS 12.3T releases.
  - Cisco IOS Release 12.2(18)SXD1 and later Cisco IOS 12.2SX releases.
  - Cisco IOS XE Release 2.2 and later Cisco IOS XE releases.
- Not supported for attaching a QoS policy for distributed control-plane services.
- Not supported on the Cisco 6500 router, Cisco 7500 series, and Cisco 10720 Internet router.

The **service-policyoutput**command configures output policing, which is performed in silent mode to silently discard packets exiting from the control plane according to the attached QoS policy. Silent mode allows a router that is running Cisco IOS software to operate without sending any system messages. If a packet that is exiting from the control plane is discarded for output policing, you do not receive an error message.

Silent mode allows a router that is running Cisco IOS software to operate without sending any system messages. If a packet that is destined for the router is discarded for any reason, users will not receive an error message. Some events that will not generate error messages are as follows:

- Traffic that is being transmitted to a port to which the router is not listening
- A connection to a legitimate address and port that is rejected because of a malformed request

Examples

The following example shows how to configure trusted hosts with source addresses 10.1.1.1 and 10.1.1.2 to forward Telnet packets to the control plane without constraint, while allowing all remaining Telnet packets to be policed at the specified rate:

```
! Allow 10.1.1.1 trusted host traffic.
Router(config)# access-list 140 deny tcp host 10.1.1.1 any eq telnet

! Allow
10.1.1.2
 trusted host traffic.
Router(config)# access-list 140 deny tcp host 10.1.1.2 any eq telnet

! Rate-limit all other Telnet traffic.
Router(config)# access-list 140 permit tcp any any eq telnet
! Define class-map “telnet-class.”
Router(config)# class-map telnet-class

Router(config-cmap)# match access-group 140
Router(config-cmap)# exit
Router(config)# policy-map control-plane-policy
Router(config-pmap)# class telnet-class
Router(config-pmap-c)# police 80000 conform transmit exceed drop
Router(config-pmap-c)# exit
```

```
Router(config-pmap)# exit
! Define aggregate control plane service for the active route processor.
Router(config)# control-plane
Router(config-cp)# service-policy input control-plane-policy
Router(config-cp)# end
```

The next example shows how to configure trusted networks with source addresses 10.0.0.0 and 10.0.0.2 to receive Internet Control Message Protocol (ICMP) port-unreachable responses without constraint, while allowing all remaining ICMP port-unreachable responses to be dropped:

```
! Allow 10.0.0.0 trusted network traffic.
Router(config)# access-list 141 deny icmp host
10.0.0.0

255.255.255.224
 any port-unreachable

! Allow 10.0.0.2 trusted network traffic.
Router(config)# access-list 141 deny icmp host
10.0.0.2 255.255.255.224
 any port-unreachable

! Rate-limit all other ICMP traffic.
Router(config)# access-list 141 permit icmp any any port-unreachable
Router(config)# class-map icmp-class

Router(config-cmap)# match access-group 141
Router(config-cmap)# exit
Router(config)# policy-map control-plane-out-policy
! Drop all traffic that matches the class "icmp-class."
Router(config-pmap)# class icmp-class
Router(config-pmap-c)# drop
Router(config-pmap-c)# exit
Router(config-pmap)# exit
Router(config)# control-plane
! Define aggregate control plane service for the active route processor.
Router(config-cp)# service-policy output control-plane-out-policy
Router(config-cp)# end
```

Related Commands

Command	Description
control-plane	Enters control-plane configuration mode to apply a QoS policy to police traffic destined for the control plane.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
show policy-map control-plane	Displays the configuration of a class or all classes for the policy map attached to the control plane.

service-policy (policy-map class)

To use a service policy as a QoS policy within a policy map (called a hierarchical service policy), use the **service-policy** command in policy-map class configuration mode. To disable a particular service policy as a QoS policy within a policy map, use the **no** form of this command.

service-policy *policy-map-name*

no service-policy *policy-map-name*

Syntax Description

policy-map-name	Specifies the name of the predefined policy map to be used as a QoS policy. The name can be a maximum of 40 alphanumeric characters.

Command Default

No service policies are used.

Command Modes

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

Command History

Release	Modification
12.1(2)E	This command was introduced.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)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.
Cisco IOS XE Release 2.1	This command was implemented on Cisco ASR 1000 series routers.

Usage Guidelines

This command is used to create hierarchical service policies in policy-map class configuration mode.

This command is different from the **service-policy** {**input**|**output**}*policy-map-name*command used in interface configuration mode. The purpose of the **service-policy**{**input**|**output**}*policy-map-name* is to attach service policies to interfaces.

The child policy is the previously defined service policy that is being associated with the new service policy through the use of the **service-policy**command. The new service policy using the preexisting service policy is the parent policy.

This command has the following restrictions:

- The **priority** command can be used in either the parent or the child policy, but not *both* policies simultaneously.
- The **shape** command can be used in either the parent or the child policy, but not *both* polices simultaneously on a subinterface.
- The **fair-queue** command cannot be defined in the parent policy.
- If the **bandwidth**command is used in the child policy, the **bandwidth** command must also be used in the parent policy. The one exception is for policies using the default class.

Examples

The following example creates a hierarchical service policy in the service policy called parent:

```
Router(config)# policy-map child
Router(config-pmap)# class voice
Router(config-pmap-c)# priority 50
Router(config-pmap-c)# exit
Router(config-pmap)# exit
Router(config)# policy-map parent
Router(config-pmap)# class class-default
Router(config-pmap-c)# shape average 10000000
Router(config-pmap-c)# service-policy child
```

FRF.11 and FRF.12 configurations on a Versatile Interface Processor (VIP)-enabled Cisco 7500 series router often require a hierarchical service policy for configuration. A hierarchical service policy for FRF.11 and FRF.12 requires the following elements:

1. A traffic class that uses the Voice over Frame Relay (VoFR) protocol as the only match criterion.
2. A traffic policy that insures low latency queueing (LLQ), which is achieved using the **priority** command, for all VoFR protocol traffic
3. A traffic policy that defines the shaping parameters and includes the elements listed in element 2.

Element 3 can only be fulfilled through the use of a hierarchical service policy, which is configured using the **service-policy** command.

In the following example, element 1 is configured in the traffic class called frf, element 2 is configured in the traffic policy called llq, and element 3 is configured in the traffic policy called llq-shape.

```
Router(config)#

class-map frf
Router(config-cmap)# match protocol vofr
Router(config-cmap)
#
exit
Router(config)#

policy-map llq
Router(config-pmap)#

class frf
Router(config-pmap-c)# priority 2000
Router(config-pmap-c)#

exit
Router(config-pmap)# exit
Router(config)# policy-map llq-shape
Router(config-pmap)# class class-default
Router(config-pmap-c)# shape average 1000 128000
Router(config-pmap-c)#
```

service-policy llq

The final step in using a hierarchical service policy for FRF.11 and FRF.12 is using the service policy in map-class configuration mode. In the following example, the traffic policy called llq-shape is attached to the map class called frag:

```
Router(config)#

map-class frame-relay frag
Router(config-map-class)# frame-relay fragment 40
Router(config-map-class)# service-policy llq-shape
```

Related Commands

Command	Description
bandwidth (policy-map class)	Specifies or modifies the bandwidth allocated for a class belonging to a policy map.
fair-queue	Specifies the number of queues to be reserved for use by a traffic class.
policy-map	Specifies the name of the service policy to configure.
priority	Gives priority to a class of traffic belonging to a policy map.
service-policy	Specifies the name of the service policy to be attached to the interface.
shape	Specifies average or peak rate traffic shaping.
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.
show policy-map interface	Displays the configuration of all classes configured for all service policies on the specified interface or displays the classes for the service policy for a specific PVC on the interface.

service-policy (service group)

To attach a policy map to a service group, use the **service-policy** command in service-group configuration mode. To remove a policy map from a service group, use the **no** form of this command.

service-policy {**input**| **output**} *policy-map-name*

no service-policy {**input**| **output**} *policy-map-name*

Syntax Description

input	Attaches the policy map to the service group in the input (ingress) direction.
output	Attaches the policy map to the service group in the output (egress) direction.
policy-map-name	Policy map name. Enter the name of an existing policy map.

Command Default

A policy map is not attached to a service group.

Command Modes

Service-group configuration (config-service-group)

Command History

Release	Modification
12.2(33)SRE	This command was introduced.

Usage Guidelines

The policy map must already exist and must contain the Quality of Service (QoS) feature to be applied to the service group, according to the provisions specified by the Service Level Agreement (SLA). To create and configure the policy map, use the Modular Quality of Service Command-Line Interface (CLI) (MQC). For more information about the MQC, see the *Cisco IOS Quality of Service Solutions Configuration Guide* .

Examples

In the following example, a policy map called 3-customer-in is attached to service group 1:

```
Router> enable
Router# configure terminal
Router(config)# service-group 1
Router(config-service-group)# service-policy input 3-customer-in
Router(config-service-group)# end
```

service-policy type qos

To apply a quality of service (QoS) policy map to an identity, use the **service-policytypeqos** command in identity policy configuration mode. To remove the QoS policy map, use the **no** form of this command.

service-policy type qos {**input| output**} *policy-map-name*

no service-policy type qos {**input| output**} *policy-map-name*

Syntax Description

input	Specifies an ingress QoS policy map.
output	Specifies an egress QoS policy map.
policy-map-name	The name of the policy map.

Command Default

No QoS policy map is applied to an identity.

Command Modes

Identity policy configuration (config-identity-policy)

Command History

Release	Modification
12.2(33)SXI	This command was introduced.

Usage Guidelines

The **input** and **output**keywords indicate the direction in which the policy map will be applied.

The value for the *policy-map-name*argument represents a QoS policy map configured on the switch using the **policy-map***policy-map-name*global configuration command.

Examples

The following example applies an ingress QoS policy map to an identity:

```
Router(config)# identity policy policy1
Router(config-identity-policy)# service-policy type qos input my-in-policy
```

Related Commands

Command	Description
identity policy	Creates an identity policy.
policy-map	Creates or modifies a policy map

Command	Description
show epm session ip	Displays the configuration and policies on an interface when a session is active.

set atm-clp

To set the ATM cell loss priority (CLP) bit when a policy map is configured, use the **setatm-clp**command in policy-map classconfigurationmode. To remove a specific ATM CLP bit setting, use the **no** form of this command.

set atm-clp

no set atm-clp

Syntax Description

This command has no arguments or keywords.

Command Default

The ATM CLP bit is automatically set to 0 by Cisco router interfaces, when Cisco routers convert IP packets into ATM cells for transmission through Multiprotocol Label Switching (MPLS)-aware ATM networks.

Command Modes

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

Command History

Release	Modification
12.1(5)T	This command was introduced.
12.2(4)T	This command was implemented on the Cisco MGX 8850 switch and the MGX 8950 switch with a Cisco MGX RPM-PR card.
12.2(4)T2	This command was implemented on the Cisco 7500 series router.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB	This command was integrated into Cisco IOS Release 12.2(31)SB and implemented on the Cisco 10000 series router.
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 disable this command, remove the service policy from the interface using the **noservice-policy** command.

The **setatm-clp**command works only on platforms that support one of the following adapters: the Enhanced ATM Port Adapter (PA-A3), the ATM Inverse Multiplexer over ATM Port Adapter with eight T1 ports (PA-A3-8T1IMA), or the ATM Inverse Multiplexer over ATM Port Adapter with eight E1 ports (PA-A3-8E1IMA). For more information, refer to the documentation for your specific router.

A policy map containing the **setatm-clp**command can be attached as an output policy only. The **setatm-clp** command does not support packets that originate from the router. A policy map containing ATM set CLP bit

quality of service (QoS) cannot be attached to PPP over X (PPPoX) sessions. The policy map is accepted only if you do not specify the **setatm-clp** command.

Examples

The following example shows how to set the CLP bit by using the **setatm-clp** command in a policy map:

```
Router(config)#
class-map ip-precedence
Router(config-cmap)#
match ip precedence 0 1
Router(config-cmap)#
exit
Router(config)#
policy-map atm-clp-set
Router(config-pmap)#
class ip-precedence
Router(config-pmap-c)#
set atm-clp
Router(config-pmap-c)#
exit
Router(config-pmap)#
exit
Router(config)#
interface atm 1/0/0.1
Router(config-if)#
service-policy output policy1
```

Related Commands

Command	Description
class	Associates a map class with a specified data-link connection identifier.
class-map	Configures a class map.
interface	Creates an interface.
match ip precedence	Identifies IP precedence values to use as the match criterion.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
service-policy	Attaches a policy map to an input interface, a virtual circuit (VC), an output interface, or a VC that will be used as the service policy for the interface or VC.
show atm pvc	Displays all ATM PVCs and traffic information.
show policy-map	Displays information about the policy map for an interface.

set cos

To set the Layer 2 class of service (CoS) value of an outgoing packet, use the **setcos** command in policy-map class configuration mode. To remove a specific CoS value setting, use the **no** form of this command.

set cos {*cos-value*| *from-field* [**table** *table-map-name*]}

no set cos {*cos-value*| *from-field* [**table** *table-map-name*]}

Cisco CMTS and 10000 Series Router

set cos *cos-value*

Syntax Description

cos-value	Specific IEEE 802.1Q CoS value from 0 to 7.
from-field	Specific packet-marking category to be used to set the CoS value of the packet. If you are using a table map for mapping and converting packet-marking values, this establishes the "map from" packet-marking category. Packet-marking category keywords are as follows: • **precedence** • **dscp**
table	(Optional) Indicates that the values set in a specified table map will be used to set the CoS value.
table-map-name	(Optional) Name of the table map used to specify the CoS value. The table map name can be a maximum of 64 alphanumeric characters.

Command Default

No CoS value is set for the outgoing packet.

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.
12.2(13)T	This command was modified for Enhanced Packet Marking to allow a mapping table (table map)to be used to convert and propagate packet-marking values.

Release	Modification
12.0(16)BX	This command was implemented on the Cisco 10000 series router for the ESR-PRE2.
12.0(31)S	This command was integrated into Cisco IOS Release 12.0(31)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB	This command was integrated into Cisco IOS Release 12.2(31)SB and implemented on the Cisco 10000 series router.
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)SCF	This command was integrated into Cisco IOS Release 12.2(33)SCF.
3.2SE	This command was integrated into Cisco IOS XE Release 3.2SE.

Usage Guidelines

CoS packet marking is supported only in the Cisco Express Forwarding switching path.

The **setcos** command should be used by a router if a user wants to mark a packet that is being sent to a switch. Switches can leverage Layer 2 header information, including a CoS value marking.

The **setcos** command can be used only in service policies that are attached in the output direction of an interface. Packets entering an interface cannot be set with a CoS value.

The **matchcos** and **setcos** commands can be used together to allow routers and switches to interoperate and provide quality of service (QoS) based on the CoS markings.

Layer 2 to Layer 3 mapping can be configured by matching on the CoS value because switches already can match and set CoS values. If a packet that needs to be marked to differentiate user-defined QoS services is leaving a router and entering a switch, the router should set the CoS value of the packet because the switch can process the Layer 2 header.

Using This Command with the Enhanced Packet Marking Feature

You can use this command as part of the Enhanced Packet Marking feature to specify the “from-field” packet-marking category to be used for mapping and setting the CoS value. The “from-field” packet-marking categories are as follows:

- Precedence
- Differentiated services code point (DSCP)

If you specify a “from-field” category but do not specify the **table** keyword and the applicable *table-map-nam* e argument, the default action will be to copy the value associated with the “from-field” category as the CoS value. For instance, if you configure the **setcosprecedence** command, the precedence value will be copied and used as the CoS value.

You can do the same for the DSCP marking category. That is, you can configure the **setcosdscp** command, and the DSCP value will be copied and used as the CoS value.

Note If you configure the **setcosdscp**command, only the *first three bits* (the class selector bits) of the DSCP field are used.

Examples

In the following example, the policy map called "cos-set" is created to assign different CoS values for different types of traffic. This example assumes that the class maps called "voice" and "video-data" have already been created.

```
Router(config)#
policy-map cos-set
Router(config-pmap)#
class voice
Router(config-pmap-c)#
set cos 1
Router(config-pmap-c)#
exit
Router(config-pmap)#
class video-data
Router(config-pmap-c)#
set cos 2
Router(config-pmap-c)#
end
```

Examples

In the following example, the policy map called "policy-cos" is created to use the values defined in a table map called "table-map1". The table map called "table-map1" was created earlier with the **table-map** (value mapping) command. For more information about the **table-map** (value mapping)command, see the **table-map**(value mapping) command page.

In this example, the setting of the CoS value is based on the precedence value defined in "table-map1":

```
Router(config)#
policy-map policy-cos
Router(config-pmap)#
class class-default
Router(config-pmap-c)#
set cos precedence table table-map1
Router(config-pmap-c)#
end
```

Examples

The following example shows how to set the class of service for the 802.1p domain:

```
Router(config)# policy-map cos7
Router(config-pmap)# class cos7
Router(config-pmap-c)# set cos 2
Router(config-pmap-c)# end
```

Note The **setcos** command is applied when you create a service policy in QoS policy-map configuration mode and attach the service policy to an interface or ATM virtual circuit (VC). For information on attaching a service policy, refer to the "Modular Quality of Service Command-Line Interface Overview" chapter of the *Cisco IOS Quality of Service Solutions Configuration Guide* .

Related Commands

Command	Description
match cos	Matches a packet on the basis of Layer 2 CoS marking.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
service-policy	Attaches a policy map to an input interface or VC, or an output interface or VC, to be used as the service policy for that interface or VC.
set dscp	Marks a packet by setting the Layer 3 DSCP value in the ToS byte.
set precedence	Sets the precedence value in the packet header.
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.
show policy-map class	Displays the configuration for the specified class of the specified policy map.
show policy-map interface	Displays the configuration of all classes configured for all service policies on the specified interface or displays the classes for the service policy for a specific PVC on the interface.

set cos cos-inner (policy-map configuration)

To set the 802.1Q prioritization bits in the trunk VLAN tag of a QinQ-translated outgoing packet with the priority value from the inner customer-edge VLAN tag, use the **setcoscos-inner** command in policy-map class configuration mode. To return to the default settings, use the **no** form of this command.

set cos cos-inner

no set cos cos-inner

Syntax Description

This command has no arguments or keywords.

Command Default

P bits are copied from the outer provider-edge VLAN tag.

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.2(18)SXD	Support for this command was introduced on the Supervisor Engine 720.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

This command is supported on the Gigabit Ethernet WAN interfaces on Cisco 7600 series routers that are configured with an Optical Service Module (OSM)-2+4GE-WAN+ OSM module only.

OSMs are not supported on Cisco 7600 series routers that are configured with a Supervisor Engine 32.

The 802.1P prioritization bits are used in the VLAN tag for QoS processing.

When the router copies the double-tagged QinQ packets to the destination interface, by default it uses the P bits from the outer (provider) VLAN tag. To preserve the P bits that are in the inner (customer) VLAN tag, use the **setcoscos-inner** command.

For the **setcoscos-inner** command to be effective, you must configure the appropriate interface or subinterface as a trusted interface using the **mlsqostrust** command. Otherwise, the interface or subinterface defaults to being untrusted, where the Layer 2 interface zeroes out the P bits of the incoming packets before the **setcoscos-inner** command can copy them to the outer VLAN tag.

The **setcoscos-inner** command is supported only for the subinterfaces that are configured with an inner (customer) VLAN. The **setcoscos-inner** command is not supported for the subinterfaces that use the **out-range** keyword on the **bridge-domain**(subinterface configuration)command or that are not configured with any form of the **bridge-domain** (subinterface configuration)command.

This behavior remains when you configure the **setcoscos-inner** command on a policy that is applied to a main interface. The**setcoscos-inner**command affects the subinterfaces that are configured with a specific inner

VLAN but it does not affect the subinterfaces that are not configured with any VLAN or that are configured with the **out-range** keyword.

Examples

This example shows how to configure a policy map for voice traffic that uses the P bits from the inner VLAN tag:

```
Router(config-cmap)# set cos cos-inner
```

This example shows how to configure the default policy map class to reset to its default value:

```
Router(config-cmap)# no set cos cos-inner
```

This example shows the system message that appears when you attempt to apply a policy to a subinterface that is configured with the **bridge-domain(subinterfaceconfiguration)**command:

```
Router(config-if)# bridge-vlan 32 dot1q-tunnel out-range

Router(config-if)# service-policy output cos1

%bridge-vlan 32 does not have any inner-vlan configured. 'set cos cos-inner' is not supported
```

Related Commands

Command	Description
bridge-domain (subinterface configuration)	Binds a PVC to the specified vlan-id.
class map	Accesses the QoS class map configuration mode to configure QoS class maps.
mode dot1q-in-dot1q access-gateway	Enables a Gigabit Ethernet WAN interface to act as a gateway for QinQ VLAN translation.
policy-map	Accesses QoS policy-map configuration mode to configure the QoS policy map.
service-policy	Attaches a policy map to an interface.
set in dscp (policy-map configuration)	Marks a packet by setting the IP DSCP in the ToS byte.
set ip precedence (policy-map configuration)	Sets the precedence value in the IP header.
show cwan qinq	Displays the inner, outer, and trunk VLANs that are used in QinQ translation.
show cwan qinq bridge-domain	Displays the provider-edge VLAN IDs that are used on a Gigabit Ethernet WAN interface for QinQ translation or shows the customer-edge VLANs that are used for a specific provider-edge VLAN.

Command	Description
show cwan qinq interface	Displays interface statistics for IEEE 802.1Q-in-802.1Q (QinQ) translation on one or all Gigabit Ethernet WAN interfaces and port-channel interfaces.
show policy-map	Displays information about the policy map.
show policy-map interface	Displays the statistics and the configurations of the input and output policies that are attached to an interface.

set cos-inner

To mark the inner class of service field in a bridged frame, use the **setcos-inner**command in policy-map class configuration mode. To remove marking of the inner CoS field, use the **no** form of this command.

set cos-inner *cos-value*

no set cos-inner *cos-value*

Syntax Description

cos-value	IEEE 802.1q CoS value from 0-7.

Command Default

No default behavior or values.

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.2(33)SRA	This command was introduced.

Usage Guidelines

This command was introduced in Cisco IOS Release 12.2(33)SRA to support marking of the inner CoS value when using multipoint bridging (MPB) features on the Enhanced FlexWAN module, and when using MPB features on SPAs with the Cisco 7600 SIP-200 and Cisco 7600 SIP-400 on the Cisco 7600 series router.

This command is not supported on the Cisco 7600 SIP-600.

On the Cisco 7600 SIP-200, this command is not supported with the **setcos** command on the same interface.

For more information about QoS and the forms of marking commands supported by the SIPs on the Cisco 7600 series router, refer to the *Cisco 7600 Series SIP, SSC, and SPA Software Configuration Guide* .

Examples

The following example shows configuration of a QoS class that filters all traffic matching on VLAN 100 into a class named “vlan-inner-100.” The configuration shows the definition of a policy-map (also named “vlan-inner-100”) that marks the inner CoS with a value of 3 for traffic in the vlan-inner-100 class. Since marking of the inner CoS value is only supported with bridging features, the configuration also shows the service policy being applied as an output policy to a serial SPA interface that bridges traffic into VLAN 100 using the **bridge-domain** command:

```
Router(config)# class-map match-all vlan-inner-100
Router(config-cmap)# match vlan inner 100
Router(config-cmap)# exit
Router(config)# policy-map vlan-inner-100
Router(config-pmap)# class vlan-inner-100
Router(config-pmap-c)# set cos-inner 3
Router(config-pmap-c)# exit
```

```
Router(config-pmap)# exit
Router(config)# interface serial3/0/0
Router(config-if)# no ip address
Router(config_if)# encapsulation ppp
Router(config-if)# bridge-domain 100 dot1q
Router(config-if)# service-policy output vlan-inner-100
Router(config-if)# shutdown
Router(config-if)# no shutdown
Router(config-if)# end
```

Related Commands

Command	Description
bridge-domain	Enables RFC 1483 ATM bridging or RFC 1490 Frame Relay bridging to map a bridged virtual LAN (VLAN) to an ATM permanent virtual circuit (PVC) or Frame Relay data-link connection identifier (DLCI).
class-map	Creates a class map to be used for matching packets to a specified class.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
class (policy-map)	Specifies the name of the class whose policy you want to create or change, and the default class (commonly known as the class-default class) before you configure its policy.
service-policy	Attaches a policy map to an input interface or virtual circuit (VC) or an output interface or VC, to be used as the service policy for that interface or VC.

set cos-inner cos

To copy the outer COS to the inner COS for double-tagged packets, use the **setcos-innercos** command in policy-map class configuration mode. To remove the outer COS copied to the inner COS for double-tagged packets, use the **no** form of this command.

set cos-inner cos *cos-value*

no set cos-inner cos *cos-value*

Syntax Description

cos-value	IEEE 802.1q CoS value from 0-7.

Command Default

No default behavior or values.

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.2(33)SRB	This command was introduced.

Usage Guidelines

This command was introduced in Cisco IOS Release 12.2(33)SRB and is limited to policies that are applied to the EVC service instances.

For classification, the reference to the outer and inner tags is made to the frames as seen on the wire - that is, for ingress frames, tags prior to the "rewrite", while the for egress, it is after the "rewrite" of the tags, if any.

For marking, the reference to the outer COS at the ingress is to the DBUS-COS and reference to the inner is to the COS in the first tag on the frame; while, at the egress, the reference to outer and inner COS is to the ones in the frame.

Examples

The following example matches on outer COS 3 and 4 and copies the outer COS to the inner COS.

```
Router(config)# class-map cos3_4
Router(config-cmap)# match cos 3 4
Router(config)# policy-map mark-it-in
Router(config-pmap)# class cos3_4
Router(config-pmap-c)# set cos-inner cos
```

Related Commands

Command	Description
bridge-domain	Enables RFC 1483 ATM bridging or RFC 1490 Frame Relay bridging to map a bridged virtual LAN (VLAN) to an ATM permanent virtual circuit (PVC) or Frame Relay data-link connection identifier (DLCI).
class-map	Creates a class map to be used for matching packets to a specified class.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
class (policy-map)	Specifies the name of the class whose policy you want to create or change, and the default class (commonly known as the class-default class) before you configure its policy.
service-policy	Attaches a policy map to an input interface or virtual circuit (VC) or an output interface or VC, to be used as the service policy for that interface or VC.

set discard-class

To mark a packet with a discard-class value, use the **setdiscard-class** command in QoS policy-map configuration mode. To prevent the discard-class value of a packet from being altered, use the **no** form of this command.

set discard-class *value*

no set discard-class *value*

Syntax Description

value	Specifies per-hop behavior (PHB) for dropping traffic. The value sets the priority of a type of traffic. Valid values are numbers from 0 to 7.

Command Default

If you do not enter this command, the packet has a discard-class value of 0.

Command Modes

QoS policy-map configuration

Command History

Release	Modification
12.2(13)T	This command was introduced.
12.3(7)XI	This command was implemented on the Cisco 10000 series router for the ESR-PRE2.
12.2(31)SB	This command was integrated into Cisco IOS Release 12.2(31)SB.

Usage Guidelines

The discard class value indicates the discard portion of the PHB. Use the **setdiscard-class** command only in DiffServ Tunneling Pipe mode. The discard class value is required when the input PHB marking will be used to classify packets on the output interface.

You can also use this command to specify the type of traffic that will be dropped when there is congestion.

Cisco 10000 Series Router

This command is supported only on the ESR-PRE2.

Examples

The following example shows that traffic will be set to the discard-class value of 2:

```
set discard-class 2
```

Related Commands

Command	Description
match discard-class	Matches packets of a certain discard class.
random-detect discard-class-based	Bases WRED on the discard class value of a packet.

set dscp

To mark a packet by setting the differentiated services code point (DSCP) value in the type of service (ToS) byte, use the **set dscp** command in QoS policy-map class configuration mode. To remove a previously set DSCP value, use the **no** form of this command.

set dscp {*dscp-value*| *from-field* [**table** *table-map-name*]}

no set dscp {*dscp-value*| *from-field* [**table** *table-map-name*]}

Syntax Description

dscp-value	A number that sets the DSCP value. The range is from 0 to 63. The following reserved keywords can be specified instead of numeric values: • **EF** (expedited forwarding) • **AF11** (assured forwarding class AF11) • **AF12** (assured forwarding class AF12)
from-field	Specific packet-marking category to be used to set the DSCP value of the packet. Packet-marking category keywords are as follows: • **cos** • **qos-group** **Note** If you are using a table map for mapping and converting packet-marking values, this establishes the "map from" packet-marking category.
table	(Optional) Indicates that the values set in a specified table map will be used to set the DSCP value. • This keyword is used in conjunction with the *from-field* argument.
table-map-name	(Optional) Name of the table map used to specify the DSCP value. The name can be a maximum of 64 alphanumeric characters. • This argument is used in conjunction with the **table** keyword.

Command Default The DSCP value in the ToS byte is not set.

Command Modes QoS policy-map class configuration (config-pmap-c)

Command History

Release	Modification
12.2(13)T	This command was introduced. It replaces the **set ip dscp** command.
12.0(28)S	This command was modified. Support for this command in IPv6 was added on the Cisco 12000 series Internet router.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1 and implemented on Cisco ASR 1000 Series Aggregation Services Routers.

Usage Guidelines Once the DSCP bit is set, other quality of service (QoS) features can then operate on the bit settings.

DSCP and Precedence Values Are Mutually Exclusive

The **set dscp** command cannot be used with the **set precedence** command to mark the *same* packet. The two values, DSCP and precedence, are mutually exclusive. A packet can have one value or the other, but not both.

Precedence Value and Queueing

The network gives priority (or some type of expedited handling) to marked traffic. Typically, you set the precedence value at the edge of the network (or administrative domain); data then is queued according to the precedence. Weighted fair queueing (WFQ) can speed up handling for high-precedence traffic at congestion points. Weighted Random Early Detection (WRED) ensures that high-precedence traffic has lower loss rates than other traffic during times of congestion.

Use of the "from-field" Packet-Marking Category

If you are using this command as part of the Enhanced Packet Marking feature, it can specify the "from-field" packet-marking category to be used for mapping and setting the DSCP value. The "from-field" packet-marking categories are as follows:

- Class of service (CoS)
- QoS group

If you specify a "from-field" category but do not specify the **table** keyword and the applicable *table-map-name* argument, the default action will be to copy the value associated with the "from-field" category as the DSCP value. For instance, if you configure the **set dscp cos** command, the CoS value will be copied and used as the DSCP value.

Note The CoS field is a 3-bit field, and the DSCP field is a 6-bit field. If you configure the **set dscp cos**command, only the three bits of the CoS field will be used.

If you configure the **set dscp qos-group** command, the QoS group value will be copied and used as the DSCP value.

The valid range for the DSCP value is a number from 0 to 63. The valid value range for the QoS group is a number from 0 to 99. Therefore, when configuring the **set dscp qos-group** command, note the following points:

- If a QoS group value falls within both value ranges (for example, 44), the packet-marking value will be copied and the packets will be marked.
- If QoS group value exceeds the DSCP range (for example, 77), the packet-marking value will not be copied and the packet will not be marked. No action is taken.

Setting DSCP Values in IPv6 Environments

When this command is used in IPv6 environments, the default match occurs on both IPv4 and IPv6 packets. However, the actual packets set by this function are only those that meet the match criteria of the class map containing this function.

Setting DSCP Values for IPv6 Packets Only

To set DSCP values for IPv6 values only, you must also use the **match protocol ipv6** command. Without that command, the precedence match defaults to match both IPv4 and IPv6 packets.

Setting DSCP Values for IPv4 Packets Only

To set DSCP values for IPv4 values only, you must use the appropriate **match ip** command. Without this command, the class map may match both IPv6 and IPv4 packets, depending on the other match criteria, and the DSCP values may act upon both types of packets.

Examples

Examples

In the following example, the policy map called “policy1” is created to use the packet-marking values defined in a table map called “table-map1”. The table map was created earlier with the **table-map** (value mapping)command. For more information about the **table-map** (value mapping) command, see the **table-map** (value mapping) command page.

In this example, the DSCP value will be set according to the CoS value defined in the table map called “table-map1”.

```
Router(config)# policy-map policy1
Router(config-pmap)# class class-default
Router(config-pmap-c)# set dscp cos table table-map1
Router(config-pmap-c)#end
```

The **set dscp** command is applied when you create a service policy in QoS policy-map configuration mode. This service policy is not yet attached to an interface. For information on attaching a service policy to an interface, see the “Modular Quality of Service Command-Line Interface” section of the *Quality of Service Solutions Configuration Guide* .

Related Commands

Command	Description
match ip dscp	Identifies one or more DSCP, AF, and CS values as a match criterion.

Command	Description
match protocol	Configures the match criteria for a class map on the basis of the specified protocol.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
service-policy	Attaches a policy map to an input interface or VC, or an output interface or VC, to be used as the service policy for that interface or VC.
set cos	Sets the Layer 2 CoS value of an outgoing packet.
set precedence	Sets the precedence value in the packet header.
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.
show policy-map class	Displays the configuration for the specified class of the specified policy map.
show policy-map interface	Displays the configuration of all classes configured for all service policies on the specified interface or displays the classes for the service policy for a specific PVC on the interface.
show table-map	Displays the configuration of a specified table map or all table maps.
table-map (value mapping)	Creates and configures a mapping table for mapping and converting one packet-marking value to another.

set fr-de

To change the discard eligible (DE) bit setting in the address field of a Frame Relay frame to 1 for all traffic leaving an interface, use the **setfr-de**command in policy-map class command. To remove the DE bit setting, use the **no** form of thiscommand.

set fr-de

no set fr-de

Syntax Description

This command has no arguments or keywords.

Command Default

The DE bit is usually set to 0. This command changes the DE bit setting to 1.

Command Modes

Policy-map class

Command History

Release	Modification
12.2(2)T	This command was introduced.
12.2(31)SB2	This command was integrated in Cisco IOS Release 12.2(31)SB2, and introduced on the PRE3 for the Cisco 10000 series router.

Usage Guidelines

To disable this command in a traffic policy, use the **nosetfr-de** command in policy-map class configuration mode of the traffic policy.

If the DE bit is already set to 1, no changes are made to the frame.

Examples

The following example shows how to set the DE bit using the **setfr-de** command in the traffic policy. The router sets the DE bit of outbound packets belonging to the ip-precedence class.

```
Router(config)#
class-map ip-precedence
Router(config-cmap)#
match ip precedence 0 1
Router(config-cmap)#
exit
Router(config)#
policy-map set-de
Router(config-pmap)#
class ip-precedence
Router(config-pmap-c)#
set fr-de
Router(config-pmap-c)#
exit
Router(config-pmap)#
exit
Router(config)# interface serial 1/0/0
```

```
Router(config-if)# no ip address
Router(config-if)# encapsulation frame-relay
Router(config-if)#
interface serial 1/0/0.1
Router(config-subif)# ip address 10.1.1.1 255.255.255.252
Router(config-subif)# no ip directed-broadcast
Router(config-subif)#
service-policy output set-de
```

Related Commands

Command	Description
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.

set ip dscp

The **setipdscp** command is replaced by the set dscp command. See the set dscp command for more information.

set ip dscp (policy-map configuration)

To mark a packet by setting the IP differentiated services code point (DSCP) value in the type of service (ToS) byte, use the **setipdscp** command in policy-map configuration mode. To remove a previously set IP DSCP value, use the **no** form of this command.

set ip dscp *ip-dscp-value*

no set ip dscp *ip-dscp-value*

Syntax Description

ip-dscp-value	IP DSCP value; valid values are from 0 to 63. See the "Usage Guidelines" section for additional information.

Command Default

This command has no default settings.

Command Modes

Policy-map configuration

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	This command was implemented on the Supervisor Engine 2 and integrated into Cisco IOS Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
15.1(2)SNH	This command was implemented on the Cisco ASR 901 Series Aggregation Services Routers.

Usage Guidelines

You can enter reserved keywords **EF** (expedited forwarding), **AF11** (assured forwarding class AF11), and **AF12** (assured forwarding class AF12) instead of numeric values for *ip-dscp-value*.

After the IP DSCP bit is set, other quality of service (QoS) features can operate on the bit settings.

You cannot mark a packet by the IP precedence using the**setipprecedence**(policy-map configuration) command and then mark the same packet with an IP DSCP value using the **setipdscp**command.

The network gives priority (or some type of expedited handling) to marked traffic. Typically, you set IP precedence at the edge of the network (or administrative domain); data is queued based on the precedence. Weighted Fair Queueing (WFQ) can speed up handling for high-precedence traffic at congestion points. Weighted Random Early Detection (WRED) ensures that high-precedence traffic has lower loss rates than other traffic during traffic congestion.

The **setipprecedence** (policy-map configuration) command is applied when you create a service policy in QoS policy-map configuration mode. This service policy is not attached to an interface or to an ATM virtual circuit. See the**service-policy** command for information on attaching a service policy to an interface.

When configuring policy-map class actions, note the following:

- For hardware-switched traffic, Policy Feature Card (PFC) QoS does not support the **bandwidth**, **priority**, **queue-limit**, or **random-detect** policy-map class commands. You can configure these commands because they can be used for software-switched traffic.
- PFC QoS does not support the **setmpls**or **setqos-group** policy-map class commands.
- PFC QoS supports the **setipdscp** and **setipprecedence** policy-map class commands (see the "Configuring Policy Map Class Marking" section in the *Cisco 7600 Series Router Cisco IOS Software Configuration Guide*).
- You cannot do all three of the following in a policy-map class:
  - Mark traffic with the **setipdscp** or **setipprecedence** (policy-map configuration) commands
  - Configure the trust state
  - Configure policing

In a policy-map class, you can either mark traffic with the **setipdscp** or **setipprecedence**(policy-map configuration) commands or do one or both of the following:

- • Configure the trust state
  - Configure policing

Examples

This example shows how to set the IP DSCP ToS byte to 8 in the policy map called policy1:

```
Router(config)#
policy-map policy1
Router(config-cmap)#
class class1
Router(config-cmap)#
set ip dscp 8
```

All packets that satisfy the match criteria of class1 are marked with the IP DSCP value of 8. How packets that are marked with the IP DSCP value of 8 are treated is determined by the network configuration.

This example shows that after you configure the settings that are shown for voice packets at the edge of the network, all intermediate routers are then configured to provide low-latency treatment to the voice packets:

```
Router(config)# class-map voice
Router(config-cmap)# match ip dscp ef
Router(config)# policy qos-policy
Router(config-cmap)# class voice
Router(config-cmap)# priority 24
```

Related Commands

Command	Description
policy-map	Accesses QoS policy-map configuration mode to configure the QoS policy map.
service-policy	Attaches a policy map to an interface.
show policy-map	Displays information about the policy map.
show policy-map interface	Displays the statistics and the configurations of the input and output policies that are attached to an interface.

set ip dscp tunnel

To set the differentiated services code point (DSCP) value in the tunnel header of a Layer 2 Tunnel Protocol Version 3 (L2TPv3) or generic routing encapsulation (GRE) tunneled packet for tunnel marking, use the **set ip dscp tunnel** command in policy-map class configuration mode. To disable this functionality, use the **no** form of this command.

set ip dscp tunnel *dscp-value*

no set ip dscp tunnel *dscp-value*

Syntax Description

dscp-value	Number from 0 to 63 that identifies the tunnel header value. The following reserved keywords can be specified instead of numeric values: • **EF** (expedited forwarding) • **AF11** (assured forwarding class AF11)

Command Default

The DSCP value is not set.

Command Modes

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

Command History

Release	Modification
12.0(28)S	This command was introduced.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRC	This command was integrated into Cisco IOS Release 12.2(33)SRC.
12.4(15)T2	This command was integrated into Cisco IOS Release 12.4(15)T2, and support for marking GRE-tunneled packets was included. **Note** For this release, marking GRE-tunneled packets is supported only on platforms equipped with a Cisco MGX Route Processor Module (RPM-XF).
12.2(33)SB	Support for marking GRE-tunneled packets was included, and support for the Cisco 7300 series router was added.
Cisco IOS XE Release 3.5S	This command was integrated into Cisco IOS XE Release 3.5S and was implemented on the Cisco ASR 1000 series router.

Usage Guidelines

It is possible to configure L2TPv3 (or GRE) tunnel marking and the **ip tos** commands at the same time. However, Modular Quality of Service (QoS) Command-Line Interface (CLI) (MQC) (L2TPv3 or GRE) tunnel marking has higher priority over **ip tos** commands, meaning that tunnel marking always rewrites the IP header of the tunnel packet and overwrites the values set by ip tos commands. The order of enforcement is as follows when these commands are used simultaneously:

1. **set ip dscp tunnel** or **set ip precedence tunnel** (L2TPv3 or GRE tunnel marking)
2. **ip tos reflect**
3. **ip tos** *tos-value*

We recommend that you configure only L2TPv3 (or GRE) tunnel marking and reconfigure any peers configured with the **ip tos** commands to use L2TPv3 (or GRE) tunnel marking.

Note For Cisco IOS Release 12.4(15)T2, marking GRE-tunneled packets is supported only on platforms equipped with a Cisco RPM-XF.

Examples

The following example shows the **set ip dscp tunnel** command used in a tunnel marking configuration. In this example, a class map called "class-cl" has been configured to match traffic on the basis of the DSCP value setting. Also, a policy map called "policy1" has been created within which the **setipdscptunnel** command has been configured.

```
Router> enable
Router# configure terminal
Router(config)# class-map class-c1
Router(config-cmap)# match ip dscp 0
Router(config-cmap)# exit
Router(config)# policy-map policy1
Router(config-pmap)# class tunnel
Router(config-pmap-c)# set ip dscp tunnel 5
Router(config-pmap-c)# end
```

Note You must still attach a policy map to an interface or ATM PVC using the **service-policy** command. Tunnel marking policies can be applied as an ingress policy on the ingress physical interface of a Service Provider Edge (SPE) router or as an egress policy on the tunnel interface. For more information about attaching a policy map to an interface or ATM PVC, see the "Applying QoS Features Using the MQC" module of the *Cisco IOS Quality of Service Solutions Configuration Guide.*

Related Commands

Command	Description
ip tos	Specifies the ToS level for IP traffic.
set ip precedence tunnel	Sets the precedence value in the header of an L2TPv3 or GRE tunneled packet.

set ip precedence (policy-map configuration)

To set the precedence value in the IP header, use the **setipprecedence** command in policy-map configuration mode. To leave the precedence value at the current setting, use the **no** form of this command.

set ip precedence *ip-precedence-value*

no set ip precedence

Syntax Description

ip-precedence-value	Precedence-bit value in the IP header; valid values are from 0 to 7. See the table below for a list of value definitions.

Command Default

This command is disabled by default.

Command Modes

Policy-map configuration

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	This command was implemented on the Supervisor Engine 2 and integrated into Cisco IOS Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
15.1(2)SNH	This command was implemented on the Cisco ASR 901 Series Aggregation Services Routers.

Usage Guidelines

The table below lists the value definitions for precedence values in the IP header. They are listed from least to most important.

Table 2: Value Definitions for IP Precedence

Values	Definitions
	routine
	priority
	immediate

Values	Definitions
	flash
	flash-override
	critical
	internet
	network

After the IP precedence bits are set, other quality of service (QoS) features, such as Weighted Fair Queueing (WFQ) and Weighted Random Early Detection (WRED), operate on the bit settings.

The network priorities (or some type of expedited handling) mark traffic through the application of WFQ or WRED at points downstream in the network. Typically, you set IP precedence at the edge of the network (or administrative domain); data is queued based on the precedence. WFQ can speed up handling for certain precedence traffic at congestion points. WRED can ensure that certain precedence traffic has lower loss rates than other traffic during traffic congestion.

The **setipprecedence**command is applied when you create a service policy in policy-map configuration mode. This service policy is not attached to an interface or to an ATM virtual circuit. See the **service-policy**command for information on attaching a service policy to an interface.

Examples

This example shows how to set the IP precedence to 5 for packets that satisfy the match criteria of the class map called class1:

```
Router(config)#
policy-map policy1
Router(config-pmap)#
class class1
Router(config-pmap-c)#
set ip precedence 5
```

All packets that satisfy the match criteria of class1 are marked with the IP precedence value of 5. How packets that are marked with the IP-precedence value of 5 are treated is determined by the network configuration.

Related Commands

Command	Description
policy-map	Accesses QoS policy-map configuration mode to configure the QoS policy map.
service-policy	Attaches a policy map to an interface.
show policy-map	Displays information about the policy map.

Command	Description
show policy-map interface	Displays the statistics and the configurations of the input and output policies that are attached to an interface.

set ip precedence (policy-map)

The **setipprecedence**(policy-map) command is replaced by the set precedence command. See the set precedence command for more information.

set ip precedence (route-map)

To set the precedence value (and an optional IP number or IP name) in the IP header, use the **setipprecedence** command in route-map configuration mode. To leave the precedence value unchanged, use the **no** form of this command.

set ip precedence [*number*| *name*]

no set ip precedence

Syntax Description

number *name*	(Optional) A number or name that sets the precedence bits in the IP header. The values for the *number* argument and the corresponding *name* argument are listed in the table below from least to most important.

Command Default

Disabled

Command Modes

Route-map configuration

Command History

Release	Modification
11.0	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

The table below lists the values for the *number* argument and the corresponding *name* argument for precedence values in the IP header. They are listed from least to most important.

Table 3: Number and Name Values for IP Precedence

Number	Name
0	**routine**
1	**priority**
2	**immediate**

Number	Name
3	**flash**
4	**flash-override**
5	**critical**
6	**internet**
7	**network**

You can set the precedence using either a number or the corresponding name. Once the IP Precedence bits are set, other QoS services such as weighted fair queueing (WFQ) and Weighted Random Early Detection (WRED) then operate on the bit settings.

The network gives priority (or some type of expedited handling) to marked traffic through the application of WFQ or WRED at points downstream in the network. Typically, you set IP Precedence at the edge of the network (or administrative domain); data then is queued based on the precedence. WFQ can speed up handling for certain precedence traffic at congestion points. WRED can ensure that certain precedence traffic has lower loss rates than other traffic during times of congestion.

The mapping from arguments such as **routine** and **priority** to a precedence value is useful only in some instances. That is, the use of the precedence bit is evolving. You can define the meaning of a precedence value by enabling other features that use the value. In the case of the high-end Internet QoS available from Cisco, IP Precedences can be used to establish classes of service that do not necessarily correspond numerically to better or worse handling in the network.

Use the **route-map**(IP)global configuration command with the **match** and **set** route-map configuration commands to define the conditions for redistributing routes from one routing protocol into another, or for policy routing. Each **route-map**command has an associated list of **match** and **set** commands. The **match** commands specify the match criteria--the conditions under which redistribution or policy routing is allowed for the current **route-map** command. The **set** commands specify the set actions--the particular redistribution or policy routing actions to perform if the criteria enforced by the **match** commands are met. The **noroute-map** command deletes the route map.

The **set**route-map configuration commands specify the redistribution set actions to be performed when all of the match criteria of a route map are met.

Examples

The following example sets the IP Precedence to 5 (critical) for packets that pass the route map match:

```
interface serial 0
 ip policy route-map texas
route-map texas
match length 68 128
set ip precedence 5
```

Related Commands

Command	Description
fair-queue (WFQ)	Enables WFQ for an interface.

Command	Description
ip policy route-map	Identifies a route map to use for policy routing on an interface.
random-detect dscp	Changes the minimum and maximum packet thresholds for the DSCP value.
send qdm message	Configures CAR and DCAR policies.
route-map (IP)	Defines the conditions for redistributing routes from one routing protocol into another, or enables policy routing.
traffic-shape adaptive	Configures a Frame Relay subinterface to estimate the available bandwidth when BECN signals are received.
traffic-shape fecn-adapt	Replies to messages with the FECN bit (which are set with TEST RESPONSE messages with the BECN bit set).
traffic-shape group	Enables traffic shaping based on a specific access list for outbound traffic on an interface.
traffic-shape rate	Enables traffic shaping for outbound traffic on an interface.

set ip precedence tunnel

To set the precedence value in the header of a Layer 2 Tunnel Protocol Version 3 (L2TPv3) or generic routing encapsulation (GRE) tunneled packet for tunnel marking, use the **set ip precedence tunnel** command in policy-map class configuration mode. To disable this functionality, use the **no** form of this command.

set ip precedence tunnel *precedence-value*

no set ip precedence tunnel *precedence-value*

Syntax Description

precedence-value	Number from 0 to 7 that identifies the precedence value of the tunnel header.

Command Default

The precedence value is not set.

Command Modes

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

Command History

Release	Modification
12.0(28)S	This command was introduced.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRC	This command was integrated into Cisco IOS Release 12.2(33)SRC.
12.4(15)T2	This command was integrated into Cisco IOS Release 12.4(15)T2, and support for marking GRE-tunneled packets was included. **Note** For this release, marking GRE-tunneled packets is supported only on platforms equipped with a Cisco MGX Route Processor Module (RPM-XF).
12.2(33)SB	Support for marking GRE-tunneled packets was included, and support for the Cisco 7300 series router was added.
Cisco IOS XE Release 3.5S	This command was integrated into Cisco IOS XE Release 3.5S and was implemented on the Cisco ASR 1000 Series Router.

Usage Guidelines

It is possible to configure L2TPv3 (or GRE) tunnel marking and the **ip tos** commands at the same time. However, Modular Quality of Service (QoS) Command-Line Interface (CLI) (MQC) (L2TPv3 or GRE) tunnel marking has higher priority over **ip tos** commands, meaning that tunnel marking always rewrites the IP header of the tunnel packet and overwrites the values set by ip tos commands. The order of enforcement is as follows when these commands are used simultaneously:

1. **set ip dscp tunnel** or **set ip precedence tunnel** (L2TPv3 or GRE tunnel marking)
2. **ip tos reflect**
3. **ip tos** *tos-value*

We recommend that you configure only L2TPv3 (or GRE) tunnel marking and reconfigure any peers configured with the **ip tos** commands to use L2TPv3 (or GRE) tunnel marking.

Note For Cisco IOS Release 12.4(15)T2, marking GRE-tunneled packets is supported only on platforms equipped with a Cisco RPM-XF.

Examples

The following example shows the **set ip precedence tunnel** command used in a tunnel marking configuration. In this example, a class map called "MATCH_PREC" has been configured to match traffic on the basis of the precedence value. Also, a policy map called "TUNNEL_MARKING" has been created within which the **set ip precedence tunnel** command has been configured.

```
Router> enable
Router# configure terminal
Router(config)# class-map match-any MATCH_PREC
Router(config-cmap)# match ip precedence 0
Router(config-cmap)# exit
Router(config)# policy-map TUNNEL_MARKING
Router(config-pmap)# class MATCH_PREC
Router(config-pmap-c)# set ip precedence tunnel 3
Router(config-pmap-c)# end
```

Note You must still attach a policy map to an interface or ATM PVC using the **service-policy** command.Tunnel marking policies can be applied as an ingress policy on the ingress physical interface of a Service Provider Edge (SPE) router or as an egress policy on the tunnel interface. For more information about attaching a policy map to an interface or ATM PVC, see the "Applying QoS Features Using the MQC" module of the *Cisco IOS Quality of Service Solutions Configuration Guide.*

Related Commands

Command	Description
ip tos	Specifies the ToS level for IP traffic in the TN3270 server.
set ip dscp tunnel	Sets the DSCP value in the header of an L2TPv3 tunneled packet.

set ip tos (route-map)

To set the type of service (ToS) bits in the header of an IP packet, use the **setiptos** command in route-map configuration mode. To leave the ToS bits unchanged, use the **no** form of this command.

set ip tos [*tos-bit-value*| **max-reliability**| **max-throughput**| **min-delay**| **min-monetary-cost**| **normal**]

no set ip tos

Syntax Description

tos-bit-value	(Optional) A value (number) from 0 to 15 that sets the ToS bits in the IP header. See the table below for more information.
max-reliability	(Optional) Sets the maximum reliability ToS bits to 2.
max-throughput	(Optional) Sets the maximum throughput ToS bits to 4.
min-delay	(Optional) Sets the minimum delay ToS bits to 8.
min-monetary-cost	(Optional) Sets the minimum monetary cost ToS bits to 1.
normal	(Optional) Sets the normal ToS bits to 0.

Command Default

Disabled

Command Modes

Route-map configuration

Command History

Release	Modification
11.2	This command was introduced.
12.4T	This command was integrated into Cisco IOS Release 12.4T.
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

This command allows you to set four bits in the ToS byte header. The table below shows the format of the four bits in binary form.

Table 4: ToS Bits and Description

T3	T2	T1	T0	Description
0	0	0	0	0 normal forwarding
0	0	0	1	1 minimum monetary cost
0	0	1	0	2 maximum reliability
0	1	0	0	4 maximum throughput
1	0	0	0	8 minimum delay

The T3 bit sets the delay. Setting T3 to 0 equals normal delay, and setting it to 1 equals low delay.

The T2 bit sets the throughput. Setting this bit to 0 equals normal throughput, and setting it to 1 equals maximum throughput. Similarly, the T1 and T0 bits set reliability and cost, respectively. Therefore, as an example, if you want to set a packet with the following requirements:

minimum delay T3 = 1

normal throughput T2 = 0

normal reliability T1 = 0

minimum monetary cost T0 = 1

You would set the ToS to 9, which is 1001 in binary format.

Use the **route-map** (IP) global configuration command with the **match** and **set** (route-map) configuration commands to define the conditions for redistributing routes from one routing protocol into another, or for policy routing. Each **route-map** command has an associated list of **match** and**set**commands. The **match** commands specify the match criteria--the conditions under which redistribution or policy routing is allowed for the current route-map command. The**set** commands specify the set actions--the particular redistribution or policy routing actions to perform if the criteria enforced by the match commands are met. The **noroute-map** command deletes the route map.

The **set** (route-map) commands specify the redistribution set actions to be performed when all of the match criteria of a route map are met.

Examples

The following example sets the IP ToS bits to 8 (minimum delay as shown in set ip tos (route-map), on page 63) for packets that pass the route-map match:

```
interface serial 0
 ip policy route-map texas
!
```

```
route-map texas
  match length 68 128
  set ip tos 8
!
```

Related Commands

Command	Description
ip policy route-map	Identifies a route map to use for policy routing on an interface.
route-map (IP)	Defines the conditions for redistributing routes from one routing protocol into another, or enables policy routing.

set precedence

To set the precedence value in the packet header, use the **set precedence** command in policy-map class configuration mode. To remove the precedence value, use the **no** form of this command.

Supported Platforms Other Than Cisco 10000 Series Routers

set precedence {*precedence-value*| *from-field* [**table** *table-map-name*]}

no set precedence {*precedence-value*| *from-field* [**table** *table-map-name*]}

Cisco 10000 Series Routers

set precedence {*precedence-value*}

no setprecedence {*precedence-value*}

Syntax Description

precedence-value	A number from 0 to 7 that sets the precedence bit in the packet header.
from-field	Specific packet-marking category to be used to set the precedence value of the packet. If you are using a table map for mapping and converting packet-marking values, this argument value establishes the "map from" packet-marking category. Packet-marking category keywords are as follows: • **cos** • **qos-group**
table	(Optional) Indicates that the values set in a specified table map will be used to set the precedence value.
table-map-name	(Optional) Name of the table map used to specify a precedence value based on the class of service (CoS) value. The name can be a maximum of 64 alphanumeric characters.

Command Default

This command is disabled.

Command Modes

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

Command History

Release	Modification
12.2(13)T	This command was introduced. This command replaces the **set ip precedence**command.
12.0(28)S	Support for this command in IPv6 was added on the Cisco 12000 series Internet routers.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB	This command was integrated into Cisco IOS Release 12.2(31)SB and implemented on the Cisco 10000 series router.
Cisco IOS XE Release 2.1	This command was implemented on Cisco ASR 1000 Series Routers.

Usage Guidelines

Command Compatibility

If a router is loaded with an image from Cisco IOS Release 12.2(13)T that contained an old configuration, the **setip precedence** command is still recognized. However, the **set precedence** command will be used in place of the **set ip precedence** command.

The **set precedence** command cannot be used with the**set dscp** command to mark the *same* packet. The two values, differentiated services code point (DSCP) and precedence, are mutually exclusive. A packet can have one value or the other, but not both.

Bit Settings

Once the precedence bits are set, other quality of service (QoS) features such as weighted fair queueing (WFQ) and Weighted Random Early Detection (WRED) then operate on the bit settings.

Precedence Value

The network gives priority (or some type of expedited handling) to marked traffic through the application of WFQ or WRED at points downstream in the network. Typically, you set the precedence value at the edge of the network (or administrative domain); data then is queued according to the specified precedence. WFQ can speed up handling for certain precedence traffic at congestion points. WRED can ensure that certain precedence traffic has lower loss rates than other traffic during times of congestion.

Using This Command with the Enhanced Packet Marking Feature

If you are using this command as part of the Enhanced Packet Marking feature, you can use this command to specify the “from-field” packet-marking category to be used for mapping and setting the precedence value. The “from-field” packet-marking categories are as follows:

- CoS
- QoS group

If you specify a “from-field” category but do not specify the **table** keyword and the applicable *table-map-name* argument, the default action will be to copy the value associated with the “from-field” category as the precedence value. For instance, if you configure the **set precedence cos** command, the CoS value will be copied and used as the precedence value.

You can do the same for the QoS group-marking category. That is, you can configure the **set precedence qos-group** command, and the QoS group value will be copied and used as the precedence value.

The valid value range for the precedence value is a number from 0 to 7. The valid value range for the QoS group is a number from 0 to 99. Therefore, when configuring the **setprecedenceqos-group** command, note the following points:

- If a QoS group value falls within both value ranges (for example, 6), the packet-marking value will be copied and the packets will be marked.
- If QoS group value exceeds the precedence range (for example, 10), the packet-marking value will not be copied, and the packet will not be marked. No action is taken.

Precedence Values in IPv6 Environments

When this command is used in IPv6 environments, it can set the value in both IPv4 and IPv6 packets. However, the actual packets set by this function are only those that meet the match criteria of the class map containing this function.

Setting Precedence Values for IPv6 Packets Only

To set the precedence values for IPv6 packets only, the **match protocol ipv6** command must also be used in the class map that classified packets for this action. Without the **match protocol ipv6**command, the class map may classify both IPv6 and IPv4 packets (depending on other match criteria), and the **set precedence** command will act upon both types of packets.

Setting Precedence Values for IPv4 Packets Only

To set the precedence values for IPv4 packets only, use a command involving the **ip** keyword like the **match ip precedence** or **match ip dscp**command or include the **match protocol ip** command along with the others in the class map. Without the additional **ip** keyword, the class map may match both IPv6 and IPv4 packets (depending on the other match criteria) and the **set precedence**or **set dscp** commandmay act upon both types of packets.

Examples

In the following example, the policy map named policy-cos is created to use the values defined in a table map named table-map1. The table map named table-map1 was created earlier with the **table-map** (value mapping) command. For more information about the **table-map** (value mapping) command, see the**table-map** (value mapping) command page.

In this example, the precedence value will be set according to the CoS value defined in table-map1.

```
Router(config)# policy-map policy-cos
Router(config-pmap)# class class-default
Router(config-pmap-c)# set precedence cos table table-map1
Router(config-pmap-c)# end
```

The **set precedence** command is applied when you create a service policy in QoS policy-map configuration mode. This service policy is not yet attached to an interface or to an ATM virtual circuit. For information on attaching a service policy to an interface, refer to the “Modular Quality of Service Command-Line Interface Overview” chapter of the *Quality of Service Solutions Configuration Guide.*

Related Commands

Command	Description
match dscp	Identifies a specific IP DSCP value as a match criterion.

Command	Description
match precedence	Identifies IP precedence values as match criteria.
match protocol	Configures the match criteria for a class map on the basis of the specified protocol.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
service-policy	Attaches a policy map to an input interface or VC, or an output interface or VC, to be used as the service policy for that interface or VC.
set cos	Sets the Layer 2 CoS value of an outgoing packet.
set dscp	Marks a packet by setting the Layer 3 DSCP value in the ToS byte.
set qos-group	Sets a group ID that can be used later to classify packets.
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.
show policy-map interface	Displays the configuration for all classes configured for all service policies on the specified interface or displays the classes for the service policy for a specific PVC on the interface.
show table-map	Displays the configuration of a specified table map or all table maps.
table-map (value mapping)	Creates and configures a mapping table for mapping and converting one packet-marking value to another.

set qos-group

To set a quality of service (QoS) group identifier (ID) that can be used later to classify packets, use the **setqos-group** command in policy-map class configuration mode. To remove the group ID, use the **no** form of this command.

Supported Platforms Except the Cisco 10000 Series Router

set qos-group {*group-id*| *from-field* [**table** *table-map-name*]}

no set qos-group {*group-id*| *from-field* [**table** *table-map-name*]}

Cisco 10000 Series Router

set qos-group *group-id*

no set qos-group *group-id*

Syntax Description

group-id	Group ID number in the range from 0 to 99.
from-field	Specific packet-marking category to be used to set the QoS group value of the packet. If you are using a table map for mapping and converting packet-marking values, this establishes the "map from" packet-marking category. Packet-marking category keywords are as follows: • **cos** --Specifies that the QoS group value is set from the packet's original 802.1P class of service (CoS) field. • **precedence** --Specifies that the QoS group value is set from the packet's original IP precedence field. • **dscp** --Specifies that the QoS group value is set from the packet's original Differentiated Services Code Point (DSCP) field. • **mpls exp topmost** --Specifies that the QoS group value is set from the packet's original topmost MPLS EXP field .
table *table-map-name*	(Optional) Used in conjunction with the *from-field*argument. Indicates that the values set in a table map specified by *table-map-name*will be used to set the QoS group value.

Command Default

No group ID is specified.

Command Modes

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

Command History

Release	Modification
11.1CC	This command was introduced.
12.0(5)XE	This command was integrated into Cisco IOS Release 12.0(5)XE.
12.0(17)SL	This command was introduced on the Cisco 10000 series router.
12.2(13)T	This command can now be used with the **random-detectdiscard-class-based** command, and this command was modified for the Enhanced Packet Marking feature. A mapping table (table map) can now be used to convert and propagate packet-marking values.
12.2(18)SXE	This command was integrated into Cisco IOS 12.2(18)SXE, and the **cos** keyword was added.
12.2(31)SB	This command was integrated into Cisco IOS Release 12.2(31)SB.
Cisco IOS XE Release 2.1	This command was implemented on Cisco ASR 1000 series routers.
15.1(2)SNH	This command was implemented on the Cisco ASR 901 Series Aggregation Services Routers.

Usage Guidelines

The **setqos-group** command allows you to associate a group ID with a packet. The group ID can be used later to classify packets into QoS groups based as prefix, autonomous system, and community string.

A QoS group and discard class are required when the input per-hop behavior (PHB) marking will be used for classifying packets on the output interface.

Using This Command with the Enhanced Packet Marking Feature

If you are using this command as part of the Enhanced Packet Marking feature, you can use this command to specify the "from-field" packet-marking category to be used for mapping and setting the precedence value.

If you specify a "from-field" category but do not specify the **table** keyword and the applicable *table-map-name* argument, the default action will be to copy the value associated with the "from-field" category as the precedence value. For instance, if you enter **setqos-grouppprecedence**, the precedence value will be copied and used as the QoS group value.

A packet is marked with a QoS group value only while it is being processed within the router. The QoS group value is not included in the packet's header when the packet is transmitted over the output interface. However, the QoS group value can be used to set the value of a Layer 2 or Layer 3 field that is included as part of the packet's headers (such as the MPLS EXP, CoS, and DSCP fields).

Note The **setqos-groupcos** and **setqos-grouppprecedence** commands are equivalent to the **mlsqostrustcos** and **mlsqostrustprec** commands.

Tip The **setqos-group** command cannot be applied until you create a service policy in policy-map configuration mode and then attach the service policy to an interface or ATM virtual circuit (VC). For information on attaching a service policy, refer to the "Modular Quality of Service Command-Line Interface Overview" chapter of the *Cisco IOS Quality of Service Solutions Configuration Guide*.

Examples

The following example shows how to set the QoS group to 1 for all packets that match the class map called class 1. These packets are then rate limited on the basis of the QoS group ID.

```
Router(config)#

policy-map policy1
Router(config-pmap)#

class class1
Router(config-pmap-c)#

set qos-group 1
Router(config-pmap-c)#

end
```

The following example shows how to set the QoS group value based on the packet's original 802.1P CoS value:

```
Router(config)# policy map policy1

Router(config-pmap)# class class-default

Router(config-pmap-c)#

set qos-group cos

Router(config-pmap-c)#

end
```

Examples

The following example shows how to set the QoS group value based on the values defined in a table map called table-map1. This table map is configured in a policy map called policy1. Policy map policy1 converts and propagates the QoS value according to the values defined in table-map1.

In this example, the QoS group value will be set according to the precedence value defined in table-map1.

```
Router(config)# policy map policy1
Router(config-pmap)# class class-default
Router(config-pmap-c)#

set qos-group precedence table table-map1
Router(config-pmap-c)#

end
```

Related Commands

Command	Description
match input vlan	Configures a class map to match incoming packets that have a specific VLAN ID.
match qos-group	Identifies a specified QoS group value as a match criterion.
mls qos trust	Sets the trusted state of an interface to determine which incoming QoS field on a packet, if any, should be preserved.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
service-policy	Attaches a policy map to an input interface or VC, or an output interface or VC, to be used as the service policy for that interface or VC.
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.
show policy-map interface	Displays the configuration of all classes configured for all service policies on the specified interface or displays the classes for the service policy for a specific PVC on the interface.

set vlan inner

To mark the bridged packets in the permanent virtual circuit (PVC) with a specific virtual LAN identifier (VLAN ID), use the **setvlaninner** command in policy-map class configuration mode. To disable this configuration, use the **no** form of this command.

set vlan inner *vlan-number*

no set vlan inner *vlan-number*

Syntax Description

vlan-number	Number that identifies the VLAN. The range is from 1 to 4094.

Command Default

The bridged packets are marked with the default VLAN ID as configured using the **bridge-dot1qencap** command.

Command Modes

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

Command History

Release	Modification
15.1(2)T	This command was introduced.

Usage Guidelines

Although multiple VLANs are allowed under a single PVC, the locally generated packets including the Address Resolution Protocol (ARP) packets are sent out with the class default VLAN ID only. The **setvlaninner** command must be applied within the class default.

Examples

The following example shows how to mark the inner VLAN ID as 2 for bridged packets in the 802.1Q tag:

```
Router(config)# policy-map egress-policy
Router(config-pmap)# class egress
Router(config-pmap-c)# set vlan inner 2
```

Related Commands

Command	Description
bridge-dot1q encap	Adds a VLAN ID at an ATM PVC over an ATM xDSL link.

shape

To specify average or peak rate traffic shaping, use the **shape** command in class-map configuration mode. To remove traffic shaping, use the **no** form of this command.

shape {**average**| **peak**} *cir* [*bc*] [*be*]

no shape {**average**| **peak**} *cir* [*bc*] [*be*]

Syntax Description

average	Specifies average rate shaping.
peak	Specifies peak rate shaping.
cir	Committed information rate (CIR), in bits per second (bps).
bc	(Optional) Committed Burst size, in bits.
be	(Optional) Excess Burst size, in bits.

Command Default

Average or peak rate traffic shaping is not specified.

Command Modes

Class-map configuration (config-cmap)

Command History

Release	Modification
12.1(2)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.
15.1(1)T	This command was modified. The allowed values for the cir argument were changed. The value must be between 8,000 and 1,000,000,000 bps.

Usage Guidelines

Traffic shaping limits the rate of transmission of data. In addition to using a specifically configured transmission rate, you can use Generic Traffic Shaping (GTS) to specify a derived transmission rate based on the level of congestion.

You can specify two types of traffic shaping; average rate shaping and peak rate shaping. Average rate shaping limits the transmission rate to the CIR. Using the CIR ensures that the average amount of traffic being sent conforms to the rate expected by the network.

Peak rate shaping configures the router to send more traffic than the CIR. To determine the peak rate, the router uses the following formula:

peak rate = CIR(1 + Be / Bc)

where:

- Be is the Excess Burst size.
- Bc is the Committed Burst size.

Peak rate shaping allows the router to burst higher than average rate shaping. However, using peak rate shaping, the traffic sent above the CIR (the delta) could be dropped if the network becomes congested.

If your network has additional bandwidth available (over the provisioned CIR) and the application or class can tolerate occasional packet loss, that extra bandwidth can be exploited through the use of peak rate shaping. However, there may be occasional packet drops when network congestion occurs. If the traffic being sent to the network must strictly conform to the configured network provisioned CIR, then you should use average traffic shaping.

Examples

The following example shows how to configure average rate shaping to ensure a bandwidth of 256 kbps:

```
shape average 256000
```

The following example shows how to configure peak rate shaping to ensure a bandwidth of 300 kbps but allow throughput up to 512 kbps if enough bandwidth is available on the interface:

```
bandwidth 300
shape peak 512000
```

Related Commands

Command	Description
bandwidth	Specifies or modifies the bandwidth allocated for a class belonging to a policy map.
class (policy-map)	Specifies the name of the class whose policy you want to create or change, and the default class (commonly known as the class-default class) before you configure its policy.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
service-policy	Attaches a policy map to an input interface or VC, or an output interface or VC, to be used as the service policy for that interface or VC.
shape max-buffers	Specifies the maximum number of buffers allowed on shaping queues.

shape (percent)

To specify average or peak rate traffic shaping on the basis of a percentage of bandwidth available on an interface, use the **shape** command in policy-map class configuration mode. To remove traffic shaping, use the **no** form of this command.

shape {**average**| **peak**} **percent** *percentage* [*sustained-burst-in-msec* **ms**] [**be** *excess-burst-in-msec* **ms**] [**bc** *committed-burst-in-msec* **ms**]

no shape {**average**| **peak**} **percent** *percentage* [*sustained-burst-in-msec* **ms**] [**be** *excess-burst-in-msec* **ms**] [**bc** *committed-burst-in-msec* **ms**]

Syntax Description

average	Specifies average rate traffic shaping.
peak	Specifies peak rate traffic shaping.
percent	Specifies that a percent of bandwidth will be used for either the average rate traffic shaping or peak rate traffic shaping.
percentage	Specifies the bandwidth percentage. Valid range is a number from 1 to 100.
sustained-burst-in-msec	(Optional) Sustained burst size used by the first token bucket for policing traffic. Valid range is a number from 4 to 200.
ms	(Optional) Indicates that the burst value is specified in milliseconds (ms).
be	(Optional) Excess burst (be) size used by the second token bucket for policing traffic.
excess-burst-in-msec	(Optional) Specifies the be size in milliseconds. Valid range is a number from 0 to 200.
bc	(Optional) Committed burst (bc) size used by the first token bucket for policing traffic.
committed-burst-in-msec	(Optional) Specifies the bc value in milliseconds. Valid range is a number from 1 to 2000.

Command Default

The default bc and be is 4 ms.

Command Modes

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

Command History

Release	Modification
12.1(2)T	This command was introduced.
12.2(13)T	This command was modified for the Percentage-Based Policing and Shaping feature.
12.0(28)S	The command was integrated into Cisco IOS Release 12.0(28)S.
12.2(18)SXE	The command was integrated into Cisco IOS Release 12.2(18)SXE.
12.2(28)SB	The 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.
Cisco IOS XE Release 2.1	This command was implemented on Cisco ASR 1000 series routers.

Usage Guidelines

Committed Information Rate

This command calculates the committed information rate (CIR) on the basis of a percentage of the available bandwidth on the interface. Once a policy map is attached to the interface, the equivalent CIR value in bits per second (bps) is calculated on the basis of the interface bandwidth and the percent value entered with this command. The **showpolicy-mapinterface** command can then be used to verify the CIR bps value calculated.

The calculated CIR bps rate must be in the range of 8000 and 154,400,000 bps. If the rate is less than 8000 bps, the associated policy map cannot be attached to the interface. If the interface bandwidth changes (for example, more is added), the CIR bps values are recalculated on the basis of the revised amount of bandwidth. If the CIR percentage is changed after the policy map is attached to the interface, the bps value of the CIR is recalculated.

Conform Burst and Peak Burst Sizes in Milliseconds

This command also allows you to specify the values for the conform burst size and the peak burst size in milliseconds. If you want bandwidth to be calculated as a percentage, the conform burst size and the peak burst size must be specified in milliseconds (ms).

The traffic shape converge rate depends on the traffic pattern and the time slice (Tc) parameter, which is directly affected by the bc that you configured. The Tc and the average rate configured are used to calculate bits per interval sustained. Therefore, to ensure that the shape rate is enforced, use a bc that results in a Tc greater than 10 ms.

Hierarchical Policy Maps

The **shape** (percent) command, when used in “child” (hierarchical) policy maps, is not supported on the Cisco 7500, the Cisco 7200, or lower series routers. Therefore, the **shape** (percent) command cannot be configured for use in hierarchical policy maps on these routers.

How Bandwidth Is Calculated

The **shape** (percent) command is often used in conjunction with the **bandwidth** and **priority** commands. The **bandwidth** and **priority** commands can be used to calculate the total amount of bandwidth available on an

entity (for example, a physical interface). When the **bandwidth** and **priority** commands calculate the total amount of bandwidth available on an entity, the following guidelines are invoked:

- If the entity is a physical interface, the total bandwidth is the bandwidth on the physical interface.
- If the entity is a shaped ATM permanent virtual circuit (PVC), the total bandwidth is calculated as follows:
  - For a variable bit rate (VBR) virtual circuit (VC), the sustained cell rate (SCR) is used in the calculation.
  - For an available bit rate (ABR) VC, the minimum cell rate (MCR) is used in the calculation.

For more information on bandwidth allocation, see the "Congestion Management Overview" chapter in the *Cisco IOS Quality of Service Solutions Configuration Guide.*

Note Thiscommand cannot be used with the **shapeadaptive** command.

Examples

The following example configures traffic shaping using an average shaping rate on the basis of a percentage of bandwidth. In this example, 25 percent of the bandwidth has been specified. Additionally, an optional be value and bc value (100 ms and 400 ms, respectively) have been specified.

```
Router> enable
Router# configure terminal
Router(config)# policy-map policy1
Router(config-pmap)# class-map class1
Router(config-pmap-c)# shape average percent 25 20 ms be 100 ms bc 400 ms
Router(config-pmap-c)# end
```

After the policy map and class maps are configured, the policy map is attached to interface as shown in the following example.

```
Router> enable
Router# configure terminal
Router(config)#

interface serial4/0
Router(config-if)#

service-policy input policy1
Router(config-if)# end
```

Related Commands

Command	Description
bandwidth	Specifies or modifies the bandwidth allocated for a class belonging to a policy map.
class (policy-map)	Specifies the name of the class whose policy you want to create or change and the default class (commonly known as the class-default class) before you configure its policy.

Command	Description
police (percent)	Configures traffic policing on the basis of a percentage of bandwidth available on an interface.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
priority	Gives priority to a class of traffic belonging to a policy map.
service-policy	Attaches a policy map to an input interface or VC, or an output interface or VC, to be used as the service policy for that interface or VC.
shape adaptive	Estimates the available bandwidth by backward explicit congestion notification (BECN) integration while traffic shaping is enabled for a Frame Relay interface or a point-to-point subinterface.
shape max-buffers	Specifies the maximum number of buffers allowed on shaping queues.
show policy-map interface	Displays the statistics and the configurations of the input and output policies that are attached to an interface.

shape (policy-map class)

To shape traffic to the indicated bit rate according to the algorithm specified or to enable ATM overhead accounting, use the **shape** command in policy-map class configuration mode. To remove shaping and leave the traffic unshaped, use the **no**form of this command.

shape {**average**| **peak**} {*mean-rate* [*burst-size* [*excess-burst-size*]]| **percent** *percentage* [*burst-size* **ms** [*excess-burst-size* **ms**]]}

no shape [**average**| **peak**]

shape [**average**| **peak**] *mean-rate* **[burst-size]** [*excess-burst-size*] **account** {**qinq**| **dot1q**} **aal5** {*subscriber-encapsulation*| **user-defined** *offset*}

no shape [**average**| **peak**] *mean-rate* **[burst-size]** [*excess-burst-size*] **account** {**qinq**| **dot1q**} **aal5** {*subscriber-encapsulation*| **user-defined** *offset*}

shape [**average**| **peak**] *mean-rate* [*burst-size*] [*excess-burst-size*] [**account** {**qinq**| **dot1q**} **aal5** *subscriber-encap*]

no shape [**average**| **peak**] *mean-rate* [*burst-size*] [*excess-burst-size*] [**account** {**qinq**| **dot1q**} **aal5** *subscriber-encap*]

shape [average] *mean-rate* [*unit*] [*burst-size*] [*excess-burst-size*] [**account** {**qinq**| **dot1q**} **aal5** *subscriber-encapsulation*]

no shape [average] *mean-rate* [*unit*] [*burst-size*] [*excess-burst-size*] [**account** {**qinq**| **dot1q**} **aal5** *subscriber-encapsulation*]

shape [average] *mean-rate* [*burst-size*] [*excess-burst-size*] **account** {{**qinq**| **dot1q**} {**aal5**| **aal3**} *subscriber-encapsulation*| **user-defined** *offset* **[atm]**}

no shape [average] *mean-rate* [*burst-size*] [*excess-burst-size*] **account** {{**qinq**| **dot1q**} {**aal5**| **aal3**} *subscriber-encapsulation*| **user-defined** *offset* **[atm]**}

Syntax Description

average	Committed Burst (Bc) is the maximum number of bits sent out in each interval.
peak	Bc + Excess Burst (Be) is the maximum number of bits sent out in each interval.
mean-rate	Also called committed information rate (CIR). Indicates the bit rate used to shape the traffic, in bps. When this command is used with backward explicit congestion notification (BECN) approximation, the bit rate is the upper bound of the range of bit rates that will be permitted. The value must be between 1,000 and 1,000,000,000 bits per second.
unit	(Optional) Specifies the unit of the specified bit rate (for example, kbps).

burst-size	(Optional) The number of bits in a measurement interval (Bc). Valid values are 256 to 154400000.
excess-burst-size	(Optional) The acceptable number of bits permitted to go over the Be. Valid values are 0 to 154400000.
percent	Specifies the percentage of interface bandwidth for committed information rate.
percentage	Percentage. Valid values are 1 to 100.
burst-size	(Optional) Sustained burst, in milliseconds. Valid values are 10 to 2000.
ms	(Optional) Specifies the time, in milliseconds.
excess-burst-size	(Optional) Excess burst, in milliseconds. Valid values are 10 to 2000.
ms	(Optional) Specifies the time, in milliseconds.
account	(Optional) Enables ATM overhead accounting. **Note** This keyword is required if you configure ATM overhead accounting.
qinq	Specifies queue-in-queue (qinq) encapsulation as the broadband aggregation system (BRAS) to digital subscriber line access multiplexer (DSLAM) encapsulation type for ATM overhead accounting.
dot1q	Specifies IEEE 802.1Q VLAN encapsulation as the BRAS-DSLAM encapsulation type for ATM overhead accounting.
aal5	Specifies the ATM Adaptation Layer 5 service for ATM overhead accounting. AAL5 supports connection-oriented variable bit rate (VBR) services.
aal3	Specifies the ATM Adaptation Layer 5 that supports both connectionless and connection-oriented links. You must specify either aal3 or aal5. **Note** For the Cisco 7300 and Cisco 7600 series routers, the **aa13** keyword is not supported.

subscriber-encap	Specifies the encapsulation type at the subscriber line. • **snap-rbe** • **mux-rbe** • **snap-dot1q-rbe** • **mux-dot1q-rbe** • **snap-pppoa** • **mux-pppoa** • **snap-1483routed** • **mux-1483routed**
user-defined	Specifies that the router is to use an offset size when calculating ATM overhead.
offset	Specifies the offset size when calculating ATM overhead. Valid values are from –127 to 127 bytes; 0 is not a valid value. **Note** For the Cisco 7300 and Cisco 7600 series routers, valid values are from -48 to 48 bytes; 0 is not a valid value. **Note** The router configures the offset size if you do not specify the user-defined offset option.
atm	Applies ATM cell tax in the ATM overhead calculation. **Note** For the Cisco 7300 and Cisco 7600 series routers, the **atm**keyword is not supported. **Note** Configuring both the offset and atm options adjusts the packet size to the offset size and then adds ATM cell tax.

Command Default

When the excess burst size (Be) is not configured, the default Be value is equal to the committed burst size (Bc). For more information about burst size defaults, see the “Usage Guidelines” section.

Traffic shaping overhead accounting for ATM is disabled.

Command Modes

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

Command History

Release	Modification
12.0(5)XE	This command was introduced.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.

Release	Modification
12.0(17)SL	This command was integrated into Cisco IOS Release 12.0(17)SL and implemented on the PRE1 for the Cisco 10000 series router.
12.2(16)BX	This command was integrated into Cisco IOS Release 12.2(16)BX and implemented on the PRE2 for the Cisco 10000 series router.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(31)SB2	This command was enhanced for ATM overhead accounting and implemented on the Cisco 10000 series router for the PRE3.
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(31)SB6	This command was enhanced to specify an offset size when calculating ATM overhead and implemented on the Cisco 10000 series router for the PRE3.
12.2(33)SRC	This command was modified. Support for the Cisco 7600 series router was added.
12.2(33)SB	This command was modified. Support for the Cisco 7300 series router was added.
Cisco IOS XE Release 2.1	This command was implemented on Cisco ASR 1000 series routers.
15.2(1)T	This command was modified. The allowed values for the offset argument were changed. The value must be between -127 and 127 bytes; 0 is not a valid value. The allowed value for the mean-rate argument was changed. The value must be between 1,000 and 1,000,000,000 bits per second.

Usage Guidelines

The measurement interval is the committed burst size (Bc) divided by committed information rate (CIR). Bc cannot be set to 0. If the measurement interval is too large (greater than 128 milliseconds), the system subdivides it into smaller intervals.

If you do not specify the committed burst size (Bc) and the excess burst size (Be), the algorithm decides the default values for the shape entity. The algorithm uses a 4 milliseconds measurement interval, so Bc is CIR * (4 / 1000).

Burst sizes larger than the default committed burst size (Bc) need to be explicitly specified. The larger the Bc, the longer the measurement interval. A long measurement interval may affect voice traffic latency, if applicable.

When the excess burst size (Be) is not configured, the default value is equal to the committed burst size (Bc).

Traffic Shaping on the Cisco 10000 Series Performance Routing Engine

The Cisco 10000 series router does not support the peak keyword.

On the PRE2, you specify a shape rate and a unit for the rate. Valid values for the rate are from 1 to 2488320000 and units are bps, kbps, mbps, gbps. The default unit is kbps. For example:

```
shape 128000 bps
```

On the PRE3, you only need to specify a shape rate. Because the unit is always bps on the PRE3, the unit argument is not available. Valid values for the shape rate are from 1000 to 2488320000.

```
shape 1000
```

The PRE3 accepts the PRE2 shape command as a hidden command. However, the PRE3 rejects the PRE2 shape command if the specified rate is outside the valid PRE3 shape rate range (1000 to 2488320000).

Traffic Shaping Overhead Accounting for ATM (Cisco 7300 Series Router, Cisco 7600 Series Router, and Cisco 10000 Series Router)

When configuring ATM overhead accounting on the Cisco 7300 series router, the Cisco 7600 series router, or the Cisco 10000 series router, you must specify the BRAS-DSLAM, DSLAM-CPE, and subscriber line encapsulation types. The router supports the following subscriber line encapsulation types:

- **snap-rbe**
- **mux-rbe**
- **snap-dot1q-rbe**
- **mux-dot1q-rbe**
- **snap-pppoa**
- **mux-pppoa**
- **snap-1483routed**
- **mux-1483routed**

For hierarchical policies, configure ATM overhead accounting in the following ways:

- Enabled on parent--If you enable ATM overhead accounting on a parent policy, you are not required to enable accounting on the child policy.
- Enabled on child and parent--If you enable ATM overhead accounting on a child policy, then you must enable ATM overhead accounting on the parent policy.

The encapsulation types must match for the child and parent policies.

The user-defined offset values must match for the child and parent policies.

Examples

The following example configures a shape entity with a CIR of 1 Mbps and attaches the policy map called dts-interface-all-action to interface pos1/0/0:

```
policy-map dts-interface-all-action
 class class-interface-all
  shape average 1000000
interface pos1/0/0
 service-policy output dts-interface-all-action
```

Examples

When a parent policy has ATM overhead accounting enabled for shaping, you are not required to enable accounting at the child level using the police command. In the following configuration example, ATM overhead

accounting is enabled for bandwidth on the gaming and class-default class of the child policy map named subscriber_classes and on the class-default class of the parent policy map named subscriber_line. The voip and video classes do not have ATM overhead accounting explicitly enabled. These priority classes have ATM overhead accounting implicitly enabled because the parent policy has ATM overhead accounting enabled. Notice that the features in the parent and child policies use the same encapsulation type.

```
policy-map subscriber_classes
 class voip
  priority level 1
  police 8000
 class video
  priority level 2
  police 20000
 class gaming
  bandwidth remaining percent 80 account dot1q aal5 snap-dot1q-rbe
 class class-default
  bandwidth remaining percent 20 account dot1q aal5 snap-dot1q-rbe
policy-map subscriber_line
 class class-default
  shape average 8000 account dot1q aal5 snap-dot1q-rbe
  service policy subscriber_classes
```

In the following example, the router will use 20 overhead bytes and ATM cell tax in calculating ATM overhead.

```
policy-map child
 class class1
  bandwidth 500 account user-defined 20 atm
 class class2
  shape average 30000 account user-defined 20 atm
```

Related Commands

Command	Description
bandwidth	Specifies or modifies the bandwidth allocated for a class belonging to a policy map, and enables ATM overhead accounting.
shape adaptive	Configures a Frame Relay interface or a point-to-point subinterface to estimate the available bandwidth by BECN integration while traffic shaping is enabled.
shape fecn-adapt	Configures a Frame Relay PVC to reflect received FECN bits as BECN bits in Q.922 TEST RESPONSE messages.
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps. If configured, the command output includes information about ATM overhead accounting.
show running-config	Displays the current configuration of the router. If configured, the command output includes information about ATM overhead accounting.

shape adaptive

To configure a Frame Relay interface or a point-to-point subinterface to estimate the available bandwidth by backward explicit congestion notification (BECN) integration while traffic shaping is enabled, use the **shapeadaptive**command in policy-map class configuration mode. To leave the available bandwidth unestimated, use the **no** form of this command.

shape adaptive *mean-rate-lower-bound*

no shape adaptive

Syntax Description

mean-rate-lower-bound	Specifies the lower bound of the range of permitted bit rates.

Command Default

Bandwidth is not estimated.

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.0(5)XE	This command was introduced.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.
12.2(13)T	This command was implemented on the Cisco 1700 series, Cisco 2500 series, Cisco 2600 series, Cisco 3620 router, Cisco 3631 router, Cisco 3640 router, Cisco 3660 router, Cisco 3725 router, Cisco 3745 router, Cisco 7200 series, Cisco 7400 series routers.
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 traffic shaping is not enabled, this command has no effect.

When continuous BECN messages are received, the shape entity immediately decreases its maximum shape rate by one-fourth for each BECN message received until it reaches the lower bound committed information rate (CIR). If, after several intervals, the interface has not received another BECN and traffic is waiting in the shape queue, the shape entity increases the shape rate back to the maximum rate by 1/16 for each interval. A

shape entity configured with the **shapeadaptive***mean-rate-lower-bound* command will always be shaped between the mean rate upper bound and the mean rate lower bound.

Note The **shapeadaptive** command cannot be used with the **shape(percent)** command.

Examples

The following example configures a shape entity with CIR of 128 kbps and sets the lower bound CIR to 64 kbps when BECNs are received:

```
policy-map dts-p2p-all-action

class class-p2p-all

shape adaptive 64000
```

Related Commands

Command	Description
shape (percent)	Specifies average or peak rate traffic shaping on the basis of a percentage of bandwidth available on an interface

shape fecn-adapt

To configure a Frame Relay interface to reflect received forward explicit congestion notification (FECN) bits as backward explicit congestion notification (BECN) bits in Q.922 TEST RESPONSE messages, use the **shapefecn-adapt**command in policy-map class configuration mode. To configure the Frame Relay interface to not reflect FECN as BECN, use the **no** form of this command.

shape fecn-adapt

no shape fecn-adapt

Syntax Description

This command has no arguments or keywords.

Command Default

No default behavior or values.

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.0(5)XE	This command was introduced.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.
12.2(13)T	This command was implemented on the Cisco 1700 series, Cisco 2500 series, Cisco 2600 series, Cisco 3620 router, Cisco 3631 router, Cisco 3640 router, Cisco 3660 router, Cisco 3725 router, Cisco 3745 router, Cisco 7200 series, Cisco 7400 series routers.
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 the downstream Frame Relay switch is congested, a Frame Relay interface or point-to-point interface receives a Frame Relay message with the FECN bit on. This message may be an indication that no traffic is waiting to carry a BECN to the far end (voice/multimedia traffic is one-way). When the **shapefecn-adapt** command is configured, a small buffer is allocated and a Frame Relay TEST RESPONSE is built on behalf of the Frame Relay switch. The Frame Relay TEST RESPONSE is equipped with the triggering data-link connection identifier (DLCI) of the triggering mechanism. It also sets the BECN bit and sends it out to the wire.

Examples

The following example configures a shape entity with a committed information rate (CIR) of 1 Mbps and adapts the Frame Relay message with FECN to BECN:

```
policy-map dts-p2p-all-action
class class-p2p-all
shape average 1000000
shape fecn-adapt
```

Related Commands

Command	Description
shape adaptive	Configures a Frame Relay interface or a point-to-point subinterface to estimate the available bandwidth by BECN integration while traffic shaping is enabled.
shape (percent)	Configures an interface to shape traffic to an indicated bit rate.

shape max-buffers

To specify the number of buffers allowed on shaping queues, use the **shapemax-buffers**command in class-map configuration mode. To set the number of buffers to its default value, use the **no** form of this command.

shape max-buffers *number-of-buffers*

no shape max-buffers

Syntax Description

number-of-buffers	Specifies the number of buffers. The minimum number of buffers is 1; the maximum number of buffers is 4096.

Command Default

1000 buffers are preset.

Command Modes

Class-map configuration (config-cmap)

Command History

Release	Modification
12.1(2)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.
12.4(20)T	This command was integrated into Cisco IOS Release 12.4(20)T, but without support for hierarchical queueing framework (HQF). See the "Usage Guidelines" for additional information.

Usage Guidelines

You can specify the maximum number of buffers allowed on shaping queues for each class configured to use Generic Traffic Shaping (GTS).

You configure this command under a class in a policy map. However, the **shapemax-buffers**command is not supported for HQF in Cisco IOS Release 12.4(20)T. Use the **queue-limit** command, which provides similar functionality.

Examples

The following example configures shaping and sets the maximum buffer limit to 100:

```
shape average 350000
shape max-buffers 100
```

Related Commands

Command	Description
bandwidth	Specifies or modifies the bandwidth allocated for a class belonging to a policy map.
class (policy-map)	Specifies the name of the class whose policy you want to create or change, and the default class (commonly known as the class-default class) before you configure its policy.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
queue-limit	Specifies or modifies the maximum number of packets a queue can hold for a class policy configured in a policy map.
service-policy	Attaches a policy map to an input interface or VC, or an output interface or VC, to be used as the service policy for that interface or VC.
shape	Specifies average or peak rate traffic shaping.

show access-lists rate-limit

To display information about rate-limit access lists, use the **showaccess-listsrate-limit**command in EXEC mode.

show access-lists rate-limit [*acl-index*]

Syntax Description

acl-index	(Optional) Rate-limit access list number from 1 to 299.

Command Modes

EXEC

Command History

Release	Modification
11.1CC	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 is sample output from the **showaccess-listsrate-limit** command:

```
Router# show access-lists rate-limit
Rate-limit access list 1
    0
Rate-limit access list 2
    1
Rate-limit access list 3
    2
Rate-limit access list 4
    3
Rate-limit access list 5
    4
Rate-limit access list 6
    5
Rate-limit access list 9
    mask FF
Rate-limit access list 10
    mask 0F
Rate-limit access list 11
    mask F0
Rate-limit access list 100
    1001.0110.1111
Rate-limit access list 101
    00E0.34B8.D840
Rate-limit access list 199
    1111.1111.1111
```

The following is sample output from the **showaccess-listsrate-limit** command when specific rate-limit access lists are specified:

```
Router# show access-lists rate-limit 1
Rate-limit access list 1
    0
Router# show access-lists rate-limit 9
Rate-limit access list 9
    mask FF
Router# show access-lists rate-limit 101
Rate-limit access list 101
    00E0.34B8.D840
```

The table below describes the significant fields shown in the displays.

Table 5: show access-lists rate-limit Field Descriptions

Field	Description
Rate-limit access list	Rate-limit access list number. A number from 1 to 99 represents a precedence-based access list. A number from 100 to 199 indicates a MAC address-based access list.
0	IP Precedence for packets in this rate-limit access list.
mask FF	IP Precedence mask for packets in this rate-limit access list.
1001.0110.1111	MAC address for packets in this rate-limit access list.

Related Commands

Command	Description
access-list rate-limit	Configures an access list for use with CAR policies.
show access-lists	Displays the contents of current IP and rate-limit access lists.

show atm bundle

To display the bundle attributes assigned to each bundle virtual circuit (VC) member and the current working status of the VC members, use the **showatmbundle** command in privileged EXEC mode.

show atm bundle [*bundle-name*]

Syntax Description

bundle-name	(Optional) Name of the bundle whose member information to be displayed.

Command Default

If no bundle name is specified, all bundles assigned to VC are displayed.

Command Modes

Privileged EXEC (#)

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.

Examples

The following is sample output from the **showatmbundle**command (* indicates that this VC is the VC for all precedence levels not explicitly configured):

```
Router# show atm bundle

new-york on atm1/0.1 Status: UP
                     Config. Active  Bumping    PG/ Peak  Avg/Min  Burst
Name       VPI/VCI   Preced. Preced. Predec./   PV  kbps  kbps     Cells  Status
                                     Accept
ny-control   0/207      7        7      4  /Yes   pv  10000  5000     32      UP
ny-premium   0/206     6-5      6-5     7  /No    pg  20000  10000    32      UP
ny-priority  0/204     4-2      4-2     1  /Yes   pg  10000  3000             UP
ny-basic*    0/201     1-0      1-0     -  /Yes   pg  10000                   UP
los-angeles on atm1/0.1 - Status: UP

                     Config. Active  Bumping    pg/ Peak  Avg/Min  Burst
Name       VPI/VCI   Preced. Preced. Predec./   pv  kbps  kbps     Cells  Status
                                     Accept
la-high     0/407     7-5      7-5     4 /Yes      pv  20000  5000     32     UP
la-med      0/404     4-2      4-2     1 /Yes      pg  10000  3000             UP
la-low*     0/401     1-0      1-0     - /Yes      pg  10000                   UP
san-francisco on atm1/0.1 Status: UP
                     Config. Active  Bumping    PG/ Peak  Avg/Min  Burst
```

```
Name       VPI/VCI    Preced. Preced. Predec./   PV  kbps  kbps     Cells  Status
                                      Accept
sf-control   0/307      7       7      4 /Yes   pv  10000  5000     32      UP
sf-premium   0/306     6-5     6-5     7 /No    pg  20000  10000    32      UP
sf-priority  0/304     4-2     4-2     1 /Yes   pg  10000  3000             UP
sf-basic*    0/301     1-0     1-0     - /Yes   pg  10000                   UP
```

Related Commands

Command	Description
bundle	Creates or modifies an existing bundle.
show atm bundle statistics	Displays statistics on the specified bundle.
show atm map	Displays the list of all configured ATM static maps to remote hosts on an ATM network.

show atm bundle stat

To display statistics or detailed statistics on the specified bundle, use the **showatmbundlestat**command in privileged EXEC mode.

show atm bundle *bundle-name* **stat [detail]**

Syntax Description

bundle-name	Name of the bundle whose member information to be displayed.
detail	(Optional) Displays detailed statistics.

Command Modes

Privileged EXEC (#)

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.

Examples

The following is sample output from the **showatmbundlestat**command:

```
Router# show atm bundle san-jose stat

Bundle Name: Bundle State: UP
AAL5-NLPID
OAM frequency : 0 second(s), OAM retry frequency: 1 second(s)
OAM up retry count: 3, OAM down retry count: 5
BUNDLE is not managed.
InARP frequency: 15 minute(s)
InPkts: 3, OutPkts: 3, Inbytes: 1836, Outbytes: 1836
InPRoc: 3, OutPRoc: 0, Broadcasts: 3
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
Router# show atm bundle san-jose stat detail
Bundle Name: Bundle State: UP
AAL5-NLPID
OAM frequency: 0 second(s), OAM retry frequency: 1 second(s)
OAM up retry count: 3, OAM down retry count: 5
BUNDLE is not managed.
InARP frequency: 15 minute(s)
InPkts: 3, OutPkts: 3, InBytes; 1836, OutBytes: 1836
InPRoc: 3, OutPRoc: 0, Broadcasts: 3
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
ATM1/0.52: VCD: 6, VPI: 0 VCI: 218, Connection Name: sj-basic
UBR, PeakRate: 155000
```

```
AAL5-LLC/SNAP, etype:0x0, Flags: 0xC20, VCmode: 0xE00
OAM frequency: 0 second(s), OAM retry frequency: 1 second(s)
OAM up retry count: 3, OAM down retry count: 5
OAM Loopbavk status: OAM Disabled
OMA VC state: Not Managed
ILMI VC state: Not Managed
InARP frequency: 15 minute(s)
InPkts: 3, OutPkts: 3, InBytes; 1836, OutBytes: 1836
InPRoc: 3, OutPRoc: 0,Broadcasts: 3
InFast: 0, OutFast: 0, InAS: 0, OututAS: 0
OAM cells received: 0
F5 InEndloop: 0, F5 InSegloop: 0, F5 InAIS: 0, F5 InRDI: 0
F4 InEndloop: 0, F4 OutSegloop:0, F4 InAIS: 0, F4 InRDI: 0
OAM cells sent: 0
F5 OutEndloop: 0. F5 OutSegloop: 0, f5 Out RDI:0
F4 OutEndloop: 0, F4 OutSegloop: 0, F4 OUtRDI: 0
OAM cell drops: 0
Status; UP
ATM1/0.52: VCD: 4, VPI: 0 VCI: 216, Connection Name: sj-premium
UBR, PeakRate: 155000
AAL5-LLC/SNAP, etype: 0x0, Flags: 0xC20, VCmode: 0xE000
OAM frequency: 0 second(s), OAM retry frequency: 1 second(s)
OAM up retry count: 3, OAM down retry count: 5
OAM Loopback status: OAM Disabled
OAM VC state:  Not Managed
ILMI VC state: Not Managed
InARP frequency: 15 minute(s)
InPkts: 0, OutPkts: 0, InBytes; 0, OutBytes: 0
InPRoc: 0, OutPRoc: 0, Broadcasts: 0
InFast: 0, OutFast: 0, InAS: 0
OAM cells received: 0
F5 InEndloop: 0, F4 InSegloop: 0, F4InAIS; 0, F4 InRDI: 0
F4 OutEndloop: 0, F4 OutSegloop: F4 OutRDI: 0
OAM cell drops: 0
Status: UP
```

Related Commands

Command	Description
bundle	Creates or modifies an existing bundle.
show atm bundle	Displays the bundle attributes assigned to each bundle VC member and the current working status of the VC members.
show atm map	Displays the list of all configured ATM static maps to remote hosts on an ATM network.

show atm bundle svc

To display the bundle attributes assigned to each bundle virtual circuit (VC) member and the current working status of the VC members, use the **showatmbundlesvc**command in privileged EXEC mode.

show atm bundle svc [*bundle-name*]

Syntax Description

bundle-name	(Optional) Name of the switched virtual circuit (SVC) bundle to be displayed, as identified by the **bundlesvc** command.

Command Default

If no bundle name is specified, all SVC bundles configured on the system are displayed.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.2(4)T	This command was introduced.

Examples

The following example provides output for the **showatmbundlesvc**command. The bundle named “finance” is configured on ATM interface 1/0.1 with eight members. All of the members are up except bundle member zero. Bundle member zero is the default member, which if initiated once will always be on and used as the default for all traffic.

```
Router# show atm bundle svc finance
finance on ATM1/0.1:UP
                    Config    Current  Peak   Avg/Min   Burst
VC Name      VPI/VCI   Preced.   Preced.  Kbps   kbps      Cells    Sts
seven        0/37        7         7      10000   5000      32     UP
six          0/36        6         6       6000                    UP
five         0/40        5         5       5000                    UP
four         0/41        4         4       4000                    UP
three        0/42        3         3       3000                    UP
two          0/43        2         2       2000                    UP
one          0/44        1         1       1000                    UP
zero*                    0
```

The table below describes the significant fields in the display.

Table 6: show atm bundle svc Field Descriptions

Field	Description
finance on ATM1/0.1: UP	Name of SVC bundle, interface type and number,and status of bundle.

Field	Description
VC Name	Name of SVC bundle.
VPI/VCI	Virtual path identifier and virtual channel identifier.
Config. Preced.	Configured precedence.
Current Preced.	Current precedence.
Peak Kbps	Peak kbps for the SVC.
Avg/Min kbps	Average or minimum kbps for the SVC.
Sts	Status of the bundle member.
*	Indicates the default bundle member.

Related Commands

Command	Description
bundle svc	Creates or modifies an SVC bundle.

show atm bundle svc stat

To display the statistics of a switched virtual circuit (SVC) bundle, use the **showatmbundlesvcstat**command in privileged EXEC mode.

show atm bundle svc *bundle-name* **stat [detail]**

Syntax Description

bundle-name	Name of the SVC bundle as identified by the **bundlesvc** command.
detail	(Optional) Displays the detailed ATM bundle statistics.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.2(4)T	This command was introduced.

Examples

The following example provides output for the **showatmbundlesvcstat**command using a bundle named “city”:

```
Router# show atm bundle svc city stat
Bundle Name:Bundle State:INITIALIZING
AAL5-NLPID
OAM frequency:0 second(s), OAM retry frequency:10 second(s)
OAM up retry count:4, OAM down retry count:3
BUNDLE is managed by.
InARP frequency:15 minutes(s)
InPkts:0, OutPkts:0, InBytes:0, OutBytes:0
InPRoc:0, OutPRoc:0, Broadcasts:0
InFast:0, OutFast:0, InAS:0, OutAS:0
InPktDrops:0, OutPktDrops:0
CrcErrors:0, SarTimeOuts:0, OverSizedSDUs:0,
                LengthViolation:0, CPIErrors:0
```

show atm bundle svc stat, on page 102 describes the significant fields in the display.

Table 7: show atm bundle svc statistics Field Descriptions

Field	Description
Bundle Name	Name of the bundle.
State	State of the bundle.
BUNDLE is managed by	Bundle management.

Field	Description
InARP frequency	Number of minutes between Inverse ARP messages or “DISABLED” if Inverse ARP is not in use on this VC.
InPkts	Total number of packets received on this virtual circuit (VC), including all fast-switched and process-switched packets.
OutPkts	Total number of packets sent on this VC, including all fast-switched and process-switched packets.
InBytes	Total number of bytes received on this VC, including all fast-switched and process-switched packets.
OutBytes	Total number of bytes sent on this VC, including all fast-switched and process-switched packets.
InPRoc	Number of incoming packets being process-switched.
OutPRoc	Number of outgoing packets being process-switched.
Broadcasts	Number of process-switched broadcast packets.
InFast	Number of incoming packets being fast-switched.
OutFast	Number of outgoing packets being fast-switched.
InAS	Number of autonomous-switched or silicon-switched input packets received.
OutAS	Number of autonomous-switched or silicon-switched input packets sent.
InPktDrops	Number of incoming packets dropped.
OutPktDrops	Number of outgoing packets dropped.
CrcErrors	Number of cyclic redundancy check (CRC) errors.
SarTimeOuts	Number of packets that timed out before segmentation and reassembly occurred.
LengthViolation	Number of packets too long or too short.

Related Commands

Command	Description
bundle svc	Creates or modifies an SVC bundle.