

send qdm message

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

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

Syntax Description	client	(Optional) Specifies a QDM client to receive the message.
	<i>client-id</i>	(Optional) Specifies the QDM identification of the client that will receive the text message.
	message	Specifies that a message will be sent.
	<i>message-text</i>	The actual text of the message.

Defaults 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.

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

Use the **send qdm message** *message-text* command to send a message to all QDM clients. For example, entering the **send qdm message hello** 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-policy

To attach 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, use the **service-policy** command in interface configuration command. To remove a service policy from an input or output interface or input or output VC, 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 specified policy map to the input interface or input VC.
	output	Attaches the specified policy map to the output interface or output VC.
	<i>policy-map-name</i>	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.

Defaults No service policy is specified.

Command Modes

- Interface configuration
- VC submode (for a standalone VC)
- Bundle-vc configuration (for ATM VC bundle members)
- Map-class configuration (for Frame Relay VCs)

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.
	12.1(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.

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

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

To successfully attach a policy map to an interface or a VC, the aggregate of the configured minimum bandwidths of the classes comprising the policy map must be less than or equal to 75 percent of the interface bandwidth or the bandwidth allocated to the VC.

To enable 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 will then attach an output service policy to the Frame Relay VC using the **service-policy** command in map-class configuration mode.

For a policy map to be successfully attached 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** map-class commands. If not configured, the minimum CIR defaults to half of the CIR.

Configuring CBWFQ on a physical interface is only possible if the interface is in the default queueing mode. Serial interfaces at E1 (2.048 Mbps) and below use WFQ by default. Other interfaces use 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.

Attaching a service policy and enabling CBWFQ on an interface renders ineffective any commands related to fancy queueing such as commands pertaining to fair queueing, custom queueing, priority queueing, and Weighted Random Early Detection (WRED). You can configure these features only after you remove the policy map from the interface.

You can modify a policy map attached to an interface or a VC, changing the bandwidth of any of the classes comprising the map. Bandwidth changes that you make to an attached policy map are effective only if the aggregate of the bandwidth amounts for all classes comprising the policy map, including the modified class bandwidth, 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 is set in motion as long as there is a subinterface that is performing 802.1Q or InterSwitch Link (ISL) trunking. Upon reload, however, the service policy is removed from the configuration due to the following error message:

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

Examples

The following example shows how to attach the service policy map called policy9 to data-link connection identifier (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 attaches the service policy map called policy9 to input serial interface 1:

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

The following example attaches the service policy map called policy9 to the input PVC called cisco:

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

The following example attaches the policy called 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 called policy9 to the output PVC called cisco:

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

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 frame-relay pvc	Displays statistics about PVCs for Frame Relay interfaces.
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 (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	<i>policy-map</i>	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.
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Defaults	No service policy is specified.
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Command Modes	Class-map configuration
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Command History	<table border="1"> <thead> <tr> <th style="border-right: none;">Release</th> <th style="border-left: none;">Modification</th> </tr> </thead> <tbody> <tr> <td style="border-right: none;">12.1(2)T</td> <td style="border-left: none;">This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	12.1(2)T	This command was introduced.
Release	Modification				
12.1(2)T	This command was introduced.				

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.
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Examples	<p>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.</p>
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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 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. Also, enables the router to silently discard packets.
<i>policy-map-name</i>	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.

Defaults

No service policy is specified.

Command Modes

Control-plane configuration

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.

Usage Guidelines

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

Silent Mode (Packet Discard)

Silent mode allows a router that is running Cisco IOS software to operate without sending any system messages. That is, 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 in which that router is not listening
- A connection to a legitimate address and port that is rejected because of a malformed request



Note

Support for output policing (the **output** keyword) is available only in 12.3(4)T.

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)# exit
```

The following example shows how to configure trusted networks with source addresses 3.3.3.0 and 4.4.4.0 to receive Internet Control Message Protocol (ICMP) port-unreachable responses without constraint, while allowing all remaining ICMP port-unreachable responses to be dropped:

```
! Allow 3.3.3.0 trusted network traffic.
Router(config)# access-list 141 deny icmp host 3.3.3.0 0.0.0.255 any port-unreachable
! Allow 4.4.4.0 trusted network traffic.
Router(config)# access-list 141 deny icmp host 4.4.4.0 0.0.0.255 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-policy
Router(config-cp)# exit
```

Related Commands	Command	Description
	control-plane	Enters control-plane configuration mode, which allows users to associate or modify attributes or parameters that are associated with the control plane of the device.
	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 of a 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

<i>policy-map-name</i>	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.
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Defaults

No service policies are used.

Command Modes

Policy-map class configuration

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.

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 **set** command is not supported on the child policy.
- 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* policies 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.

set atm-clp

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

set atm-clp

Syntax Description

This command has no arguments or keywords.

Defaults

The CLP bit is automatically set to 0 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

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.

Usage Guidelines

To disable this command, remove the service policy from the interface.

To use the **set atm-clp** command, you must have one of the following adapters: the Enhanced ATM Port Adapter (PA-A3), the ATM Inverse Multiplexer over ATM Port Adapter with 8 T1 Ports (PA-A3-8T1IMA), or the ATM Inverse Multiplexer over ATM Port Adapter with 8 E1 Ports (PA-A3-8E1IMA). Therefore, the **set atm-clp** command is not supported on any platform that does not support these adapters. For more information, refer to the documentation for your specific router.

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

Examples

The following example illustrates setting the CLP bit using the **set atm-clp** command in the 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 bear
```

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 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 **set cos** 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]}
```

Syntax Description		
	<i>cos-value</i>	Specific IEEE 802.1Q CoS value from 0 to 7.
	<i>from-field</i>	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: <ul style="list-style-type: none"> • precedence • dscp
	table	(Optional) Used in conjunction with the <i>from-field</i> argument. Indicates that the values set in a specified table map will be used to set the CoS value.
	<i>table-map-name</i>	(Optional) Used in conjunction with the table keyword. Name of the table map used to specify the CoS value. The table map name can be a maximum of 64 alphanumeric characters.

Defaults	Disabled
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Command Modes	Policy-map class configuration
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Command History	Release	Modification
	12.1(5)T	This command was introduced.
	12.2(13)T	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.

Usage Guidelines

CoS packet marking is supported only in the Cisco Express Forwarding (CEF)-switching path.

The **set cos** 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 **set cos** 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 **match cos** and **set cos** 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

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 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-name* 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 **set cos precedence** 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 **set cos dscp** command, and the DSCP value will be copied and used as the CoS value.



Note

If you configure the **set cos dscp** 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 CoSs 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)# exit
Router(config-pmap)# exit
```

Enhanced Packet Marking Example

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)# exit
```

**Note**

The **set cos** command is applied when you create a service policy in 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 discard-class

To mark a packet with a discard-class value, use the **set discard-class** command in 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

<i>value</i>	Per-hop behavior (PHB) for dropping traffic. The priority of a type of traffic. Valid values are numbers from 0 to 7.
--------------	---

Defaults

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

Command Modes

Policy-map configuration

Command History

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

Usage Guidelines

Discard-class indicates the discard portion of the PHB. Use the **set discard-class** command only in Pipe mode. Discard-class 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.

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 policy-map class configuration mode. To remove a previously set DSCP value, use the **no** form of this command.

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

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

Syntax Description		
ip	(Optional) Specifies that the match is for IPv4 packets only. If not used, the match is on both IPv4 and IPv6 packets.	
<i>dscp-value</i>	A number from 0 to 63 that sets the DSCP value. The following reserved keywords can be specified instead of numeric values:	<ul style="list-style-type: none"> • EF (expedited forwarding) • AF11 (assured forwarding class AF11) • AF12 (assured forwarding class AF12)
<i>from-field</i>	Specific packet-marking category to be used to set the DSCP 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:	<ul style="list-style-type: none"> • cos • qos-group
table	(Optional) Used in conjunction with the <i>from-field</i> argument. Indicates that the values set in a specified table map will be used to set the DSCP value.	
<i>table-map-name</i>	(Optional) Used in conjunction with the table keyword. Name of the table map used to specify the DSCP value. The name can be a maximum of 64 alphanumeric characters.	

Defaults No packets are marked by setting the DSCP value in the ToS byte.

Command Modes Policy-map class configuration

Command History	Release	Modification
	12.2(13)T	This command was introduced. This command replaces the set ip dscp command.

Usage Guidelines

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

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.

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.

The value of the *dscp-value* argument can be specified by the reserved keywords **EF**, **AF11**, and **AF12** instead of numeric values.

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 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 three-bit field, and the DSCP field is a six-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 value range for the DSCP 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 for IPv6 Packets Only

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

Setting DSCP Values for IPv4 Packets Only

To set the DSCP values for IPv4 packets only, use the **ip** keyword. Without the **ip** keyword the match occurs on both IPv4 and IPv6 packets.

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)# exit
```

**Note**

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, 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 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 **set fr-de** command in policy-map class command. To remove the DE bit setting, use the **no** form of this command.

set fr-de

no set fr-de

Syntax Description This command has no arguments or keywords.

Defaults 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.

Usage Guidelines To disable this command in a traffic policy, use the **no set fr-de** command in policy-map class configuration mode of the traffic policy.

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

Examples The following example illustrates a DE bit that was set using the **set fr-de** command in the traffic policy:

```
Router(config)# class-map ip-precedenc
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 fr-de
Router(config-pmap-c)# exit
Router(config-pmap)# exit
Router(config)# interface atm 1/0/0
Router(config-if)# service-policy output bear
```

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

set ip precedence (policy-map)

The **set ip precedence** (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 **set ip precedence** 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	<i>number</i> <i>name</i>	(Optional) A number or name that sets the precedence bits in the IP header. The values for the <i>number</i> argument and the corresponding <i>name</i> argument are listed in Table 18 from least to most important.
Defaults	Disabled	
Command Modes	Route-map configuration	
Command History	Release	Modification
	11.0	This command was introduced.
Usage Guidelines	Table 18 lists the values for the <i>number</i> argument and the corresponding <i>name</i> argument for precedence values in the IP header. They are listed from least to most important.	

Table 18 Number and Name Values for IP Precedence

Number	Name
0	routine
1	priority
2	immediate
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 **routin**e 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 **no route-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.
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 tos (route-map)

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

set ip tos *[number]*

no set ip tos

Syntax Description	<i>number</i>	(Optional) A number from 0 to 15 that sets the TOS bits in the IP header. See Table 19 for more information.
---------------------------	---------------	--

Defaults	Disabled
-----------------	----------

Command Modes	Route-map configuration
----------------------	-------------------------

Command History	Release	Modification
	11.2	This command was introduced.

Usage Guidelines This command allows you to set four bits in the TOS byte header. [Table 19](#) shows the format of the four bits in binary form.

Table 19 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 throughout 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 **no route-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 TOS bits to 8 (minimum delay as shown in [Table 19](#)) 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.

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

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

Syntax Description		
<i>precedence-value</i>		A number from 0 to 7 that sets the precedence bit in the packet header.
<i>from-field</i>		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 establishes the “map from” packet-marking category. Packet-marking category keywords are as follows: <ul style="list-style-type: none"> • cos • qos-group
table		(Optional) Used in conjunction with the <i>from-field</i> argument. Indicates that the values set in a specified table map will be used to set the precedence value.
<i>table-map-name</i>		(Optional) Used in conjunction with the table keyword. 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.

Defaults	Disabled
----------	----------

Command Modes	Policy-map class configuration
---------------	--------------------------------

Command History	Release	Modification
	12.2(13)T	This command was introduced. This command replaces the set ip precedence command.

Usage Guidelines

Command Compatibility

If a router is loaded with an image from this version (that is, Cisco IOS Release 12.2(13)T) that contained an old configuration, the **set ip 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, DSCP and precedence, are mutually exclusive. A packet can one value or the other, but not both.

Bit Settings

After 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.

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.

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 **set precedence qos-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.

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** 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** command may act upon both types of packets.

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-map-1” 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)# exit
```

**Note**

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 *Cisco IOS Quality of Service Solutions Configuration Guide*.

Related Commands

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 **set qos-group** command in policy-map class configuration mode. To remove the group ID, use the **no** form of this command.

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

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

Syntax Description		
	<i>group-id</i>	Group ID number in the range from 0 to 99.
	<i>from-field</i>	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: <ul style="list-style-type: none"> • precedence • dscp • mpls exp topmost
	table	(Optional) Used in conjunction with the <i>from-field</i> argument. Indicates that the values set in a specified table map will be used to set the QoS group value.
	<i>table-map-name</i>	(Optional) Used in conjunction with the table keyword. Name of the table map used to specify the QoS group value.

Defaults	
	Disabled
	No group ID is specified.

Command Modes	
	Policy-map class configuration

Command History	Release	Modification
	11.1 CC	This command was introduced.
	12.0(5)XE	This command was integrated into Cisco IOS Release 12.0(5)XE.
	12.2(13)T	This command can now be used with the random-detect discard-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.

Usage Guidelines	
	The set qos-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. The “from-field” packet-marking categories are as follows:

- Precedence
- Differentiated services code point (DSCP)
- Multiprotocol Label Switching (MPLS) Experimental (EXP) topmost

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 qos-group precedence** command, the precedence value will be copied and used as the QoS group value.

Examples

The following example sets the QoS group to 1 for all packets that match the class map called “class1”. 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
```

Enhanced Packet Marking Example

The following example sets 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)# exit
```



Note

The **set qos-group** command is applied when 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*.

Related Commands	Command	Description
	match qos-group	Identifies a specified QoS group value as a 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 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.

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.
<i>cir</i>	Specifies the committed information rate (CIR), in bits per second (bps).
<i>bc</i>	(Optional) Specifies the Committed Burst size, in bits.
<i>be</i>	(Optional) Specifies the Excess Burst size, in bits.

Defaults

Average or peak rate traffic shaping is not specified.

Command Modes

Class-map configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.

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:

$$\text{peak rate} = \text{CIR}(1 + \text{Be} / \text{Bc})$$

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 sets the uses average rate shaping to ensure a bandwidth of 256 kbps:

```
shape average 256000
```

The following example uses 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 percent [bc] [be]
```

```
no shape {average | peak} percent percent [bc] [be]
```

Syntax Description		
	average	Specifies average rate traffic shaping.
	peak	Specifies peak rate traffic shaping.
	percent	Specifies that percent of bandwidth will be used for either the average rate or peak rate traffic shaping.
	<i>percent</i>	Specifies the bandwidth percentage. Valid range is a number from 1 to 100.
	<i>bc</i>	(Optional) Specifies the committed burst (bc) size in milliseconds (ms). Valid range is a number from 10 to 2000.
	<i>be</i>	(Optional) Specifies the excess burst (be) size in ms. Valid range is a number from 10 to 2000.

Defaults Disabled

Command Modes Policy-map class configuration

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.

Usage Guidelines This command calculates the committed information rate (CIR) based on 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 based on the interface bandwidth and the percent value entered with this command. The **show policy-map interface** 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 154400000 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 based on 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.

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.

The **shape (percent)** command, when used in “child” (nested) 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 nested 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, refer to the “Congestion Management Overview” chapter of the *Cisco IOS Quality of Service Solutions Configuration Guide*.

Examples

The following example configures traffic shaping using an average shaping rate based on a percentage of bandwidth. In this example, 25 percent of the bandwidth has been specified. Additionally, an optional bc value and be value (300 ms and 400 ms, respectively) have been specified.

```
Router(config)# policy-map policy1
Router(config-pmap)# class-map class1
Router(config-pmap-c)# shape average percent 25 300 ms 400 ms
Router(config-pmap-c)# service-policy child-policy1
Router(config-pmap-c)# exit
Router(config-pmap)# exit
Router(config)# interface serial 3/1
Router(config-if)# service-policy output policy1
```

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.
police (percent)	Configures traffic policing based on 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 max-buffers	Specifies the maximum number of buffers allowed on shaping queues.

shape (policy-map class)

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

shape [**average** | **peak**] *mean-rate* [[*burst-size*] [*excess-burst-size*]]

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

Syntax Description

average	(Optional) Committed Burst (Bc) is the maximum number of bits sent out in each interval.
peak	(Optional) Bc + Excess Burst (Be) is the maximum number of bits sent out in each interval.
<i>mean-rate</i>	(Optional) Also called committed information rate (CIR). Indicates the bit rate used to shape the traffic, in bits per second. 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.
<i>burst-size</i>	(Optional) The number of bits in a measurement interval (Bc).
<i>excess-burst-size</i>	(Optional) The acceptable number of bits permitted to go over the Be.

Defaults

When Be is not configured, the default value is equal to Bc. For more information about burst size defaults, see the “Usage Guidelines” section of this command.

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.

Usage Guidelines

The measurement interval is Bc divided by 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 Bc and Be, the algorithm decides the default values for the shape entity. The algorithm uses a 4 milliseconds measurement interval, so Bc will be $CIR * (4 / 1000)$.

Burst sizes larger than the default 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 Be is not configured, the default value is equal to Bc.

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
```

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 fecn-adapt	Configures a Frame Relay PVC to reflect received FECN bits as BECN bits in Q.922 TEST RESPONSE messages.

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 **shape adaptive** 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	<i>mean-rate-lower-bound</i>	Specifies the lower bound of the range of permitted bit rates.
---------------------------	------------------------------	--

Defaults	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.

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 **shape adaptive** *mean-rate-lower-bound* command will always be shaped between the mean rate upper bound and the mean rate lower bound.

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 average 128000
    shape adaptive 64000
```

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 **shape fecn-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.

Defaults 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.

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 **shape fecn-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 maximum number of buffers allowed on shaping queues, use the **shape max-buffers** command in class-map configuration mode. To remove the maximum number of buffers, use the **no** form of this command.

shape max-buffers *number-of-buffers*

no shape max-buffers *number-of-buffers*

Syntax Description	<i>number-of-buffers</i>	Specifies the maximum number of buffers. The minimum number of buffers is 1; the maximum number of buffers is 4096.
---------------------------	--------------------------	---

Defaults	1000 buffers
-----------------	--------------

Command Modes	Class-map configuration
----------------------	-------------------------

Command History	Release	Modification
	12.1(2)T	This command was introduced.

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

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.
	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 **show access-lists rate-limit** command in EXEC mode.

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

Syntax Description	<i>acl-index</i>	(Optional) Rate-limit access list number from 1 to 299.
Command Modes	EXEC	
Command History	Release	Modification
	11.1 CC	This command was introduced.

Examples

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

```
Router# show access-lists rate-limit 1

Rate-limit access list 1
  0
```

show access-lists rate-limit

```
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
```

Table 20 describes the significant fields shown in the displays.

Table 20 *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 **show atm bundle** command in privileged EXEC mode.

show atm bundle *bundle-name*

Syntax Description	<i>bundle-name</i>	The name of the bundle whose member information is displayed. This is the bundle name specified by the bundle command when the bundle was created.
--------------------	--------------------	---

Command Modes	Privileged EXEC
---------------	-----------------

Command History	Release	Modification
	12.0(3)T	This command was introduced.

Examples

The following is sample output from the **show atm bundle** 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
```

Name	VPI/VCI	Config. Preced.	Active Preced.	Bumping Preced./Accept	PG/PV	Peak kbps	Avg/Min kbps	Burst Cells	Status
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
```

Name	VPI/VCI	Config. Preced.	Active Preced.	Bumping Preced./Accept	pg/pv	Peak kbps	Avg/Min kbps	Burst Cells	Status
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

■ show atm bundle

san-francisco on atm1/0.1 Status: UP

Name	VPI/VCI	Config. Preced.	Active Preced.	Bumping Predec./Accept	PG/PV	Peak kbps	Avg/Min kbps	Burst Cells	Status
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
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 statistics

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

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

Syntax Description	<i>bundle-name</i>	Specifies the name of the bundle whose member information is displayed. This is the bundle name specified by the bundle command when the bundle was created.
	detail	(Optional) Displays detailed statistics.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.0(3)T	This command was introduced.

Examples

The following is sample output from the **show atm bundle statistics** command:

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

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 statistics 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)
```

show atm bundle statistics

```

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, F4 InAIS: 0, F4 InRDI: 0
F4 OutEndloop: 0, F4 OutSegloop: 0, F4 OutRDI: 0
OAM cell drops: 0
Status: UP

```

Related Commands

Command	Description
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 **show atm bundle svc** 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 **bundle svc** command.

Command Modes

Privileged EXEC

Command History

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

Usage Guidelines

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

Examples

The following example provides output for the **show atm bundle svc** 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
```

VC Name	VPI/VCI	Config Preced.	Current Preced.	Peak Kbps	Avg/Min kbps	Burst 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					

Table 21 describes the significant fields in the display.

Table 21 *show atm bundle svc Field Descriptions*

Field	Description
finance on ATM1/0.1: UP	Name of SVC bundle, interface type and number, status of bundle.
VC Name	Name of SVC bundle.
VPI/VCI	Virtual path identifier / 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 statistics

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

show atm bundle svc *bundle-name* **statistics**

Syntax Description	<i>bundle-name</i>	Name of the SVC bundle as identified by the bundle svc command.
---------------------------	--------------------	--

Command Modes	Privileged EXEC
----------------------	-----------------

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

Examples

The following example provides output for the **show atm bundle svc statistics** command using a bundle named "city":

```
Router# show atm bundle svc city statistics

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
```

[Table 22](#) describes the significant fields in the display.

Table 22 *show atm bundle svc statistics Field Descriptions*

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

Table 22 *show atm bundle svc statistics Field Descriptions (continued)*

Field	Description
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.

show auto discovery qos

To display the data collected during the Auto-Discovery (data collection) phase of the AutoQoS for the Enterprise feature, use the **show auto discovery qos** command in privileged EXEC mode.

show auto discovery qos [**interface** *interface type*]

Syntax Description	interface	(Optional) Indicates that the configurations for a specific interface type will be displayed.
	<i>interface type</i>	(Optional) Specifies the interface type.

Defaults Displays the configurations created for all interface types.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.3(7)T	This command was introduced.
	12.3(11)T	Command output was modified to include suggested policy map information.

Usage Guidelines The suggested policy output (shown in the example below) lets you preview class maps and policy maps before you issue the **auto qos** command on an interface. You can then continue with the Auto-Discovery phase until more data is gathered or you can cut and paste the existing data and edit it as desired.

Examples The following is sample output from the **show auto discovery qos** command. This example displays the data collected during the Auto-Discovery (data collection) phase using DSCP classification in trusted mode and includes suggested policy map information.

```
Router# show auto discovery qos

Serial2/1.1
AutoQoS Discovery enabled for trusted DSCP
Discovery up time: 2 hours, 42 minutes
AutoQoS Class information:
Class Voice:
Recommended Minimum Bandwidth: 118 Kbps/1% (PeakRate)
Detected DSCPs and data:
DSCP value      AverageRate      PeakRate         Total
                (kbps/%)        (kbps/%)        (bytes)
-----
46/ef           106/1            118/1            129510064
Class Interactive Video:
Recommended Minimum Bandwidth: 25 Kbps/<1% (AverageRate)
Detected DSCPs and data:
DSCP value      AverageRate      PeakRate         Total
                (kbps/%)        (kbps/%)        (bytes)
```

show auto discovery qos

```

-----
34/af41      25/<1      28/<1      31084292
Class Signaling:
Recommended Minimum Bandwidth: 50 Kbps/<1% (AverageRate)
Detected DSCPs and data:
DSCP value   AverageRate   PeakRate     Total
              (kbps/%)     (kbps/%)     (bytes)
-----
24/cs3      50/<1      56/<1      61838040
Class Streaming Video:
Recommended Minimum Bandwidth: 79 Kbps/<1% (AverageRate)
Detected DSCPs and data:
DSCP value   AverageRate   PeakRate     Total
              (kbps/%)     (kbps/%)     (bytes)
-----
32/cs4      79/<1      88/<1      96451788
Class Transactional:
Recommended Minimum Bandwidth: 105 Kbps/1% (AverageRate)
Detected DSCPs and data:
DSCP value   AverageRate   PeakRate     Total
              (kbps/%)     (kbps/%)     (bytes)
-----
18/af21     105/1      117/1      127798678
Class Bulk:
Recommended Minimum Bandwidth: 132 Kbps/1% (AverageRate)
Detected DSCPs and data:
DSCP value   AverageRate   PeakRate     Total
              (kbps/%)     (kbps/%)     (bytes)
-----
10/af11     132/1      147/1      160953984
Class Scavenger:
Recommended Minimum Bandwidth: 24 Kbps (AverageRate)/0% (fixed)
Detected DSCPs and data:
DSCP value   AverageRate   PeakRate     Total
              (kbps/%)     (kbps/%)     (bytes)
-----
8/cs1       24/<1      27/<1      30141238
Class Management:
Recommended Minimum Bandwidth: 34 Kbps/<1% (AverageRate)
Detected DSCPs and data:
DSCP value   AverageRate   PeakRate     Total
              (kbps/%)     (kbps/%)     (bytes)
-----
16/cs2      34/<1      38/<1      41419740
Class Routing:
Recommended Minimum Bandwidth: 7 Kbps/<1% (AverageRate)
Detected DSCPs and data:
DSCP value   AverageRate   PeakRate     Total
              (kbps/%)     (kbps/%)     (bytes)
-----
48/cs6      7/<1       7/<1       8634024
Class Best Effort:
Current Bandwidth Estimation: 820 Kbps/8% (AverageRate)
Detected DSCPs and data:
DSCP value   AverageRate   PeakRate     Total
              (kbps/%)     (kbps/%)     (bytes)
-----
0/default   820/8      915/9      997576380

```

Suggested AutoQoS Policy based on a discovery uptime of 2 hours, 42 minutes:

```

!
class-map match-any AutoQoS-Voice-Trust
match ip dscp ef

```

```
!  
class-map match-any AutoQoS-Inter-Video-Trust  
  match ip dscp af41  
!  
class-map match-any AutoQoS-Signaling-Trust  
  match ip dscp cs3  
!  
class-map match-any AutoQoS-Stream-Video-Trust  
  match ip dscp cs4  
!  
class-map match-any AutoQoS-Transactional-Trust  
  match ip dscp af21  
  match ip dscp af22  
  match ip dscp af23  
!  
class-map match-any AutoQoS-Bulk-Trust  
  match ip dscp af11  
  match ip dscp af12  
  match ip dscp af13  
!  
class-map match-any AutoQoS-Scavenger-Trust  
  match ip dscp cs1  
!  
class-map match-any AutoQoS-Management-Trust  
  match ip dscp cs2  
!  
class-map match-any AutoQoS-Routing-Trust  
  match ip dscp cs6  
!  
  
policy-map AutoQoS-Policy-S2/1.1Trust  
  class AutoQoS-Voice-Trust  
    priority percent 1  
  class AutoQoS-Inter-Video-Trust  
    bandwidth remaining percent 1  
  class AutoQoS-Signaling-Trust  
    bandwidth remaining percent 1  
  class AutoQoS-Stream-Video-Trust  
    bandwidth remaining percent 1  
  class AutoQoS-Transactional-Trust  
    bandwidth remaining percent 1  
    random-detect dscp-based  
  class AutoQoS-Bulk-Trust  
    bandwidth remaining percent 1  
    random-detect dscp-based  
  class AutoQoS-Scavenger-Trust  
    bandwidth remaining percent 1  
  class AutoQoS-Management-Trust  
    bandwidth remaining percent 1  
  class AutoQoS-Routing-Trust  
    bandwidth remaining percent 1  
  class class-default  
    fair-queue
```

Table 23 describes the significant fields shown in the display.

Table 23 *show auto discovery qos Field Descriptions*

Field	Description
Serial2/1.1	The interface or subinterface on which data is being collected.
AutoQoS Discovery enabled for trusted DSCP	Indicates that the data collection phase of AutoQoS has been enabled.
Discovery up time	Indicates the period of time in which data was collected.
AutoQoS Class information	Displays information for each AutoQoS class.
Class Voice	Information for the named class, along with data pertaining to the detected applications. This data includes DSCP value, average rate (in kilobits per second (kbps)), peak rate (kbps), and total packets (bytes).
Suggested AutoQoS Policy based on a discovery uptime of hours and minutes	Policy-map and class-map statistics based on a specified discovery time.

Related Commands

Command	Description
auto qos	Installs the QoS class maps and policy maps created by the AutoQoS for the Enterprise feature.
auto discovery qos	Begins discovering and collecting data for configuring the AutoQoS for the Enterprise feature.
show auto qos	Displays the interface configurations, policy maps, and class maps created by AutoQoS on a specific interface or all interfaces.

show auto qos

To display the interface configurations, policy maps, and class maps created by AutoQoS on a specific interface or all interfaces, use the **show auto qos** command in privileged EXEC mode.

show auto qos [**interface** *interface-type*]

Syntax Description	interface	(Optional) Indicates that the configurations for a specific interface type will be displayed.
	<i>interface-type</i>	(Optional) Specifies the interface type.

Defaults Displays the configurations created for all interface types.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(15)T	This command was introduced as part of the AutoQoS — VoIP feature.
	12.3(7)T	This command was modified for the AutoQoS for the Enterprise feature. The command displays the classes, class maps, and policy maps created on the basis of the data collected during the Auto-Discovery phase of the AutoQoS for the Enterprise feature.

Usage Guidelines The **show auto qos interface** command can be used with Frame Relay data-link connection identifiers (DLCIs) and ATM permanent virtual circuits (PVCs).

When the AutoQoS — VoIP or the AutoQoS for the Enterprise features are enabled, configurations are generated for each interface or PVC. These configurations are then used to create the interface configurations, policy maps, class maps, and access control lists (ACLs) for use on the network. The **show auto qos** command can be used to verify the contents of the interface configurations, policy maps, class maps, and ACLs.

Examples

show auto qos interface Command: Configured for the AutoQoS — VoIP Feature

When the **interface** keyword is configured along with the corresponding *interface-type* argument, the **show auto qos interface** *interface-type* command displays the configurations created by the AutoQoS — VoIP feature on the specified interface.

In the following example, the serial subinterface serial6/1.1 has been specified:

```
Router# show auto qos interface serial6/1.1

S6/1.1: DLCI 100 -
!
interface Serial6/1
  frame-relay traffic-shaping
!
```

```

interface Serial6/1.1 point-to-point
  frame-relay interface-dlci 100
    class AutoQoS-VoIP-FR-Serial6/1-100
  frame-relay ip rtp header-compression
!
map-class frame-relay AutoQoS-VoIP-FR-Serial6/1-100
  frame-relay cir 512000
  frame-relay bc 5120
  frame-relay be 0
  frame-relay mincir 512000
  service-policy output AutoQoS-Policy-UnTrust
  frame-relay fragment 640

```

When the **interface** keyword is configured but an interface type is not specified, the **show auto qos interface** command displays the configurations created by the AutoQoS — VoIP feature on all the interfaces or PVCs on which the AutoQoS — VoIP feature is enabled.

```

Router# show auto qos interface

Serial6/1.1: DLCI 100 -
!
interface Serial6/1
  frame-relay traffic-shaping
!
interface Serial6/1.1 point-to-point
  frame-relay interface-dlci 100
    class AutoQoS-VoIP-FR-Serial6/1-100
  frame-relay ip rtp header-compression
!
map-class frame-relay AutoQoS-VoIP-FR-Serial6/1-100
  frame-relay cir 512000
  frame-relay bc 5120
  frame-relay be 0
  frame-relay mincir 512000
  service-policy output AutoQoS-Policy-UnTrust
  frame-relay fragment 640

ATM2/0.1: PVC 1/100 -
!
interface ATM2/0.1 point-to-point
  pvc 1/100
    tx-ring-limit 3
    encapsulation aal5mux ppp Virtual-Template200
!
interface Virtual-Template200
  bandwidth 512
  ip address 10.10.107.1 255.255.255.0
  service-policy output AutoQoS-Policy-UnTrust
  ppp multilink
  ppp multilink fragment-delay 10
  ppp multilink interleave

```

The following example displays all of the configurations created by the AutoQoS — VoIP feature:

```

Router# show auto qos

Serial6/1.1: DLCI 100 -
!
interface Serial6/1
  frame-relay traffic-shaping
!

```

```

interface Serial6/1.1 point-to-point
  frame-relay interface-dlci 100
    class AutoQoS-VoIP-FR-Serial6/1-100
  frame-relay ip rtp header-compression
  !
map-class frame-relay AutoQoS-VoIP-FR-Serial6/1-100
  frame-relay cir 512000
  frame-relay bc 5120
  frame-relay be 0
  frame-relay mincir 512000
  service-policy output AutoQoS-Policy-UnTrust
  frame-relay fragment 640

```

Table 24 describes the significant fields shown in the display.

Table 24 *show auto qos Field Descriptions (AutoQoS — VoIP Feature Configured)*

Field	Description
class AutoQoS-VoIP-FR-Serial6/1-100	Name of class created by the AutoQoS — VoIP feature. In this instance, the name of the class is AutoQoS-VoIP-FR-Serial6/1-100.
service-policy output AutoQoS-Policy-UnTrust	Indicates that the policy map called “AutoQoS-Policy-UnTrust” has been attached to interface in the outbound direction of the interface.

show auto qos interface Command: Configured for the AutoQoS for the Enterprise Feature

The following is sample output from the **show auto qos** command. This example displays the classes, class maps, and policy maps created on the basis of the data collected during the Auto-Discovery phase of the AutoQoS for the Enterprise feature.

```

Router# show auto qos
!
policy-map AutoQoS-Policy-Se2/1.1
  class AutoQoS-Voice-Se2/1.1
    priority percent 70
    set dscp ef
  class AutoQoS-Inter-Video-Se2/1.1
    bandwidth remaining percent 10
    set dscp af41
  class AutoQoS-Stream-Video-Se2/1.1
    bandwidth remaining percent 1
    set dscp cs4
  class AutoQoS-Transactional-Se2/1.1
    bandwidth remaining percent 1
    set dscp af21
  class AutoQoS-Scavenger-Se2/1.1
    bandwidth remaining percent 1
    set dscp cs1
  class class-default
    fair-queue
!
policy-map AutoQoS-Policy-Se2/1.1-Parent
  class class-default
    shape average 1024000
    service-policy AutoQoS-Policy-Se2/1.1
!
class-map match-any AutoQoS-Stream-Video-Se2/1.1
  match protocol cuseeme
!

```

```

class-map match-any AutoQoS-Transactional-Se2/1.1
  match protocol sqlnet
!
class-map match-any AutoQoS-Voice-Se2/1.1
  match protocol rtp audio
!
class-map match-any AutoQoS-Scavenger-Se2/1.1
  match protocol napster
!
class-map match-any AutoQoS-Inter-Video-Se2/1.1
  match protocol rtp video
!
rmon event 33333 log trap AutoQoS description "AutoQoS SNMP traps for Voice Drops" owner
AutoQoS

Serial2/1.1: DLCI 58 -
!
interface Serial2/1.1 point-to-point
  frame-relay interface-dlci 58
    class AutoQoS-FR-Serial2/1-58
!
map-class frame-relay AutoQoS-FR-Serial2/1-58
  frame-relay cir 1024000
frame-relay bc 10240
  frame-relay be 0
  frame-relay mincir 1024000
  service-policy output AutoQoS-Policy-Se2/1.1-Parent

```

Table 25 describes the significant fields shown in the display.

Table 25 *show auto qos Field Descriptions (AutoQoS for the Enterprise Feature Configured)*

Field	Description
policy-map AutoQoS-Policy-Se2/1.1	Name of the policy map created by the AutoQoS feature. In this instance the name of the policy map is AutoQoS-Policy-Se2/1.1.
class AutoQoS-Voice-Se2/1.1 priority percent 70 set dscp ef	Name of class created by the AutoQoS feature. In this instance, the name of the class is AutoQoS-Voice-Se2/1.1. Following the class name, the specific QoS features configured for the class are displayed.
class-map match-any AutoQoS-Stream-Video-Se2/1.1 match protocol cuseeme	Name of the class map and the packet matching criteria specified.

Related Commands

Command	Description
auto discovery qos	Begins discovering and collecting data for configuring the AutoQoS for the Enterprise feature.
auto qos	Installs the QoS class maps and policy maps created by the AutoQoS for the Enterprise feature.
auto qos voip	Configures the AutoQoS — VoIP feature on an interface.
show auto discovery qos	Displays the data collected during the Auto-Discovery phase of the AutoQoS for the Enterprise feature.

show class-map

To display all class maps and their matching criteria, use the **show class-map** command in EXEC mode.

show class-map [*class-map-name*]

Syntax Description	<i>class-map-name</i>	(Optional) Name of the class map. The class map name can be a maximum of 40 alphanumeric characters.
---------------------------	-----------------------	--

Command Modes	EXEC
----------------------	------

Command History	Release	Modification
	12.0(5)T	
12.2(13)T		This command was modified to display the Frame Relay data-link connection identified (DLCI) number as a criterion for matching traffic inside a class map. In addition, this command was modified to display Layer 3 packet length as a criterion for matching traffic inside a class map.

Usage Guidelines You can use the **show class-map** command to display all class maps and their matching criteria. If you enter the optional *class-map-name* argument, the specified class map and its matching criteria will be displayed.

Examples In the following example, three class maps are defined. Packets that match access list 103 belong to class c3, IP packets belong to class c2, and packets that come through input Ethernet interface 1/0 belong to class c1. The output from the **show class-map** command shows the three defined class maps.

```
Router# show class-map

Class Map c3
Match access-group 103

Class Map c2
Match protocol ip

Class Map c1
Match input-interface Ethernet1/0
```

In the following example, a class map called “c1” has been defined, and the Frame Relay DLCI number of 500 has been specified as a match criterion:

```
Router# show class-map

class map match-all c1
  match fr-dlci 500
```

Table 26 describes the significant fields shown in the display.

Table 26 *show class-map Field Descriptions¹*

Field	Description
Class-map	Class of traffic being displayed. Output is displayed for each configured class map in the policy. The choice for implementing class matches (for example, match-all or match-any) can also appear next to the traffic class.
Match	Match criteria specified for the class map. Choices include criteria such as the Frame Relay DLCI number, Layer 3 packet length, IP precedence, IP differentiated services code point (DSCP) value, Multiprotocol Label Switching (MPLS) experimental value, access groups, and quality of service (QoS) groups.

1. A number in parentheses may appear next to the class-map name, and match criteria information. The number is for Cisco internal use only and can be disregarded.

Related Commands

Command	Description
class-map	Creates a class map to be used for matching packets to a specified class.
match fr-dlci	Specifies the Frame Relay DLCI number as a match criterion in a class map.
match packet length (class-map)	Specifies and uses the length of the Layer 3 packet in the IP header as a match criterion in a class map.
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 packet statistics of all classes that are configured for all service policies either on the specified interface or subinterface or on a specific PVC on the interface.

show cops servers

To display the IP address and connection status of the policy servers for which the router is configured, use the **show cops servers** command in EXEC mode. The display also tells you about the Common Open Policy Service (COPS) client on the router.

show cops servers

Syntax Description This command has no keywords or arguments.

Command Modes EXEC

Command History	Release	Modification
	12.1(1)T	This command was introduced.

Examples In the following example, information is displayed about the current policy server and client. When Client Type appears followed by an integer, 1 stands for Resource Reservation Protocol (RSVP) and 2 stands for Differentiated Services Provisioning. (0 indicates keepalive.)

```
Router# show cops servers

COPS SERVER: Address: 161.44.135.172. Port: 3288. State: 0. Keepalive: 120 sec
              Number of clients: 1. Number of sessions: 1.
COPS CLIENT: Client type: 1. State: 0.
```

Related Commands	Command	Description
	show ip rsvp policy cops	Displays policy server address(es), ACL IDs, and current state of the router-server connection.

show frame-relay ip rtp header-compression

To show Frame Relay Real-Time Transport Protocol (RTP) header compression statistics, use the **show frame-relay ip rtp header-compression** command in user EXEC or privileged EXEC mode.

show frame-relay ip rtp header-compression [*interface type number*]

Syntax Description	interface type number (Optional) Specifies the interface type and number. A space is not needed between the type and number.
---------------------------	---

Command Modes	User EXEC Privileged EXEC
----------------------	------------------------------

Command History	Release	Modification
	11.3	This command was introduced.
	12.2(13)T	This command was modified to support display of RTP header compression statistics for Frame Relay permanent virtual circuit (PVC) bundles.

Examples

The following is sample output from the **show frame-relay ip rtp header-compression** command:

```
Router# show frame-relay ip rtp header-compression

DLCI 17 Link/Destination info: ip 10.1.1.1
Interface Serial0:
  Rcvd:   0 total, 0 compressed, 0 errors
         0 dropped, 0 buffer copies, 0 buffer failures
  Sent:   6000 total, 5998 compressed,
         227922 bytes saved, 251918 bytes sent
         1.90 efficiency improvement factor
  Connect: 16 rx slots, 16 tx slots, 2 long searches, 2 misses
         99% hit ratio, five minute miss rate 0 misses/sec, 0 max
```

The following sample output from the **show frame-relay ip rtp header-compression** command shows statistics for a PVC bundle called MP-3-static:

```
Router# show frame-relay ip rtp header-compression interface Serial1/4

vc-bundle MP-3-static Link/Destination info:ip 10.1.1.1
Interface Serial1/4:
  Rcvd:   14 total, 13 compressed, 0 errors
         0 dropped, 0 buffer copies, 0 buffer failures
  Sent:   15 total, 14 compressed,
         474 bytes saved, 119 bytes sent
         4.98 efficiency improvement factor
  Connect:256 rx slots, 256 tx slots,
         1 long searches, 1 misses 0 collisions, 0 negative cache hits
         93% hit ratio, five minute miss rate 0 misses/sec, 0 max
```

Table 27 describes the significant fields shown in the display.

Table 27 *show frame-relay ip rtp header-compression Field Descriptions*

Field	Description
Interface Serial0	Type and number of the interface.
Rcvd: total	Number of packets received on the interface.
compressed	Number of packets with compressed header.
errors	Number of errors.
dropped	Number of dropped packets.
buffer copies	Number of buffers that were copied.
buffer failures	Number of failures in allocating buffers.
Sent: total	Total number of packets sent.
compressed	Number of packets sent with compressed header.
bytes saved	Total savings in bytes due to compression.
bytes sent	Total bytes sent after compression.
efficiency improvement factor	Compression efficiency.
Connect: rx slots	Total number of receive slots.
tx slots	Total number of transmit slots.
long searches	Searches that needed more than one lookup.
misses	Number of new states that were created.
hit ratio	Number of times existing states were revised.
five minute miss rate	Average miss rate.
max	Maximum miss rate.

Related Commands

Command	Description
frame-relay ip rtp compression-connections	Specifies the maximum number of RTP header compression connections on a Frame Relay interface.
frame-relay ip rtp header-compression	Enables RTP header compression for all Frame Relay maps on a physical interface.
frame-relay map ip compress	Enables both RTP and TCP header compression on a link.
frame-relay map ip nocompress	Disables both RTP and TCP header compression on a link.
frame-relay map ip rtp header-compression	Enables RTP header compression per DLCI.
show ip rpf events	Displays RTP header compression statistics.

show frame-relay ip tcp header-compression

To display Frame Relay Transmission Control (TCP)/IP header compression statistics, use the **show frame-relay ip tcp header-compression** command in EXEC mode.

show frame-relay ip tcp header-compression [*interface type number*]

Syntax Description	interface type number (Optional) Interface type and number.						
Command Modes	EXEC						
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>10.3</td> <td>This command was introduced.</td> </tr> <tr> <td>12.2(13)T</td> <td>This command was modified to support display of TCP/IP header compression statistics for Frame Relay permanent virtual circuit (PVC) bundles.</td> </tr> </tbody> </table>	Release	Modification	10.3	This command was introduced.	12.2(13)T	This command was modified to support display of TCP/IP header compression statistics for Frame Relay permanent virtual circuit (PVC) bundles.
Release	Modification						
10.3	This command was introduced.						
12.2(13)T	This command was modified to support display of TCP/IP header compression statistics for Frame Relay permanent virtual circuit (PVC) bundles.						

Examples

The following is sample output from the **show frame-relay ip tcp header-compression** command:

```
Router# show frame-relay ip tcp header-compression

DLCI 200          Link/Destination info: ip 10.108.177.200
Interface Serial0:
Rcvd:   40 total, 36 compressed, 0 errors
        0 dropped, 0 buffer copies, 0 buffer failures
Sent:   0 total, 0 compressed
        0 bytes saved, 0 bytes sent
Connect: 16 rx slots, 16 tx slots, 0 long searches, 0 misses, 0% hit ratio
        Five minute miss rate 0 misses/sec, 0 max misses/sec
```

The following sample output from the **show frame-relay ip rtp header-compression** command shows statistics for a PVC bundle called “MP-3-static”:

```
Router# show frame-relay ip tcp header-compression interface Serial1/4

vc-bundle MP-3-static      Link/Destination info:ip 10.1.1.1
Interface Serial1/4:
Rcvd:   14 total, 13 compressed, 0 errors
        0 dropped, 0 buffer copies, 0 buffer failures
Sent:   15 total, 14 compressed,
        474 bytes saved, 119 bytes sent
        4.98 efficiency improvement factor
Connect:256 rx slots, 256 tx slots,
        1 long searches, 1 misses 0 collisions, 0 negative cache hits
        93% hit ratio, five minute miss rate 0 misses/sec, 0 max
```

Table 28 describes the significant fields shown in the display.

Table 28 *show frame-relay ip tcp header-compression Field Descriptions*

Field	Description
Rcvd:	Table of details concerning received packets.
total	Sum of compressed and uncompressed packets received.
compressed	Number of compressed packets received.
errors	Number of errors caused by errors in the header fields (version, total length, or IP checksum).
dropped	Number of packets discarded. Seen only after line errors.
buffer failures	Number of times that a new buffer was needed but was not obtained.
Sent:	Table of details concerning sent packets.
total	Sum of compressed and uncompressed packets sent.
compressed	Number of compressed packets sent.
bytes saved	Number of bytes reduced because of the compression.
bytes sent	Actual number of bytes transmitted.
Connect:	Table of details about the connections.
rx slots, tx slots	Number of states allowed over one TCP connection. A state is recognized by a source address, a destination address, and an IP header length.
long searches	Number of times that the connection ID in the incoming packet was not the same as the previous one that was processed.
misses	Number of times that a matching entry was not found within the connection table and a new entry had to be entered.
hit ratio	Percentage of times that a matching entry was found in the compression tables and the header was compressed.
Five minute miss rate	Miss rate computed over the most recent 5 minutes and the maximum per-second miss rate during that period.

show interfaces fair-queue

To display information and statistics about weighted fair queueing (WFQ) for a Versatile Interface Processor (VIP)-based interface, use the **show interfaces fair-queue** command in EXEC mode.

show interfaces [*interface-type interface-number*] **fair-queue**

Syntax Description	
<i>interface-type</i>	(Optional) The type of the interface.
<i>interface-number</i>	(Optional) The number of the interface.

Command Modes EXEC

Command History	Release	Modification
	11.1 CC	This command was introduced.

Examples

The following is sample output from the **show interfaces fair-queue** command for VIP-distributed WFQ (DWFQ):

```
Router# show interfaces fair-queue

Hssi0/0/0 queue size 0
      packets output 1417079, drops 2
WFQ: aggregate queue limit 54, individual queue limit 27
      max available buffers 54

      Class 0: weight 10 limit 27 qsize 0 packets output 1150 drops 0
      Class 1: weight 20 limit 27 qsize 0 packets output 0 drops 0
      Class 2: weight 30 limit 27 qsize 0 packets output 775482 drops 1
      Class 3: weight 40 limit 27 qsize 0 packets output 0 drops 0
```

[Table 29](#) describes the significant fields shown in the display.

Table 29 *show interfaces fair-queue* Field Descriptions

Field	Description
queue size	Current output queue size for this interface.
packets output	Number of packets sent out this interface or number of packets in this class sent out the interface.
drops	Number of packets dropped or number of packets in this class dropped.
aggregate queue limit	Aggregate limit, in number of packets.
individual queue limit	Individual limit, in number of packets.
max available buffers	Available buffer space allocated to aggregate queue limit, in number of packets.
Class	QoS group or type of service (ToS) class.

Table 29 *show interfaces fair-queue Field Descriptions (continued)*

Field	Description
weight	Percent of bandwidth allocated to this class during periods of congestion.
limit	Queue limit for this class in number of packets.
qsize	Current size of the queue for this class.

Related Commands

Command	Description
show interfaces	Displays statistics for all interfaces configured on the router or access server.

show interfaces random-detect

To display information about Weighted Random Early Detection (WRED) for a Versatile Interface Processor (VIP)-based interface, use the **show interfaces random-detect** command in EXEC mode.

show interfaces [*interface-type interface-number*] **random-detect**

Syntax Description

<i>interface-type</i>	(Optional) The type of the interface.
<i>interface-number</i>	(Optional) The number of the interface.

Command Modes

EXEC

Command History

Release	Modification
11.1 CC	This command was introduced.

Examples

The following is sample output from the **show interfaces random-detect** command for VIP-distributed WRED (DWRED):

```
Router# show interfaces random-detect

FastEthernet1/0/0 queue size 0
      packets output 29692, drops 0
WRED: queue average 0
      weight 1/512
      Precedence 0: 109 min threshold, 218 max threshold, 1/10 mark weight
            1 packets output, drops: 0 random, 0 threshold
      Precedence 1: 122 min threshold, 218 max threshold, 1/10 mark weight
            (no traffic)
      Precedence 2: 135 min threshold, 218 max threshold, 1/10 mark weight
            14845 packets output, drops: 0 random, 0 threshold
      Precedence 3: 148 min threshold, 218 max threshold, 1/10 mark weight
            (no traffic)
      Precedence 4: 161 min threshold, 218 max threshold, 1/10 mark weight
            (no traffic)
      Precedence 5: 174 min threshold, 218 max threshold, 1/10 mark weight
            (no traffic)
      Precedence 6: 187 min threshold, 218 max threshold, 1/10 mark weight
            14846 packets output, drops: 0 random, 0 threshold
      Precedence 7: 200 min threshold, 218 max threshold, 1/10 mark weight
            (no traffic)
```

[Table 30](#) describes the significant fields shown in the display.

Table 30 *show interfaces random-detect* Field Descriptions

Field	Description
queue size	Current output queue size for this interface.
packets output	Number of packets sent out this interface.
drops	Number of packets dropped.

Table 30 *show interfaces random-detect Field Descriptions (continued)*

Field	Description
queue average	Average queue length.
weight	Weighting factor used to determine the average queue size.
Precedence	WRED parameters for this precedence.
min threshold	Minimum threshold for this precedence.
max threshold	Maximum length of the queue. When the average queue is this long, any additional packets will be dropped.
mark weight	Probability of a packet being dropped if the average queue is at the maximum threshold.
packets output	Number of packets with this precedence that have been sent.
random	Number of packets dropped randomly through the WRED process.
threshold	Number of packets dropped automatically because the average queue was at the maximum threshold length.
(no traffic)	No packets with this precedence.

Related Commands

Command	Description
random-detect (interface)	Enables WRED or DWRED.
random-detect flow	Enables flow-based WRED.
show interfaces	Displays statistics for all interfaces configured on the router or access server.
show queueing	Lists all or selected configured queueing strategies.

show interfaces rate-limit

To display information about committed access rate (CAR) for an interface, use the **show interfaces rate-limit** command in EXEC mode.

show interfaces [*interface-type interface-number*] **rate-limit**

Syntax Description	
<i>interface-type</i>	(Optional) The type of the interface.
<i>interface-number</i>	(Optional) The number of the interface.

Command Modes EXEC

Command History	Release	Modification
	11.1 CC	This command was introduced.

Examples

The following is sample output from the **show interfaces rate-limit** command:

```
Router# show interfaces fddi2/1/0 rate-limit

Fddi2/1/0
Input
matches: access-group rate-limit 100
  params: 80000000 bps, 64000 limit, 80000 extended limit
  conformed 0 packets, 0 bytes; action: set-prec-continue 1
  exceeded 0 packets, 0 bytes; action: set-prec-continue 0
  last packet: 4737508ms ago, current burst: 0 bytes
  last cleared 01:05:47 ago, conformed 0 bps, exceeded 0 bps
matches: access-group 101
  params: 80000000 bps, 56000 limit, 72000 extended limit
  conformed 0 packets, 0 bytes; action: set-prec-transmit 5
  exceeded 0 packets, 0 bytes; action: set-prec-transmit 0
  last packet: 4738036ms ago, current burst: 0 bytes
  last cleared 01:02:05 ago, conformed 0 bps, exceeded 0 bps
matches: all traffic
  params: 50000000 bps, 48000 limit, 64000 extended limit
  conformed 0 packets, 0 bytes; action: set-prec-transmit 5
  exceeded 0 packets, 0 bytes; action: set-prec-transmit 0
  last packet: 4738036ms ago, current burst: 0 bytes
  last cleared 01:00:22 ago, conformed 0 bps, exceeded 0 bps
Output
matches: all traffic
  params: 80000000 bps, 64000 limit, 80000 extended limit
  conformed 0 packets, 0 bytes; action: transmit
  exceeded 0 packets, 0 bytes; action: drop
  last packet: 4809528ms ago, current burst: 0 bytes
  last cleared 00:59:42 ago, conformed 0 bps, exceeded 0 bps
```

Table 31 describes the significant fields shown in the display.

Table 31 *show interfaces rate-limit Field Descriptions*

Field	Description
Input	These rate limits apply to packets received by the interface.
matches	Packets that match this rate limit.
params	Parameters for this rate limit, as configured by the rate-limit command.
bps	Average rate, in bits per second.
limit	Normal burst size, in bytes.
extended limit	Excess burst size, in bytes.
conformed	Number of packets that have conformed to the rate limit.
action	Conform action.
exceeded	Number of packets that have exceeded the rate limit.
action	Exceed action.
last packet	Time since the last packet, in milliseconds.
current burst	Instantaneous burst size at the current time.
last cleared	Time since the burst counter was set back to zero by the clear counters command.
conformed	Rate of conforming traffic.
exceeded	Rate of exceeding traffic.
Output	These rate limits apply to packets sent by the interface.

Related Commands

Command	Description
access-list rate-limit	Configures an access list for use with CAR policies.
clear counters	Clears the interface counters.
shape	Specifies average or peak rate traffic shaping.
show access-lists	Displays the contents of current IP and rate-limit access lists.
show interfaces	Displays statistics for all interfaces configured on the router or access server.

show ip nbar pdlm

To display the Packet Description Language Module (PDLM) in use by network-based application recognition (NBAR), use the **show ip nbar pdlm** command in privileged EXEC mode.

show ip nbar pdlm

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.0(5)XE2	This command was introduced.
	12.1(1)E	This command was integrated into Cisco IOS Release 12.1(1)E.
	12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.
	12.1(13)E	This command was implemented on Catalyst 6000 family switches without FlexWAN modules.

Usage Guidelines This command is used to display a list of all the PDLMs that have been loaded into NBAR using the **ip nbar pdlm** command.

Examples In this example of the **show ip nbar pdlm** command, the citrix.pdlm PDLM has been loaded from Flash memory:

```
Router# show ip nbar pdlm
```

```
The following PDLMs have been loaded:
flash://citrix.pdlm
```

Related Commands	Command	Description
	ip nbar pdlm	Extends or enhances the list of protocols recognized by NBAR through a Cisco-provided PDLM.