

# 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. |
|                    | <b>message</b>      | 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                                   |
|------------------|------------------------|---|
|                  | <b>show qdm status</b> | 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.   |
|--------------------|------------------------|---|
|                    | <b>output</b>          | 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 <b>policy-map</b> 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 submodule (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  |
|----------------------------------|--|
| <b>policy-map</b>                | Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.   |
| <b>show frame-relay pvc</b>      | Displays statistics about PVCs for Frame Relay interfaces.   |
| <b>show policy-map</b>           | Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.  |
| <b>show policy-map interface</b> | 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**

|                           |                   |   |
|---------------------------|-------------------|---|
| <b>Syntax Description</b> | <i>policy-map</i> | The name of a service policy map (created using the <b>policy-map</b> command) to be attached. The name can be a maximum of 40 alphanumeric characters. |
|---------------------------|-------------------|---|

|                 |                                 |
|-----------------|---------------------------------|
| <b>Defaults</b> | No service policy is specified. |
|-----------------|---------------------------------|

|                      |                         |
|----------------------|-------------------------|
| <b>Command Modes</b> | Class-map configuration |
|----------------------|-------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.1(2)T       | This command was introduced. |

|                         |   |
|-------------------------|---|
| <b>Usage Guidelines</b> | 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. |
|-------------------------|---|

|                 |  |
|-----------------|--|
| <b>Examples</b> | <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> |
|-----------------|--|

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

# 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*

|                           |                        |  |
|---------------------------|------------------------|--|
| <b>Syntax Description</b> | <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. |
|---------------------------|------------------------|--|

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No service policies are used. |
|-----------------|-------------------------------|

|                      |                                |
|----------------------|--------------------------------|
| <b>Command Modes</b> | Policy-map class configuration |
|----------------------|--------------------------------|

| <b>Command History</b> | <b>Release</b>   | <b>Modification</b>          |
|------------------------|--|------------------------------|
|                        | 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**

| <b>Command</b>                      | <b>Description</b>   |
|-------------------------------------|--|
| <b>bandwidth (policy-map class)</b> | Specifies or modifies the bandwidth allocated for a class belonging to a policy map.   |
| <b>fair-queue</b>                   | Specifies the number of queues to be reserved for use by a traffic class.  |
| <b>policy-map</b>                   | Specifies the name of the service policy to configure.   |
| <b>priority</b>                     | Gives priority to a class of traffic belonging to a policy map.  |
| <b>service-policy</b>               | Specifies the name of the service policy to be attached to the interface.  |
| <b>shape</b>                        | Specifies average or peak rate traffic shaping.  |
| <b>show policy-map</b>              | Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.  |
| <b>show policy-map interface</b>    | 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-A3-8TIIMA), or the ATM Inverse Multiplexer over ATM Port Adapter with 8 E1 Ports (PA-A3-8EIIMA). 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**

| <b>Command</b>         | <b>Description</b>   |
|------------------------|--|
| <b>policy-map</b>      | Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy. |
| <b>show atm pvc</b>    | Displays all ATM PVCs and traffic information.   |
| <b>show policy-map</b> | 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"> <li>• <b>precedence</b></li> <li>• <b>dscp</b></li> </ul> |
|                    | <b>table</b>          | (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 <b>table</b> 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

**Command Modes** Policy-map class configuration

| Command History | Release   | Modification   |
|-----------------|-----------|--|
|                 | 12.1(5)T  | This command was introduced.   |
|                 | 12.2(13)T | This command was modified for 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  |
|----------------------------------|--|
| <b>match cos</b>                 | Matches a packet on the basis of Layer 2 CoS marking.  |
| <b>policy-map</b>                | Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.   |
| <b>service-policy</b>            | 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.  |
| <b>set dscp</b>                  | Marks a packet by setting the Layer 3 DSCP value in the ToS byte.  |
| <b>set precedence</b>            | Sets the precedence value in the packet header.  |
| <b>show policy-map</b>           | Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.  |
| <b>show policy-map class</b>     | Displays the configuration for the specified class of the specified policy map.  |
| <b>show policy-map interface</b> | 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*

|                           |              |   |
|---------------------------|--------------|---|
| <b>Syntax Description</b> | <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. |
|---------------------------|--------------|---|

|                 |   |
|-----------------|---|
| <b>Defaults</b> | If you do not enter this command, the packet has a discard-class value of zero. |
|-----------------|---|

|                      |                          |
|----------------------|--------------------------|
| <b>Command Modes</b> | Policy-map configuration |
|----------------------|--------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(13)T      | This command was introduced. |

|                         |  |
|-------------------------|--|
| <b>Usage Guidelines</b> | <p>Discard-class indicates the discard portion of the PHB. Use the <b>set discard-class</b> command only in Pipe mode. Discard-class is required when the input PHB marking will be used to classify packets on the output interface.</p> <p>You can also use this command to specify the type of traffic that will be dropped when there is congestion.</p> |
|-------------------------|--|

|                 |   |
|-----------------|---|
| <b>Examples</b> | <p>The following example shows that traffic will be set to the discard-class value of 2:</p> <pre>set discard-class 2</pre> |
|-----------------|---|

|                         |  |  |
|-------------------------|--|--|
| <b>Related Commands</b> | <b>Command</b>                           | <b>Description</b>                                 |
|                         | <b>match discard-class</b>               | Matches packets of a certain discard class.        |
|                         | <b>random-detect discard-class-based</b> | 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    |   |  |
|-----------------------|---|--|
| <b>ip</b>             | (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"> <li>• <b>EF</b> (expedited forwarding)</li> <li>• <b>AF11</b> (assured forwarding class AF11)</li> <li>• <b>AF12</b> (assured forwarding class AF12)</li> </ul> |
| <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"> <li>• <b>cos</b></li> <li>• <b>qos-group</b></li> </ul>   |
| <b>table</b>          | (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 <b>table</b> 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 <b>set ip dscp</b> 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  |
|----------------------------------|--|
| <b>match protocol</b>            | Configures the match criteria for a class map on the basis of the specified protocol.  |
| <b>policy-map</b>                | Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.   |
| <b>service-policy</b>            | 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.  |
| <b>set cos</b>                   | Sets the Layer 2 CoS value of an outgoing packet.  |
| <b>set precedence</b>            | Sets the precedence value in the packet header.  |
| <b>show policy-map</b>           | Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.  |
| <b>show policy-map class</b>     | Displays the configuration for the specified class of the specified policy map.  |
| <b>show policy-map interface</b> | 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. |
| <b>show table-map</b>            | Displays the configuration of a specified table map or all table maps.   |
| <b>table-map (value mapping)</b> | 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   |
|------------------|------------------------|---|
|                  | <b>policy-map</b>      | Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.              |
|                  | <b>show policy-map</b> | 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**

|                           |   |   |
|---------------------------|---|---|
| <b>Syntax Description</b> | <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 <a href="#">Table 15</a> from least to most important. |
| <b>Defaults</b>           | Disabled  |   |
| <b>Command Modes</b>      | Route-map configuration   |   |
| <b>Command History</b>    | <b>Release</b>  | <b>Modification</b>   |
|                           | 11.0  | This command was introduced.  |
| <b>Usage Guidelines</b>   | <a href="#">Table 15</a> 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 15** 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 **routine** and **priority** to a precedence value is useful only in some instances. That is, the use of the precedence bit is evolving. You can define the meaning of a precedence value by enabling other features that use the value. In the case of the high-end Internet QoS available from Cisco, IP Precedences can be used to establish classes of service that do not necessarily correspond numerically to better or worse handling in the network.

Use the **route-map** (IP) global configuration command with the **match** and **set** route-map configuration commands to define the conditions for redistributing routes from one routing protocol into another, or for policy routing. Each **route-map** command has an associated list of **match** and **set** commands. The **match** commands specify the match criteria—the conditions under which redistribution or policy routing is allowed for the current **route-map** command. The **set** commands specify the set actions—the particular redistribution or policy routing actions to perform if the criteria enforced by the **match** commands are met. The **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   |
|---------------------------------|---|
| <b>fair-queue (WFQ)</b>         | Enables WFQ for an interface.   |
| <b>ip policy route-map</b>      | Identifies a route map to use for policy routing on an interface.   |
| <b>random-detect dscp</b>       | Changes the minimum and maximum packet thresholds for the DSCP value.   |
| <b>send qdm message</b>         | Configures CAR and DCAR policies.   |
| <b>route-map (IP)</b>           | Defines the conditions for redistributing routes from one routing protocol into another, or enables policy routing. |
| <b>traffic-shape adaptive</b>   | Configures a Frame Relay subinterface to estimate the available bandwidth when BECN signals are received.           |
| <b>traffic-shape fecn-adapt</b> | Replies to messages with the FECN bit (which are set with TEST RESPONSE messages with the BECN bit set).            |
| <b>traffic-shape group</b>      | Enables traffic shaping based on a specific access list for outbound traffic on an interface.                       |
| <b>traffic-shape rate</b>       | 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**

|                           |               |  |
|---------------------------|---------------|--|
| <b>Syntax Description</b> | <i>number</i> | (Optional) A number from 0 to 15 that sets the TOS bits in the IP header. See <a href="#">Table 16</a> for more information. |
|---------------------------|---------------|--|

|                 |          |
|-----------------|----------|
| <b>Defaults</b> | Disabled |
|-----------------|----------|

|                      |                         |
|----------------------|-------------------------|
| <b>Command Modes</b> | Route-map configuration |
|----------------------|-------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 11.2           | This command was introduced. |

**Usage Guidelines** This command allows you to set four bits in the TOS byte header. [Table 16](#) shows the format of the four bits in binary form.

**Table 16 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 16](#)) 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   |
|----------------------------|---|
| <b>ip policy route-map</b> | Identifies a route map to use for policy routing on an interface.   |
| <b>route-map (IP)</b>      | 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"> <li>• <b>cos</b></li> <li>• <b>qos-group</b></li> </ul> |
| <b>table</b>            | (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 <b>table</b> 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 <b>set ip precedence</b> 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   |
|----------------------------------|---|
| <b>match precedence</b>          | Identifies IP precedence values as match criteria.  |
| <b>match protocol</b>            | Configures the match criteria for a class map on the basis of the specified protocol.   |
| <b>policy-map</b>                | Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.  |
| <b>service-policy</b>            | 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.   |
| <b>set cos</b>                   | Sets the Layer 2 CoS value of an outgoing packet.   |
| <b>set dscp</b>                  | Marks a packet by setting the Layer 3 DSCP value in the ToS byte.   |
| <b>set qos-group</b>             | Sets a group ID that can be used later to classify packets.   |
| <b>show policy-map</b>           | Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.   |
| <b>show policy-map interface</b> | 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. |
| <b>show table-map</b>            | Displays the configuration of a specified table map or all table maps.  |
| <b>table-map (value mapping)</b> | 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"> <li>• <b>precedence</b></li> <li>• <b>dscp</b></li> <li>• <b>mpls exp topmost</b></li> </ul> |
| <b>table</b>          | (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 <b>table</b> 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 <b>random-detect discard-class-based</b> 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 <b>set qos-group</b> 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  |
|------------------|----------------------------------|--|
|                  | <b>match qos-group</b>           | Identifies a specified QoS group value as a match criterion.   |
|                  | <b>policy-map</b>                | Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.   |
|                  | <b>service-policy</b>            | 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.  |
|                  | <b>show policy-map</b>           | Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.  |
|                  | <b>show policy-map interface</b> | 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

|                |   |
|----------------|---|
| <b>average</b> | Specifies average rate shaping.   |
| <b>peak</b>    | 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   |
|---------------------------|---|
| <b>bandwidth</b>          | Specifies or modifies the bandwidth allocated for a class belonging to a policy map.  |
| <b>class (policy-map)</b> | 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. |
| <b>policy-map</b>         | Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.  |
| <b>service-policy</b>     | 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.                                   |
| <b>shape max-buffers</b>  | 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 |                |   |
|--------------------|----------------|---|
|                    | <b>average</b> | Specifies average rate traffic shaping.   |
|                    | <b>peak</b>    | Specifies peak rate traffic shaping.  |
|                    | <b>percent</b> | 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   |
|------------------|---------------------------|---|
|                  | <b>bandwidth</b>          | Specifies or modifies the bandwidth allocated for a class belonging to a policy map.  |
|                  | <b>class (policy-map)</b> | 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. |
|                  | <b>police (percent)</b>   | Configures traffic policing based on a percentage of bandwidth available on an interface.   |
|                  | <b>policy-map</b>         | Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.  |
|                  | <b>priority</b>           | Gives priority to a class of traffic belonging to a policy map.   |
|                  | <b>service-policy</b>     | 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.                                   |
|                  | <b>shape max-buffers</b>  | 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

|                          |   |
|--------------------------|---|
| <b>average</b>           | (Optional) Committed Burst (Bc) is the maximum number of bits sent out in each interval.  |
| <b>peak</b>              | (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   |
|----------------------------------|---|
| <a href="#">shape adaptive</a>   | Configures a Frame Relay interface or a point-to-point subinterface to estimate the available bandwidth by BECN integration while traffic shaping is enabled. |
| <a href="#">shape fecn-adapt</a> | 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**

|                           |                                |  |
|---------------------------|--------------------------------|--|
| <b>Syntax Description</b> | <i>mean-rate-lower-bound</i>   | Specifies the lower bound of the range of permitted bit rates.   |
| <b>Defaults</b>           | Bandwidth is not estimated.    |  |
| <b>Command Modes</b>      | Policy-map class configuration |  |
| <b>Command History</b>    | <b>Release</b>                 | <b>Modification</b>  |
|                           | 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   |
|------------------|---------------------------------|---|
|                  | <a href="#">shape adaptive</a>  | Configures a Frame Relay interface or a point-to-point subinterface to estimate the available bandwidth by BECN integration while traffic shaping is enabled. |
|                  | <a href="#">shape (percent)</a> | 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*

|                           |                          |   |
|---------------------------|--------------------------|---|
| <b>Syntax Description</b> | <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. |
|---------------------------|--------------------------|---|

|                 |              |
|-----------------|--------------|
| <b>Defaults</b> | 1000 buffers |
|-----------------|--------------|

|                      |                         |
|----------------------|-------------------------|
| <b>Command Modes</b> | Class-map configuration |
|----------------------|-------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.1(2)T       | This command was introduced. |

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

|                 |  |
|-----------------|--|
| <b>Examples</b> | The following example configures shaping and sets the maximum buffer limit to 100: |
|-----------------|--|

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

|                         |                           |   |
|-------------------------|---------------------------|---|
| <b>Related Commands</b> | <b>Command</b>            | <b>Description</b>  |
|                         | <b>bandwidth</b>          | Specifies or modifies the bandwidth allocated for a class belonging to a policy map.  |
|                         | <b>class (policy-map)</b> | 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. |
|                         | <b>policy-map</b>         | Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.  |
|                         | <b>service-policy</b>     | 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.                                   |
|                         | <b>shape</b>              | 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*]

|                           |                  |   |
|---------------------------|------------------|---|
| <b>Syntax Description</b> | <i>acl-index</i> | (Optional) Rate-limit access list number from 1 to 299. |
| <b>Command Modes</b>      | EXEC             |   |
| <b>Command History</b>    | <b>Release</b>   | <b>Modification</b>                                     |
|                           | 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
```

```

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 17 describes the significant fields shown in the displays.

**Table 17** *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  |
|-------------------------------|--|
| <b>access-list rate-limit</b> | Configures an access list for use with CAR policies.             |
| <b>show access-lists</b>      | 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*

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

**Command Modes** Privileged EXEC

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 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 Predec./ 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 Predec./ 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     |

san-francisco 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 |
|-------------|---------|-----------------|----------------|------------------------|-------|-----------|--------------|-------------|--------|
| 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  |
|--|--|
| <a href="#">show atm bundle statistics</a> | Displays statistics on the specified bundle.   |
| <a href="#">show atm map</a>               | 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 <b>bundle</b> command when the bundle was created. |
|                    | <b>detail</b>      | (Optional) Displays detailed statistics.  |

Command Modes Privileged EXEC

| Command History | Release | Modification |
|-----------------|---------|--------------|
|                 |         | 12.0(3)T     |

**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)
```

```

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  |
|---------------------------------|--|
| <a href="#">show atm bundle</a> | Displays the bundle attributes assigned to each bundle VC member and the current working status of the VC members. |
| <a href="#">show atm map</a>    | 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*]

|                           |                    |   |
|---------------------------|--------------------|---|
| <b>Syntax Description</b> | <i>bundle-name</i> | (Optional) Name of the switched virtual circuit (SVC) bundle to be displayed, as identified by the <b>bundle svc</b> command. |
|---------------------------|--------------------|---|

|                      |                 |
|----------------------|-----------------|
| <b>Command Modes</b> | Privileged EXEC |
|----------------------|-----------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)T       | This command was introduced. |

|                         |   |
|-------------------------|---|
| <b>Usage Guidelines</b> | 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<br>Preced. | Current<br>Preced. | Peak<br>Kbps | Avg/Min<br>kbps | Burst<br>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 18 describes the significant fields in the display.

**Table 18** *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                        |
|-------------------|------------------------------------|
| <b>bundle svc</b> | 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

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

|                      |                 |
|----------------------|-----------------|
| <b>Command Modes</b> | Privileged EXEC |
|----------------------|-----------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 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, CPIDErrors:0
```

Table 19 describes the significant fields in the display.

**Table 19** *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 19** *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                        |
|-------------------|------------------------------------|
| <b>bundle svc</b> | Creates or modifies an SVC bundle. |

# show auto qos

To display the configurations created by the AutoQoS — VoIP feature on a specific interface or all interfaces, use the **show auto qos** command in EXEC mode.

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

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

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

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(15)T | This command was introduced. |

**Usage Guidelines**

The **auto qos voip** command displays the configurations created for all interface types.

When the **auto qos voip** command is used to configure the AutoQoS — VoIP feature, configurations are generated for each interface or permanent virtual circuit (PVC). These configurations are then used to create the interface configurations, policy maps, class maps, and access control lists (ACLs). The **show auto qos** command can be used to verify the contents of the interface configurations, policy maps, class maps, and ACLs.

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

**Examples**

The following section contains sample output of the **show auto qos** command when the various optional keywords are specified.



### Note

The **show auto qos** command displays only those configurations created by the AutoQoS — VoIP feature.

### show auto qos interface Command Example

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
!

```

## ■ show auto qos

```

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 20 describes the significant fields shown in the display.

**Table 20** *show auto qos Field Descriptions*

| 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<br>AutoQoS-Policy-UnTrust | Indicates that the policy map called “AutoQoS-Policy-UnTrust” has been attached to interface in the outbound direction of the interface. |

---

**Related Commands**

| Command              | Description  |
|----------------------|--|
| <b>auto qos voip</b> | Configures the AutoQoS — VoIP feature on an interface. |

# 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*]

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

|                      |      |
|----------------------|------|
| <b>Command Modes</b> | EXEC |
|----------------------|------|

| <b>Command History</b> | Release  | Modification                 |
|------------------------|--|------------------------------|
|                        | 12.0(5)T   | This command was introduced. |
| 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 21 describes the significant fields shown in the display.

**Table 21** *show class-map Field Descriptions<sup>1</sup>*

| 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   |
|--|---|
| <b>class-map</b>                       | Creates a class map to be used for matching packets to a specified class.   |
| <b>match fr-dlci</b>                   | Specifies the Frame Relay DLCI number as a match criterion in a class map.  |
| <b>match packet length (class-map)</b> | Specifies and uses the length of the Layer 3 packet in the IP header as a match criterion in a class map.   |
| <b>show policy-map</b>                 | Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.   |
| <b>show policy-map interface</b>       | 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   |
|------------------|---------------------------------|---|
|                  | <b>show ip rsvp policy cops</b> | 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*]

|                           |   |
|---------------------------|---|
| <b>Syntax Description</b> | <b>interface type number</b> (Optional) Specifies the interface type and number. A space is not needed between the type and number. |
|---------------------------|---|

|                      |                              |
|----------------------|------------------------------|
| <b>Command Modes</b> | User EXEC<br>Privileged EXEC |
|----------------------|------------------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>  |
|------------------------|----------------|--|
|                        | 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 22 describes the significant fields shown in the display.

**Table 22** *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  |
|---|--|
| <b>frame-relay ip rtp compression-connections</b> | Specifies the maximum number of RTP header compression connections on a Frame Relay interface. |
| <b>frame-relay ip rtp header-compression</b>      | Enables RTP header compression for all Frame Relay maps on a physical interface.               |
| <b>frame-relay map ip compress</b>                | Enables both RTP and TCP header compression on a link.   |
| <b>frame-relay map ip nocompress</b>              | Disables both RTP and TCP header compression on a link.  |
| <b>frame-relay map ip rtp header-compression</b>  | Enables RTP header compression per DLCI.   |
| <b>show ip rpf events</b>                         | Displays RTP header compression statistics.  |

# 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 23](#) describes the significant fields shown in the display.

**Table 23** *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 23** *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   |
|------------------------|---|
| <b>show interfaces</b> | 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 24](#) describes the significant fields shown in the display.

**Table 24** *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 24** *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   |
|----------------------------------|---|
| <b>random-detect (interface)</b> | Enables WRED or DWRED.  |
| <b>random-detect flow</b>        | Enables flow-based WRED.  |
| <b>show interfaces</b>           | Displays statistics for all interfaces configured on the router or access server. |
| <b>show queueing</b>             | 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 25 describes the significant fields shown in the display.

**Table 25** *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 <b>rate-limit</b> 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 <b>clear counters</b> 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   |
|-------------------------------|---|
| <b>access-list rate-limit</b> | Configures an access list for use with CAR policies.                              |
| <b>clear counters</b>         | Clears the interface counters.  |
| <b>shape</b>                  | Specifies average or peak rate traffic shaping.                                   |
| <b>show access-lists</b>      | Displays the contents of current IP and rate-limit access lists.                  |
| <b>show interfaces</b>        | 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   |
|------------------|---------------------|---|
|                  | <b>ip nbar pdlm</b> | Extends or enhances the list of protocols recognized by NBAR through a Cisco-provided PDLM. |