QoS: ATM Cell-Based Policer

The QoS: ATM Cell-Based Policer feature allows you to configure traffic policing for ATM cells. This feature allows you to specify traffic policing in cells, bytes, or percentage of bandwidth.

Feature History for the QOS: ATM Cell-Based Policer Feature

Release	Modification
12.0(28)S	This feature was introduced.
12.2(27)SBA	This feature was integrated into Cisco IOS Release 12.2(27)SBA.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

Contents

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Prerequisites for ATM Cell-Based Policer

- For input traffic policing on a Cisco 7500 series router, verify that distributed Cisco Express Forwarding (dCEF) is enabled on the interface on which traffic policing is configured.
- For output traffic policing on a Cisco 7500 series router, ensure that the incoming traffic is dCEF-switched. Traffic policing cannot be used on the switching path unless dCEF switching is enabled.

Restrictions for ATM Cell-Based Policer

When you specify traffic policing based on cells per second (CPS), you can apply the service policy on ATM interfaces only. If you try to apply a service policy that uses CPS on a non-ATM interface, you receive the following error:

```
police rates specified in cells-per-second are not supported on this interface
```

Information About ATM Cell-Based Policer

To configure ATM Cell-Based Policer, you need to understand the following concept:

- Defining Class and Policy Maps for ATM Cell-Based Policer, page 2

Defining Class and Policy Maps for ATM Cell-Based Policer

To configure the ATM Cell-Based Policer feature, you must define a traffic class, configure a policy map, and then attach that policy map to the appropriate interface. These three tasks can be accomplished by using the Modular Quality of Service (QoS) Command-Line Interface (CLI) (MQC).

The MQC is a command-line interface that allows you to define traffic classes, create and configure traffic policies (policy maps), and then attach these traffic policies to interfaces.

In the MQC, the **class-map** command is used to define a traffic class (which is then associated with a traffic policy). The purpose of a traffic class is to classify traffic.

The MQC consists of the following three processes:

- Defining a traffic class with the **class-map** command.
- Creating a traffic policy by associating the traffic class with one or more QoS features (using the **policy-map** command).
- Attaching the traffic policy to the interface with the **service-policy** command.

A traffic class contains three major elements: a name, a series of match commands, and, if more than one **match** command exists in the traffic class, an instruction on how to evaluate these **match** commands (that is, match-all or match-any). The traffic class is named in the **class-map** command line; for example, if you enter the **class-map cisco** command while configuring the traffic class in the CLI, the traffic class would be named “cisco”.

The **match** commands are used to specify various criteria for classifying packets. Packets are checked to determine whether they match the criteria specified in the **match** commands. If a packet matches the specified criteria, that packet is considered a member of the class and is forwarded according to the QoS specifications set in the traffic policy. Packets that fail to meet any of the matching criteria are classified as members of the default traffic class.

How to Configure ATM Cell-Based Policer

This section contains the following procedures:

- Configuring a Class and Policy Map, page 3 (required)
- Attaching the Policy Map to an Interface, page 7 (required)
- Verifying the Configuration, page 9 (optional)

Configuring a Class and Policy Map

A class map is used to organize traffic into specific categories or classes. These categories or classes of traffic are associated with a traffic policy or policy map. In turn, the policy map is used with the class map to apply a specific QoS feature to the traffic.

The following sections explain the various ways to enable the ATM cell-based policer:

- Configuring Cell-Based Traffic Policing, page 3
- Configuring Byte-Based Traffic Policing, page 5
- Configuring Traffic Policing as a Percentage of Bandwidth, page 6

Configuring Cell-Based Traffic Policing

To configure cell-based traffic policing, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **policy-map** *policy-name*
4. **class** {*class-name* | **class-default**}
5. **police rate** *units* **cps** [**burst** *burst-in-cells* **cells**] [**peak-rate** *peak-rate-in-cps* **cps**] [**peak-burst** *peak-burst-in-cells* **cells**]
6. **exit**

DETAILED STEPS

	Command	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**policy-map** *policy-name* **Example:** `Router(config)# policy-map policy1`	Specifies the name of the policy map to be created. Enters policy-map configuration mode. • Enter the policy map name.
Step 4	**class** {*class-name* | **class-default**} **Example:** `Router(config-pmap)# class class1`	Specifies the class so that you can configure or modify its policy. Enters policy-map class configuration mode. • Enter the class name or specify the default class (class-default).

Step 5	**police rate** *units* **cps**
	[**burst** *burst-in-cells* **cells**]
	[**peak-rate** *peak-rate-in-cps* **cps**]
	[**peak-burst** *peak-burst-in-cells* **cells**]
	
	Example:
	`Router(config-pmap-c)# police rate 100000 cps`
	`burst 1000 cells`
	`peak-rate 120000 cps`
	`peak-burst 1200 cells`
		Configures the traffic police rate on the basis of the cells and cells per second. Enters policy-map class police configuration mode.

Step 6	**exit** **Example:** `Router(config-pmap-c-police)# exit`	Exits policy-map class police configuration mode.

Configuring Byte-Based Traffic Policing

To configure byte-based traffic policing, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **policy-map** *policy-name*
4. **class** {*class-name* | **class-default**}
5. **police rate** *units* **bps** [**burst** *burst-in-bytes* **bytes**] [**peak-rate** *peak-rate-in-bps* **bps**] [**peak-burst** *peak-burst-in-bytes* **bytes**]
6. **exit**

DETAILED STEPS

	Command	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**policy-map** *policy-name* **Example:** `Router(config)# policy-map policy1`	Specifies the name of the policy map to be created. Enters policy-map configuration mode. • Enter the policy map name.
Step 4	**class** {*class-name* | **class-default**} **Example:** `Router(config-pmap)# class class1`	Specifies the class so that you can configure or modify its policy. Enters policy-map class configuration mode. • Enter the class name or specify the default class (class-default).

	Command	Purpose

Step 5	**police rate** *units* **bps**
	[**burst** *burst-in-bytes* **bytes**]
	[**peak-rate** *peak-rate-in-bps* **bps**]
	[**peak-burst** *peak-burst-in-bytes* **bytes**]
	
	Example:
	`Router(config-pmap-c)# police rate 100000 bps`
	`burst 1000 bytes`
	`peak-rate 120000 bps`
	`peak-burst 1200 bytes`
		Configures the traffic police rate on the basis of the bytes and bits per second. Enters policy-map class police configuration mode.

Step 6	**exit** **Example:** `Router(config-pmap-c-police)# exit`	Exits policy-map class police configuration mode.

Configuring Traffic Policing as a Percentage of Bandwidth

To configure traffic policing based on a percentage of bandwidth, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **policy-map** *policy-name*
4. **class** {*class-name* | **class-default**}
5. **police rate percent** *percentage* [**burst** *ms* **ms**] [**peak-rate percent** *percentage*] [**peak-burst** *ms* **ms**]
6. **exit**

DETAILED STEPS

	Command	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**policy-map** *policy-name* **Example:** `Router (config)# policy-map policy1`	Specifies the name of the policy map to be created. Enters policy-map configuration mode. • Enter the policy map name.

	Command	Purpose
Step 4	**class** {*class-name* | **class-default**} **Example:** `Router(config-pmap)# class class1`	Specifies the class so that you can configure or modify its policy. Enters policy-map class configuration mode. • Enter the class name or specify the default class (class-default).

Step 5	**police rate percent** *percentage*
	[**burst** *ms* **ms**]
	[**peak-rate percent** *percentage*]
	[**peak-burst** *ms* **ms**]
	
	Example:
	`Router(config-pmap-c)# police rate percent 20`
	`burst 250 ms`
	`peak-rate percent 30`
	`peak-burst 300 ms`
		Configures the traffic police rate on the basis of the percentage of bandwidth. Enters policy-map class police configuration mode.

Step 6	**exit** **Example:** `Router(config-pmap-c-police)# exit`	Exits policy-map class police configuration mode.

Attaching the Policy Map to an Interface

After a policy map is created, the next step is to attach the policy map to an interface. Policy maps can be attached to either the input or output direction of the interface.

Note Depending on the needs of your network, you may need to attach the policy map to a subinterface, an ATM PVC, a Frame Relay DLCI, or other type of interface.

To attach the policy map to an interface, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **pvc** [*name*] *vpi*/*vci* [**ilmi** | **qsaal** | **smds**]
5. **service-policy** {**input** | **output**} *policy-map-name*
6. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Router(config)# interface a4/0`	Configures an interface (or subinterface) type and enters interface configuration mode. • Enter the interface type number.
Step 4	**pvc** [*name*] *vpi*/*vci* [**ilmi** | **qsaal** | **smds**] **Example:** `Router(config-if)# pvc cisco 0/16 ilmi`	(Optional) Creates or assigns a name to an ATM PVC and specifies the encapsulation type on an ATM PVC. Enters ATM VC configuration mode. **Note** This step is required only if you are attaching the policy map to an ATM PVC. If you are not attaching the policy map to an ATM PVC, skip this step and proceed with Step 5.
Step 5	**service-policy** {**input** | **output**} *policy-map-name* **Example:** `Router(config-if)# service-policy input policy1`	Specifies the name of the policy map to be attached to the input *or* output direction of the interface. **Note** Policy maps can be configured on ingress or egress routers. They can also be attached in the input or output direction of an interface. The direction (input or output) and the router (ingress or egress) to which the policy map should be attached varies according your network configuration. When using the **service-policy** command to attach the policy map to an interface, be sure to choose the router and the interface direction that are appropriate for your network configuration. • Enter the policy map name.
Step 6	**exit** **Example:** `Router(config-if)# exit`	(Optional) Exits interface configuration mode.

Verifying the Configuration

This task allows you to verify that you created the configuration you intended and that the feature is functioning correctly.

To verify the configuration, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **show class-map** [*class-map-name*]

   and/or

   show policy-map interface *interface-name*
3. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show class-map** [*class-map-name*] **Example:** `Router# show class-map class1`	Displays all information about a class map, including the match criterion. • Enter the class map name.
	and/or	
	show policy-map interface *interface-name* **Example:** `Router# show policy-map interface s4/0`	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. • Enter the interface name.
Step 3	**exit** **Example:** `Router# exit`	(Optional) Exits EXEC mode.

Troubleshooting Tips

The commands in the "Verifying the Configuration" section allow you to verify that you achieved the intended configuration and that the feature is functioning correctly. If, after using the **show** commands listed above, you find that the configuration is not correct or the feature is not functioning as expected, perform these operations:

If the configuration is not the one you intended, complete the following procedures:

- Use the **show running-config** command and analyze the output of the command.
- If the policy map does not appear in the output of the **show running-config** command, enable the **logging console** command.
- Attach the policy map to the interface again.

If the packets are not being matched correctly (for example, the packet counters are not incrementing correctly), complete the following procedures:

- Run the **show policy-map** command and analyze the output of the command.
- Run the **show running-config** command and analyze the output of the command.
- Use the **show policy-map interface** command and analyze the output of the command. Check the the following findings:
  - If a policy map applies queueing, and the packets are matching the correct class, but you see unexpected results, compare the number of the packets in the queue with the number of the packets matched.
  - If the interface is congested, and only a small number of the packets are being matched, check the tuning of the transmission (tx) ring, and evaluate whether the queueing is happening on the tx ring. To do this, use the **show controllers** command, and look at the value of the tx count in the output of the command.

Configuration Examples for ATM Cell-Based Policer

This section provides the following configuration examples:

Specifying the Traffic Police Rate with Cells and Cells per Second: Example

The following example configures traffic police rate of 100,000 cells per second, a burst rate of 1000 cells, a peak rate of 120,000 cells per second, and a peak burst rate of 1200 cells.

```
Router> enable
Router# configure terminal
Router(config)# policy-map policy1
Router(config-pmap)# class class1
Router(config-pmap-c)# police rate 100000 cps burst 1000 cells peak-rate 120000 cps
peak-burst 1200 cells
Router(config-pmap-c-police)# exit
```

The following example configures a traffic police rate of 100,000 cells per second, a maximum burst size of 1000 cells, a peak rate of 120,000 cells per second, and a cell delay variation tolerance of 2,310 microseconds.

```
Router# configure terminal
Router(config)# policy-map policy1
Router(config-pmap)# class class1
Router(config-pmap-c)# police rate 100000 cps atm-mbs 1000 peak-rate 120000 cps
delay-tolerance 2310
Router(config-pmap-c-police)# exit
```

Specifying the Traffic Police Rate with Bits and Bits per Second: Example

The following example configures traffic policing using a police rate of 100,000 bits per second, a burst rate of 1000 bytes, a peak rate of 120,000 bits per second, and a peak burst rate of 1200 bytes.

```
Router> enable
Router# configure terminal
Router(config)# policy-map policy1
Router(config-pmap)# class class1
Router(config-pmap-c)# police rate 100000 bps burst 1000 bytes peak-rate 120000 bps
peak-burst 1200 bytes
Router(config-pmap-c-police)# exit
```

Specifying the Traffic Police Rate as a Percent of the Interface Bandwidth: Example

The following example configures traffic policing using a police rate and a peak rate on the basis of a percentage of bandwidth. In this example, a police rate of 20 percent and a peak rate of 30 percent have been specified. Additionally, a burst rate of 250 milliseconds and a peak burst rate of 300 milliseconds have been specified.

```
Router> enable
Router# configure terminal
Router(config)# policy-map policy1
Router(config-pmap)# class class1
Router(config-pmap-c)# police rate percent 20 burst 250 ms peak-rate percent 30 peak-burst
300 ms
Router(config-pmap-c-police)# exit
```

Verifying the Configuration: Example

This section contains sample output from the **show policy-map interface** and the **show policy-map** commands. The output from these commands can be used to verify and monitor the feature configuration on your network.

The following is sample output from the **show policy-map** command. This sample output displays the contents of a policy map called "policy1." In policy 1, a traffic police rate of 12,000 cells per second has been configured, and the burst, peak rate, and peak burst rates were specified. As part of the traffic policing configuration, optional conform, exceed, and violate actions have been specified.

```
Router# show policy-map policy1

  Policy Map policy1
    Class class1
      police rate 12000 cps, burst 130 cells, peak-rate 13000 cps, peak-burst 150 cells
```

```
        conform-action transmit
        exceed-action drop
        violate-action drop
```

The following is sample output from the **show policy-map interface** command. This sample displays the statistics for the ATM 2/0 interface on which cell-based traffic policing has been enabled. The police rate, burst rate, peak rate, and peak burst rate are specified in cells.

```
Router# show policy-map interface a2/0
 ATM2/0

Class-map: class-default (match-any) (1059/0)
      0 packets, 0 bytes
      5 minute offered rate 0 bps, drop rate 0 bps
      Match: any  (1060)
        0 packets, 0 bytes
        5 minute rate 0 bps
      police:
         rate 12000 cps, burst 130 cells
           (5088000 bps/6890 bytes)
         peak-rate 13000 cps, peak-burst 150 cells
           (5512000 bps/7950 bytes)
          conformed 0 packets, 0 bytes; action:
            transmit
          exceeded 0 packets, 0 bytes; action:
            drop
          violated 0 packets, 0 bytes; action:
            drop
          conformed 0 bps, exceed 0 bps
```

Additional References

The following sections provide references related to the QOS: ATM Cell-Based Policer feature.

Related Documents

Related Topic	Document Title
QoS commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	*Cisco IOS Quality of Service Solutions Command Reference*, Release 12.3 T
Modular QoS Command-Line Interface (CLI) (MQC)	*Cisco IOS Quality of Service Solutions Configuration Guide*
Information about attaching policy maps to interfaces	*Cisco IOS Quality of Service Solutions Configuration Guide*
Traffic shaping	*Cisco IOS Quality of Service Solutions Configuration Guide*
Traffic policing	*Cisco IOS Quality of Service Solutions Configuration Guide*
dCEF	*Cisco IOS Switching Services Configuration Guide*
Commands related to dCEF	*Cisco IOS Switching Services Command Reference*, Release 12.3 T

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIBs	MIBs Link
No new or modified MIBS are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFCs	Title
• RFC 2697	*A Single Rate Three Color Marker*
• RFC 2698	*A Two Rate Three Color Marker*

Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/public/support/tac/home.shtml

Command Reference

This section documents modified commands only.

- **police rate**
- **show policy-map**
- **show policy-map interface**

police rate

To configure traffic policing for ATM cells, use the **police rate** command in policy-map class configuration mode. To remove traffic policing from the configuration, use the **no** form of this command.

police rate command with cells and cells per second (CPS)

police rate *units* **cps** [**burst** *burst-in-cells* **cells**] [**peak-rate** *peak-rate-in-cps* **cps**] [**peak-burst** *peak-burst-in-cells* **cells**]

or

police rate *units* **cps** [**atm-mbs** *max-burst-in-cells*] [**peak-rate** *peak-rate-in-cps* **cps**] [**delay-tolerance** *usecs*]

police rate command with bytes and bits per second (BPS)

police rate *units* **bps** [**burst** *burst-in-bytes* **bytes**] [**peak-rate** *peak-rate-in-bps* **bps**] [**peak-burst** *peak-burst-in-bytes* **bytes**]

police rate command with percentages

police rate percent *percentage* [**burst** *burst-in-ms* **ms**] [**peak-rate percent** *percentage*] [**peak-burst** *burst-in-ms* **ms**]

Syntax Description

units	Specifies the police rate. If the police rate is specified in cells per second, the valid range of values is 7 to 1,538,241 CPS. If the police rate is specified in bits per second, the valid range of values is 8,000 to 10,000,000,000 BPS.
cps	(Optional) Specifies that the police rate is in cells per second. If the **cps** keyword is not specified, the command interprets the units in bits per second.
bps	(Optional) Specifies that the police rate is in bits per second.
burst	(Optional) Indicates that the burst rate will be used for policing traffic. This keyword is similar to the **bc** keyword used in the MQC policer.
burst-in-cells	Burst rate in cells. The valid range of values is 1,000/53 to 512,000,000/53.
burst-in-bytes	Burst rate in bytes. The valid range of values is 1,000 to 512,000,000.
cells	Indicates that the burst rate is in cells.
bytes	Indicates that the burst rate is in bytes.
peak-rate	(Optional) Indicates that the peak rate will be used for policing traffic. This keyword is similar to the **be** keyword used in the MQC policer. If you do not specify the **peak-rate** keyword, the command uses the platform-specific default values.
peak-rate-in-cps	Peak rate in cells per second. The valid range of values is 7 to 1538241.
peak-rate-in-bps	Peak rate in bits per second. The valid range of values is 1,000/53 to 512,000,000/53.
cps	Indicates that the peak rate is in cells per second.
bps	Indicates that the peak rate is in bits per second.
peak-burst	(Optional) Indicates that the peak burst rate will be used for policing traffic.

peak-burst-in-cells	Peak burst rate in cells. The valid range of values is 1,000/53 to 512,000,000/53.
peak-burst-in-bytes	Peak burst rate in bytes. The valid range of values is 1,000 to 512,000,000.
atm-mbs	(Optional) Indicates that the maximum burst size (MBS) will be used for policing traffic. This keyword is available only when the rate is specified in units of CPS.
max-burst-in-cells	Maximum number of cells. The maximum burst size is 500,000.
delay-tolerance	(Optional) Indicates that the cell delay variation tolerance will be used for traffic policing. This keyword is available only when the **atm-mbs** keyword is specified. This keyword is available only when the police rate is specified in units of CPS. This keyword is relevant for ATM interfaces.
usecs	Delay tolerance in microseconds. The valid range of values is 1 to 100,000.
percent	(Optional) Indicates that a percentage of interface bandwidth will be used for traffic policing.
percentage	Specifies the bandwidth percentage. Valid range is a number from 1 to 100.
burst	(Optional) Indicates that the burst rate will be used for policing traffic.
burst-in-ms	Burst rate in milliseconds. The valid range of values is 1 to 2,000.
ms	Indicates that the burst rate is in milliseconds.
peak-rate percent	(Optional) Indicates that a percentage of interface bandwidth will be used to determine the peak rate.
percentage	Specifies the bandwidth percentage. Valid range is a number from 1 to 100.
peak-burst	(Optional) Indicates that the peak burst rate will be used for policing traffic.
ms	Peak burst rate in milliseconds. The valid range of values is 1 to 2,000.
ms	Indicates that the peak burst rate is in milliseconds.

Defaults

If you do not specify either **bps** or **cps**, then **bps** is assumed.

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.0(28)S	This command was introduced.
12.2(27)SBA	This command was integrated into Cisco IOS Release 12.2(27)SBA.

Usage Guidelines

- This command does not change or add to any of the policer actions that can be specified with the **conform-action**, **exceed-action**, or **violate-action** commands.
- The **police rate** command used with the **cps** keywords is accepted on ATM interfaces only. If you try to apply a service policy that uses cells per second on a non-ATM interface, you receive the following error:

```
police rates specified in cells-per-second are not supported on this interface
```

- The Cisco 7200 and 7500 series routers accept rates specified in CPS and BPS. The value of CPS is converted to the value of BPS by the router, because the policer is implemented in bps/bytes units only.

  The following formula is used for conversion:

  rate_in_bps = rate_in_cps * 8 * 53

  burst_in_bytes = burst_in_cells * 53.

  The output of **show running-config** and **show policy** commands show the policy as the user entered it. However, the output of the **show policy-map interface** command shows both what user entered and the converted value.

Examples

The following example configures a police rate. In this example, a police rate of 12000 BPS and a peak rate of 13000 BPS have been specified.

```
Router> enable
Router# configure terminal
Router (config)# policy-map policy1
Router(config-pmap)# class class1
Router(config-pmap-c)# police rate 12000 bps peak-rate 13000 bps
Router(config-pmap-c-police)# exit
```

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

```
Router> enable
Router# configure terminal
Router(config-if)# interface a2/0
Router(config-if)# service-policy input policy1
Router(config-if)# exit
```

Related Commands

Command	Description
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
service-policy	Attaches a policy map to an input interface or VC, or an output interface or VC, to be used as the service policy for that interface or VC.
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.
show policy-map interface	Displays the 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 policy-map

To display the configuration of all classes for a specified service policy map or all classes for all existing policy maps, use the **show policy-map** command in EXEC mode.

show policy-map [*policy-map*]

Syntax Description

policy-map	(Optional) Name of the service policy map whose complete configuration is to be displayed.

Defaults

All existing policy map configurations are displayed.

Command Modes

EXEC

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.
12.2(13)T	The output of this command was modified for the Percentage-Based Policing and Shaping feature and includes the bandwidth percentage used when calculating traffic policing and shaping.
12.0(28)S	The output of this command was modified for the QoS: Percentage-Based Policing feature to display the committed (conform) burst (bc) and excess (peak) burst (be) sizes in milliseconds (ms).
12.2(27)SBA	This command was integrated into Cisco IOS Release 12.2(27)SBA.

Usage Guidelines

The **show policy-map** command displays the configuration of a service policy map created using the **policy-map** command. You can use the **show policy-map** command to display all class configurations comprising any existing service policy map, whether or not that service policy map has been attached to an interface.

Examples

The following is sample output from the **show policy-map** command. This sample output displays the contents of a policy map called "policy1." In policy 1, traffic policing on the basis of a committed information rate (CIR) of 20 percent has been configured, and the bc and be have been specified in milliseconds. As part of the traffic policing configuration, optional conform, exceed, and violate actions have been specified.

```
Router# show policy-map policy1
  Policy Map policy1
    Class class1
     police cir percent 20 bc 300 ms pir percent 40 be 400 ms
```

```
conform-action transmit
exceed-action drop
violate-action drop
```

Table 1 describes the significant fields shown in the display.

Table 1 show policy-map Field Descriptions

Field	Description
Policy Map	Name of policy map displayed.
Class	Name of class configured in policy map displayed.
police	Indicates that traffic policing on the basis of specified percentage of bandwidth has been enabled. The committed burst (bc) and excess burst (be) sizes have been specified in milliseconds (ms), and optional conform, exceed, and violate actions have been specified.

Related Commands

Command	Description
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
show policy-map class	Displays the configuration for the specified class of the specified policy map.
show policy-map interface	Displays the packet statistics of all classes that are configured for all service policies either on the specified interface or subinterface or on a specific PVC on the interface.

show policy-map interface

To display the packet statistics of all classes that are configured for all service policies either on the specified interface or subinterface or on a specific permanent virtual circuit (PVC) on the interface, use the **show policy-map interface** command in EXEC mode.

show policy-map interface *interface-name* [**vc** [*vpi/*] *vci*][**dlci** *dlci*] [**input** | **output**]

Syntax Description

interface-name	Name of the interface or subinterface whose policy configuration is to be displayed.
vc	(Optional) For ATM interfaces only, shows the policy configuration for a specified PVC. The name can be up to 16 characters long.
vpi/	(Optional) ATM network virtual path identifier (VPI) for this PVC. On the Cisco 7200 and 7500 series routers, this value ranges from 0 to 255. The absence of both the forward slash (**/**) and a *vpi* value defaults the *vpi* value to 0. If this value is omitted, information for all virtual circuits (VCs) on the specified ATM interface or subinterface is displayed. The *vpi* and *vci* arguments cannot both be set to 0; if one is 0, the other cannot be 0.
vci	(Optional) ATM network virtual channel identifier (VCI) for this PVC. This value ranges from 0 to 1 less than the maximum value set for this interface by the **atm vc-per-vp** command. Typically, the lower values 0 to 31 are reserved for specific traffic (F4 Operation, Administration, and Maintenance (OAM), switched virtual circuit (SVC) signaling, Integrated Local Management Interface (ILMI), and so on) and should not be used. The VCI is a 16-bit field in the header of the ATM cell. The VCI value is unique only on a single link, not throughout the ATM network, because it has local significance only. The *vpi* and *vci* arguments cannot both be set to 0; if one is 0, the other cannot be 0.
dlci	(Optional) Indicates a specific PVC for which policy configuration will be displayed.
dlci	(Optional) Specific data-link connection identifier (DLCI) number used on the interface. Policy configuration for the corresponding PVC will be displayed when a DLCI is specified.
input	(Optional) Indicates that the statistics for the attached input policy will be displayed.
output	(Optional) Indicates that the statistics for the attached output policy will be displayed.

Defaults

No default behavior or values

Command Modes

EXEC

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 display information about the policy for all Frame Relay PVCs on the interface, or, if a DLCI is specified, the policy for that specific PVC. This command was also modified to display the total number of packets marked by the QoS set action.
12.1(3)T	This command was modified to display per-class accounting statistics.
12.2(4)T	This command was modified to display burst parameters and associated actions.
12.2(8)T	This command was modified to display the multiple actions configured for packets conforming to, exceeding, or violating a specific rate.
12.0(28)S	The output of this command was modified for the QoS: Percentage-Based Policing feature to include milliseconds when calculating the committed (conform) burst (bc) and excess (peak) burst (be) sizes.
12.2(27)SBA	This command was integrated into Cisco IOS Release 12.2(27)SBA.

Usage Guidelines

The **show policy-map interface** command displays the configuration for classes on the specified interface or the specified PVC only if a service policy has been attached to the interface or the PVC.

Examples

The following is sample output from the **show policy-map interface** command. This sample displays the statistics for the serial 2/0 interface on which traffic policing has been enabled. The committed (conform) burst (bc) and excess (peak) burst (be) are specified in milliseconds (ms).

```
Router# show policy-map interface s2/0
 Serial2/0

  Service-policy output: policy1 (1050)

    Class-map: class1 (match-all) (1051/1)
      0 packets, 0 bytes
      5 minute offered rate 0 bps, drop rate 0 bps
      Match: ip precedence 0  (1052)
      police:
          cir 20 % bc 300 ms
          cir 409500 bps, bc 15360 bytes
          pir 40 % be 400 ms
          pir 819000 bps, be 40960 bytes
        conformed 0 packets, 0 bytes; actions:
          transmit
        exceeded 0 packets, 0 bytes; actions:
          drop
        violated 0 packets, 0 bytes; actions:
          drop
        conformed 0 bps, exceed 0 bps, violate 0 bps

    Class-map: class-default (match-any) (1054/0)
      0 packets, 0 bytes
      5 minute offered rate 0 bps, drop rate 0 bps
```

```
      Match: any  (1055)
        0 packets, 0 bytes
        5 minute rate 0 bps
```

In this example, the CIR and PIR are displayed in bps, and both the committed burst (bc) and excess burst (be) are displayed in bits.

The CIR, PIR bc, and be are calculated on the basis of the formulas described below.

Formula for Calculating the CIR

When calculating the CIR, the following formula is used:

- CIR percentage specified (as shown in the output of the **show policy-map** command) * bandwidth (BW) of the interface (as shown in the output of the **show interfaces** command) = total bits per second

According to the output of the **show interfaces** command for the serial 2/0 interface, the interface has a bandwidth (BW) of 2048 kbps.

```
Router # show interfaces s2/0
Serial2/0 is administratively down, line protocol is down
  Hardware is M4T
  MTU 1500 bytes, BW 2048 Kbit, DLY 20000 usec, rely 255/255, load 1/255
```

The following values are used for calculating the CIR:

20 % * 2048 kbps = 409600 bps

Formula for Calculating the PIR

When calculating the PIR, the following formula is used:

- PIR percentage specified (as shown in the output of the **show policy-map** command) * bandwidth (BW) of the interface (as shown in the output of the **show interfaces** command) = total bits per second

According to the output of the **show interfaces** command for the serial 2/0 interface, the interface has a bandwidth (BW) of 2048 kbps.

```
Router # show interfaces s2/0
Serial2/0 is administratively down, line protocol is down
  Hardware is M4T
  MTU 1500 bytes, BW 2048 Kbit, DLY 20000 usec, rely 255/255, load 1/255
```

The following values are used for calculating the PIR:

40 % * 2048 kbps = 819200 bps

Note Discrepancies between this total and the total shown in the output of the **show policy-map interface** command can be attributed to a rounding calculation or to differences associated with the specific interface configuration.

Formula for Calculating the Committed Burst (bc)

When calculating the bc, the following formula is used:

- The bc in milliseconds (as shown in the **show policy-map** command) * the CIR in bits per seconds = total number bytes

The following values are used for calculating the bc:

300 ms * 409600 bps = 15360 bytes

Formula for Calculating the Excess Burst (be)

When calculating the bc and the be, the following formula is used:

- The be in milliseconds (as shown in the **show policy-map** command) * the PIR in bits per seconds = total number bytes

The following values are used for calculating the be:

400 ms * 819200 bps = 40960 bytes

Table 2 describes the significant fields shown in the display.

Table 2 show policy-map interface Field Descriptions[1]

Field	Description
Service-policy output	Name of the output service policy applied to the specified interface or VC.
Class-map	Class of traffic being displayed. Output is displayed for each configured class in the policy. The choice for implementing class matches (for example, match-all or match-any) can also appear next to the traffic class.
packets and bytes	Number of packets (also shown in bytes) identified as belonging to the class of traffic being displayed.
offered rate	Rate, in kbps, of packets coming in to the class.
drop rate	Rate, in kbps, at which packets are dropped from the class. The drop rate is calculated by subtracting the number of successfully transmitted packets from the offered rate.
Match	Match criteria specified for the class of traffic. Choices include criteria such as the 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. For more information about the variety of match criteria options that are available, refer to the "Configuring the Modular Quality of Service Command-Line Interface" chapter of the *Cisco IOS Quality of Service Solutions Configuration Guide*.
police	Indicates that traffic policing has been enabled. Display includes the CIR, PIR (in both a percentage of bandwidth and in bps) and the bc and be in bytes and milliseconds. Also displays the optional conform, exceed, and violate actions, if any, and the statistics associated with these optional actions.

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

Related Commands

Command	Description
police (percent)	Configures traffic policing on the basis of a percentage of bandwidth available on an interfaces.
shape (percent)	Specifies average or peak rate traffic shaping on the basis of a percentage of bandwidth available on an interface.
show frame-relay pvc	Displays statistics about PVCs for Frame Relay interfaces.
show interfaces	Displays statistics for all interfaces configured on the router or access server.
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.
show policy-map class	Displays the configuration for the specified class of the specified policy map.