MQC—Traffic Shaping Overhead Accounting for ATM

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The MQC—Traffic Shaping Overhead Accounting for ATM feature enables a broadband aggregation system (BRAS) to account for various encapsulation types when applying quality of service (QoS) functionality to packets. Typically, in Ethernet digital subscriber line (DSL) environments, the encapsulation from the router to the digital subscriber line access multiplexer (DSLAM) is Gigabit Ethernet and the encapsulation from DSLAM to customer premises equipment (CPE) is ATM. ATM overhead accounting enables the router to account for ATM encapsulation on the subscriber line and for the overhead added by cell segmentation. This enables the service provider to prevent overruns at the subscriber line and ensures that the router executes QoS features on the actual bandwidth used by ATM packets.

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the "Feature Information for MQC—Traffic Shaping Overhead Accounting for ATM" section on page 46.

Finding Support Information for Platforms and Cisco IOS and Catalyst OS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS and Catalyst OS software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

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Prerequisites for Traffic Shaping Overhead Accounting for ATM

Traffic classes must be configured using the **class-map** command.

Restrictions for Traffic Shaping Overhead Accounting for ATM

- The router supports ATM overhead accounting only for the **shape** and **bandwidth** commands.
- If you enable ATM overhead accounting on a child policy, then you must enable ATM overhead accounting on the parent policy.
- In a policy map, you must either enable ATM overhead accounting for all classes in the policy or disable overhead accounting for all classes in the policy. You cannot enable overhead accounting for some classes and disable overhead accounting for other classes in the same policy, except if the parent policy has overhead accounting enabled.
- When you enter the **show policy-map interface** command, the resulting classification byte counts and the queuing feature byte counts do not match. This is because the classification byte count does not consider overhead, whereas the queuing features do consider overhead.
- You must attach a policy map with ATM overhead accounting configured to only an Ethernet interface.

Information About Traffic Shaping Overhead Accounting for ATM

Before configuring traffic shaping overhead accounting for ATM, you should understand the following concepts:

Benefits of Traffic Shaping Overhead Accounting for ATM

The Traffic Shaping Overhead Accounting for ATM feature enables the broadband aggregation system (BRAS) to account for various encapsulation types when applying QoS to packets. Typically, in Ethernet Digital Subscriber Line (DSL) environments, the encapsulation from the BRAS to the DSLAM is Gigabit Ethernet and the encapsulation from the DSLAM to the CPE is ATM. ATM overhead accounting enables the BRAS to account for ATM encapsulation on the subscriber line and for the overhead added by cell segmentation. This enables the service provider to prevent overruns at the subscriber line and ensures that the router executes QoS features on the actual bandwidth used by ATM subscriber traffic.

BRAS and Encapsulation Types

BRAS uses the encapsulation type you configure for the DSLAM-CPE side to calculate the ATM overhead per packet, except for IP and PPP over Ethernet (PPPoE) packets. DSLAM-CPE encapsulation types are based on Subnetwork Access Protocol (SNAP) and multiplexer (MUX) formats of ATM Adaptation Layer 5 (AAL5), followed by routed bridge encapsulation (RBE), IP, PPPoE, or PPP over ATM (PPPoA). Because the DSLAM treats IP and PPPoE packets as payload, the BRAS does not account for these encapsulations.

On the BRAS-DSLAM side, encapsulation is IEEE 802.1Q VLAN or Q-in-Q (qinq). However, because the DSLAM removes the BRAS-DSLAM encapsulation, the BRAS does not account for 802.1Q or qinq encapsulation.

AAL5 segmentation processing adds the additional overhead of the 5-byte cell headers, the AAL5 Common Part Convergence Sublayer (CPCS) padding, and the AAL5 trailer. For more information, see the "ATM Overhead Calculation" section on page 3.

Subscriber Line Encapsulation Types

The router supports the following subscriber line encapsulation types:

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

ATM Overhead Calculation

When calculating ATM overhead for traffic shaping, the router considers the encapsulation type used between the BRAS and the DSLAM, and between the DSLAM and CPE (see the "BRAS and Encapsulation Types" section on page 3).

Table 1 describes the fields the router uses for the various encapsulation types when calculating ATM overhead.

Table 1 ATM Overhead Calculation

Encapsulation Type	Number Bytes	Description
802.1Q	18	6-byte destination MAC address + 6-byte source MAC address + 2-byte protocol ID (0x8100) + 2-byte VID/CFI/PRIORITY + 2-byte length/type
PPPoE	6	1-byte version/type (0x11) + 1-byte code (0x00) + 2-byte session ID + 2-byte length
AAL5 SNAP plus 1483	18	8-byte AAL5 trailer + 3-byte LLC header (0xAAAA03) + 3-byte OUI (0x0080c2) + 2-byte protocol ID (0x0007) + 2-byte PAD (0x0000)
802.3	14	6-byte destination MAC address + 6-byte source MAC address + 2-byte protocol ID (0x8000)
AAL5 MUX plus 1483	8	8-byte AAL5 trailer
Queue-in-Queue	22	6-byte destination MAC address + 6-byte source MAC address + 2-byte protocol ID (0x8100) + 2-byte VID/CFI/PRIORITY + 2-byte protocol ID + 2-byte inner tag + 2-byte length or type
AAL5 SNAP plus PPPoA	12	8-byte AAL5 trailer + 3-byte LLC header (0xFEFE03) + 1-byte protocol ID (0xCF)
AAL5 MUX plus PPPoA	10	8-byte AAL5 trailer + 2-byte protocol ID (0x0021)

ATM Overhead Accounting and Hierarchical Policies

In hierarchical policies, you can enable ATM overhead accounting for shaping and bandwidth on top-level parent policies, middle-level child policies, and bottom-level child policies. If you enable ATM overhead accounting on a parent class-default class, you are not required to enable accounting on a child traffic class that does not contain the **bandwidth** or **shape** command. However, if you enable ATM overhead accounting on a child policy, then you must enable ATM overhead accounting on the parent policy. The parent and child classes must specify the same encapsulation type when enabling overhead accounting.

Table 2 summarizes the configuration requirements for ATM overhead accounting. For example, if overhead accounting is currently enabled for a parent policy, then accounting can be disabled or enabled on a child policy.

Table 2 Overhead Accounting Configuration Requirements

Policy Map	Current Configuration	Configuration Requirement
Parent	Enabled	No requirement for child policy (disabled or enabled)
Child	Enabled	Enabled on parent policy
Child class	Enabled	Enabled on all classes in the child policy map, except priority classes with policing

Table 2 Overhead Accounting Configuration Requirements (continued)

Policy Map	Current Configuration	Configuration Requirement
Child class (non-priority without policing)	Disabled	Disabled on all classes in the child policy map
Child class (priority with policing)	Disabled	Disabled or enabled on all non-priority classes in the child policy map

How to Configure Traffic Shaping Overhead Accounting for ATM

This section contains the following tasks.

- Configuring Traffic Shaping Overhead Accounting for ATM in a Hierarchical Policy, page 5 (required)
- Verifying the Traffic Shaping Overhead Accounting for ATM Configuration, page 9 (optional)

Configuring Traffic Shaping Overhead Accounting for ATM in a Hierarchical Policy

To configure traffic shaping overhead accounting for ATM in a hierarchical policy map structure, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **policy-map** *policy-map-name*
4. **class** *class-map-name*
5. **bandwidth** {*bandwidth-kbps* | **percent** *percentage* | **remaining percent** *percentage*} **account** {**qinq** | **dot1q**} **aal5** *subscriber-encap*
6. **exit**
7. **policy-map** *policy-map-name*
8. **class class-default**
9. **shape** [**average** | **peak**] *mean-rate* [*burst-size*] [*excess-burst-size*] [**account** {**qinq** | **dot1q**} **aal5** *subscriber-encap*
10. **service-policy** *policy-map-name*
11. **end**

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	**policy-map** *policy-map-name* **Example:** `Router(config)# policy-map Business`	Creates or modifies the child policy and enters policy-map configuration mode. • Enter the policy map name. This is the name of the child policy and can be a maximum of 40 alphanumeric characters.
Step 4	**class** *class-map-name* **Example:** `Router(config-pmap)# class video`	Assigns the traffic class you specify to the policy map, and enters policy-map class configuration mode. • Enter the traffic class name. This is the name of the previously configured class map, and can be a maximum of 40 alphanumeric characters.

	Command or Action	Purpose
Step 5	**bandwidth** {*bandwidth-kbps* | **percent** *percentage* | **remaining percent** *percentage*} **account** {**qinq** | **dot1q**} **aal5** *subscriber-encap* **Example:** `Router(config-pmap-c)# bandwidth 8000 account dot1q aal5 snap-pppoa`	Enables Class-Based Weighted Fair Queuing (CBWFQ) on the basis of the keywords and arguments specified, such as the following: • *bandwidth-kbps* specifies or modifies the minimum bandwidth allocated for a class belonging to a policy map. Valid values are from 8 to 2,488,320, which represents from 1 to 99 percent of the link bandwidth. • **percent** *percentage* specifies or modifies the minimum percentage of the link bandwidth allocated for a class belonging to a policy map. Valid values are from 1 to 99. • **remaining percent** *percentage* specifies or modifies the minimum percentage of unused link bandwidth allocated for a class belonging to a policy map. Valid values are from 1 to 99. • **account** enables ATM overhead accounting. • **qinq** specifies queue-in-queue encapsulation as the BRAS-DSLAM encapsulation type. • **dot1q** specifies IEEE 802.1Q VLAN encapsulation as the BRAS-DSLAM encapsulation type. • **aal5** specifies the ATM Adaptation Layer 5 that supports connection-oriented variable bit rate (VBR) services. • *subscriber-encap* specifies the encapsulation type at the subscriber line. For more information, see the "Subscriber Line Encapsulation Types" section on page 3.
Step 6	**exit** **Example:** `Router(config-pmap-c)# exit`	Exits policy-map class configuration mode.
Step 7	**policy-map** *policy-map-name* **Example:** `Router(config-pmap)# policy-map Premium`	Creates or modifies the top-level parent policy. • Enter the policy map name. This is the name of the top-level parent policy map, and can be a maximum of 40 alphanumeric characters.
Step 8	**class class-default** **Example:** `Router(config-pmap)# class class-default`	Configures or modifies the parent class-default class. **Note** You can configure only the class-default class in a parent policy. Do not configure any other traffic class.

	Command or Action	Purpose
Step 9	**shape** [**average** | **peak**] *mean-rate* [*burst-size*] [*excess-burst-size*] [**account** {**qinq** | **dot1q**} **aal5** *subscriber-encap* **Example:** `Router(config-pmap-c)# shape 8000 account qinq aal5 snap-dot1q-rbe`	Shapes traffic to the indicated bit rate and enables ATM overhead accounting on the basis of the keywords and arguments specified, such as the following: • (Optional) **average** is the committed burst (Bc) that specifies the maximum number of bits sent out in each interval. • (Optional) **peak** is the Bc + excess burst (Be) and specifies the maximum number of bits sent out in each interval. The Cisco 10000 router does not support this option. • *mean-rate* is 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 are permitted. • (Optional) *burst-size* is the number of bits in a measurement interval (Bc). • (Optional) *excess-burst-size* is the acceptable number of bits permitted to go over the Be. • **account** enables ATM overhead accounting. • **qinq** specifies queue-in-queue encapsulation as the BRAS-DSLAM encapsulation type. • **dot1q** specifies IEEE 802.1Q VLAN encapsulation as the BRAS-DSLAM encapsulation type. • **aal5** is the ATM Adaptation Layer 5 that supports connection-oriented variable bit rate (VBR) services. • *subscriber-encaps* specifies the encapsulation type at the subscriber line. For more information, see the "Subscriber Line Encapsulation Types" section on page 3.
Step 10	**service-policy** *policy-map-name* **Example:** `Router(config-pmap-c)# service-policy Business`	Applies a child policy to the parent class-default class. • Enter the policy map name. This is the name of the previously configured child policy map. **Note** Do not specify the **input** or **output** keywords when applying a child policy to a parent class-default class.
Step 11	**end** **Example:** `Router(config-pmap-c)# end`	Exits policy-map class configuration mode.

Verifying the Traffic Shaping Overhead Accounting for ATM Configuration

To verify the traffic shaping overhead accounting for ATM configuration, complete the following steps.

SUMMARY STEPS

1. **enable**
2. **show policy-map** [*policy-map-name*]
3. **show running-config**
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show policy-map** [*policy-map-name*] **Example:** `Router# show policy-map unit-test`	(Optional) Displays the configuration of all classes for a specified policy map or all classes for all existing policy maps. • (Optional) Enter the policy map name. The name can be a maximum of 40 alphanumeric characters.
Step 3	**show running-config** **Example:** `Router# show running-config`	(Optional) Displays the contents of the currently running configuration file.
Step 4	**end** **Example:** `Router# end`	Exits privileged EXEC mode.

Examples

The following sample output from the **show policy-map** command indicates that ATM overhead accounting is enabled for the class-default class. The BRAS-DSLAM encapsulation is dot1q and the subscriber line encapsulation is snap-rbe based on the AAL3 service.

```
Router# show policy-map unit-test

Policy Map unit-test
    Class class-default
        Average Rate Traffic Shaping
        cir 10% account dot1q aal3 snap-rbe
```

Configuration Examples for Traffic Shaping Overhead Accounting for ATM

This section provides the following configuration examples:

Enabling Traffic Shaping Overhead Accounting for ATM: Example

The following example shows how to enable ATM overhead accounting using a hierarchical policy map structure. The Child policy map has two classes: Business and Non-Business. The Business class has priority and is policed at 128000 kbps. The Non-Business class has ATM overhead accounting enabled and has a bandwidth of 20 percent of the available bandwidth. The Parent policy map shapes the aggregate traffic to 256000 kbps and enables ATM overhead accounting.

Notice that Layer 2 overhead accounting is not explicitly configured for the Business traffic class. If the class-default class of a parent policy has ATM overhead accounting enabled, you are not required to enable ATM overhead accounting on a child traffic class that does not contain the **bandwidth** or **shape** command. Therefore, in this example, the Business priority queue implicitly has ATM overhead accounting enabled because its parent class-default class has overhead accounting enabled.

```
policy-map Child
    class Business
        priority
        police 128000
    class Non-Business
        bandwidth percent 20 account dot1q aal5 snap-rbe-dot1q
        exit
    exit
policy-map Parent
    class class-default
        shape 256000 account dot1q aal5 snap-rbe-dot1q
        service-policy Child
```

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

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

```
    class class-default
        bandwidth remaining ratio 10 account aal5 snap-rbe-dot1q
        shape average 512 account aal5 snap-rbe-dot1q
        service policy subscriber_classes
```

Verifying Traffic Shaping Overhead Accounting for ATM: Example

The following output from the **show policy-map interface** command indicates that ATM overhead accounting is enabled for shaping and disabled for bandwidth:

```
Service-policy output:unit-test

    Class-map: class-default (match-any)
    100 packets, 1000 bytes
    30 second offered rate 800 bps, drop rate 0 bps
    Match: any
    shape (average) cir 154400, bc 7720, be 7720
    target shape rate 154400
      overhead accounting: enabled
    bandwidth 30% (463 kbps)
      overhead accounting: disabled

    queue limit 64 packets
    (queue depth/total drops/no-buffer drops) 0/0/0
    (packets output/bytes output) 100/1000
```

The following output from the **show running-config** command indicates that ATM overhead accounting is enabled for shaping. The BRAS-DSLAM encapsulation is dot1q and the subscriber line encapsulation is snap-rbe based on the AAL5 service.

```
subscriber policy recording rules limit 64
no mpls traffic-eng auto-bw timers frequency 0
call rsvp-sync
!
controller T1 2/0
    framing sf
    linecode ami
!
controller T1 2/1
    framing sf
    linecode ami
!
!
policy-map unit-test
    class class-default
        shape average percent 10 account dot1q aal5 snap-rbe
!
```

Additional References

The following sections provide references related to traffic shaping overhead accounting for ATM.

Related Documents

Related Topic	Document Title
Hierarchical policies, policy maps	*Cisco IOS Quality of Service Solutions Configuration Guide,* Release 12.4 *Cisco 10000 Series Router Quality of Service Configuration Guide*
Modular Quality of Service (QoS) Command-Line Interface (CLI) (MQC)	*Cisco IOS Quality of Service Solutions Configuration Guide,* Release 12.4
Policing and shaping traffic	*Cisco IOS Quality of Service Solutions Configuration Guide,* Release 12.4 *Cisco 10000 Series Router Quality of Service Configuration Guide*

Standards

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

MIBs

MIB	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

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

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/techsupport

Command Reference

The following commands are introduced or modified in the feature or features documented in this module. For information about these commands, see the *Cisco IOS Quality of Service Solutions Command Reference* at http://www.cisco.com/en/US/docs/ios/qos/command/reference/qos_book.html. For information about all Cisco IOS commands, go to the Command Lookup Tool at http://tools.cisco.com/Support/CLILookup or to the *Cisco IOS Master Commands List*.

- **bandwidth (policy-map class)**
- **shape (policy-map class)**
- **show policy-map**
- **show running-config**

bandwidth (policy-map class)

To specify or modify the bandwidth allocated for a class belonging to a policy map, or to enable ATM overhead accounting, use the **bandwidth** command in policy-map class configuration mode. To remove the bandwidth specified for a class, use the **no** form of this command.

bandwidth {*bandwidth-kbps* | **remaining percent** *percentage* | **percent** *percentage*} [**account** {**qinq** | **dot1q**} **aal5** *subscriber-encapsulation*]

no bandwidth {*bandwidth-kbps* | **remaining percent** *percentage* | **percent** *percentage*} [**account** {**qinq** | **dot1q**} **aal5** *subscriber-encapsulation*]

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bandwidth {*bandwidth-kbps* | **percent** *percentage* | **remaining percent** *percentage*} **account** {{{**qinq** | **dot1q**} {**aal5** | **aal3**} {*subscriber-encapsulation*}} | {**user-defined** *offset* [**atm**]}}

no bandwidth {*bandwidth-kbps* | **percent** *percentage* | **remaining percent** *percentage*} **account** {{{**qinq** | **dot1q**} {**aal5** | **aal3**} {*subscriber-encapsulation*}} | {**user-defined** *offset* [**atm**]}}

Syntax Description

bandwidth-kbps	Amount of bandwidth, in kilobits per second (kbps), to be assigned to the class. The amount of bandwidth varies according to the interface and platform in use.
remaining percent *percentage*	Percentage of guaranteed bandwidth based on a relative percent of available bandwidth. The percentage can be a number from 1 to 100.
percent *percentage*	Percentage of guaranteed bandwidth based on an absolute percent of available bandwidth to be set aside for the priority class. The percentage can be a number from 1 to 100.
account	Enables ATM overhead accounting.
qinq	Specifies queue-in-queue encapsulation as the broadband aggregation system (BRAS) to digital subscriber line access multiplexer (DSLAM) encapsulation type for ATM overhead accounting.
dot1q	Specifies IEEE 802.1Q VLAN encapsulation as the BRAS-DSLAM encapsulation type for ATM overhead accounting.
aal5	Specifies ATM Adaptation Layer 5 and the encapsulation type at the subscriber line for ATM overhead accounting. AAL5 supports connection-oriented variable bit rate (VBR) services. See the "Usage Guidelines" section for valid encapsulation types.
aal3	Specifies the ATM Adaptation Layer 5 that supports both connectionless and connection-oriented links. You must specify either **aal3** or **aal5**.
user-defined	Specifies that the router is to use an offset size when calculating ATM overhead.

offset	Specifies the offset size when calculating ATM overhead. Valid values are from -63 to 63 bytes. **Note** The router configures the offset size if you do not specify the **user-defined** *offset* option.
atm	**A**pplies ATM cell tax in the ATM overhead calculation. **Note** Configuring both the *offset* and **atm** options adjusts the packet size to the offset size and then adds ATM cell tax.

Command Default

No bandwidth is specified.

ATM overhead accounting is disabled.

Command Modes

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

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 and was implemented on Versatile Interface Processor (VIP)-enabled Cisco 7500 series routers.
12.0(7)T	The **percent** keyword was added.
12.0(17)SL	This command was introduced on the Cisco 10000 series router.
12.0(22)S	Support for the **percent** keyword was added on the Cisco 10000 series router.
12.0(23)SX	Support for the **remaining percent** keyword was added on the Cisco 10000 series router.
12.1(5)T	This command was implemented on VIP-enabled Cisco 7500 series routers.
12.2(2)T	The **remaining percent** keyword was added.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(31)SB	This command was implemented on the Cisco 10000 series routers.
12.2(31)SB22	This command was introduced on the PRE3 for the Cisco 10000 series router, and was enhanced for ATM overhead accounting on the Cisco 10000 series router for the PRE3.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
12.2(31)SB6	This command was enhanced to specify an offset size when calculating ATM overhead and implemented on the Cisco 10000 series router for the PRE3.
12.2(1st)SRC	This command was integrated into Cisco IOS Release 12.2(1st)SRC and support for the Cisco 7600 series router was added.

Usage Guidelines

You should use the **bandwidth** command when you configure a policy map for a class defined by the **class-map** command. The **bandwidth** command specifies the bandwidth for traffic in that class. Class-based weighted fair queueing (CBWFQ) derives the weight for packets belonging to the class from the bandwidth allocated to the class. CBWFQ then uses the weight to ensure that the queue for the class is serviced fairly.

Specifying Bandwidth as a Percentage for All Supported Platforms Except the Cisco 10000 Series Routers

Besides specifying the amount of bandwidth in kilobits per second (kbps), you can specify bandwidth as a percentage of either the available bandwidth or the total bandwidth. During periods of congestion, the classes are serviced in proportion to their configured bandwidth percentages. The bandwidth percentage is based on the interface bandwidth or when used in a hierarchical policy. Available bandwidth is equal to the interface bandwidth minus the sum of all bandwidths reserved by the Resource Reservation Protocol (RSVP) feature, the IP RTP Priority feature, and the low latency queueing (LLQ) feature.

Note It is important to remember that when the **bandwidth remaining percent** command is configured, hard bandwidth guarantees may not be provided and only relative bandwidths are assured. That is, class bandwidths are always proportional to the specified percentages of the interface bandwidth. When the link bandwidth is fixed, class bandwidth guarantees are in proportion to the configured percentages. If the link bandwidth is unknown or variable, the router cannot compute class bandwidth guarantees in kbps.

Specifying Bandwidth as a Percentage for the Cisco 10000 Series Routers

Besides specifying the amount of bandwidth in kilobits per second (kbps), you can specify bandwidth as a percentage of either the available bandwidth or the total bandwidth. During periods of congestion, the classes are serviced in proportion to their configured bandwidth percentages. The minimum bandwidth percentage is based on the nearest parent shape rate.

Note It is important to remember that when the **bandwidth remaining percent** command is configured, hard bandwidth guarantees may not be provided and only relative bandwidths are assured. That is, class bandwidths are always proportional to the specified percentages of the interface bandwidth. When the link bandwidth is fixed, class bandwidth guarantees are in proportion to the configured percentages. If the link bandwidth is unknown or variable, the router cannot compute class bandwidth guarantees in kbps.

The router converts the specified bandwidth to the nearest multiple of 1/255 (ESR–PRE1) or 1/65,535 (ESR–PRE2) of the interface speed. Use the **show policy-map interface** command to display the actual bandwidth.

Restrictions for All Supported Platforms

The following restrictions apply to the **bandwidth** command:

- The amount of bandwidth configured should be large enough to also accommodate Layer 2 overhead.
- A policy map can have all the class bandwidths specified in kbps or all the class bandwidths specified in percentages, but not a mix of both in the same class. However, the unit for the **priority** command in the priority class can be different from the bandwidth unit of the nonpriority class.

- When the **bandwidth percent** command is configured, and a policy map containing class policy configurations is attached to the interface to stipulate the service policy for that interface, available bandwidth is assessed. If a policy map cannot be attached to a particular interface because of insufficient interface bandwidth, the policy is removed from all interfaces to which it was successfully attached. This restriction does not apply to the **bandwidth remaining percent** command.

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

Note that when the policy map containing class policy configurations is attached to the interface to stipulate the service policy for that interface, available bandwidth is assessed. If a policy map cannot be attached to a particular interface because of insufficient interface bandwidth, then the policy is removed from all interfaces to which it was successfully attached.

Modular QoS Command-Line Interface Queue Limits

The **bandwidth** command can be used with the Modular Quality of Service Command-line Interface (MQC) to specify the bandwidth for a particular class. When used with the MQC, the **bandwidth** command uses a default queue limit for the class. This queue limit can be modified using the **queue-limit** command, thereby overriding the default set by the **bandwidth** command.

Note To meet the minimum bandwidth guarantees required by interfaces, it is especially important to modify the default queue limit of high-speed interfaces by using the **queue-limit** command.

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The Cisco 10000 series router supports the **bandwidth** command on outbound interfaces only. It does not support this command on inbound interfaces.

On the PRE2, you specify a bandwidth value and a unit for the bandwidth value. Valid values for the bandwidth are from 1 to 2488320000 and units are bps, kbps, mbps, gbps. The default unit is kbps. For example, the following commands configure a bandwidth of 10000 bps and 10000 kbps on the PRE2:

```
bandwidth 10000 bps

bandwidth 10000
```

On the PRE3, you only specify a bandwidth value. Because the unit is always kbps, the PRE3 does not support the *unit* argument. Valid values are from 1 to 2000000. For example, the following command configures a bandwidth of 128,000 kbps on the PRE3:

```
bandwidth 128000
```

The PRE3 accepts the PRE2 **bandwidth** command only if the command is used without the *unit* argument. The PRE3 rejects the PRE2 **bandwidth** command if the specified bandwidth is outside the valid PRE3 bandwidth value range (1 to 2000000).

Besides specifying the amount of bandwidth in kilobits per second (kbps), you can specify bandwidth as a percentage of either the available bandwidth or the total bandwidth. During periods of congestion, the classes are serviced in proportion to their configured bandwidth percentages. The bandwidth percentage is based on the interface bandwidth or when used in a hierarchical policy the minimum bandwidth percentage is based on the nearest parent shape rate.

Note It is important to remember that when the **bandwidth remaining percent** command is configured, hard bandwidth guarantees may not be provided and only relative bandwidths are assured. Class bandwidths are always proportional to the specified percentages of the interface bandwidth. When the link bandwidth is fixed, class bandwidth guarantees are in proportion to the configured percentages. If the link bandwidth is unknown or variable, the router cannot compute class bandwidth guarantees in kbps.

The router converts the specified bandwidth to the nearest multiple of 1/255 (PRE1) or 1/65535 (PRE2, PRE3) of the interface speed. Use the **show policy-map interface** command to display the actual bandwidth.

Usage Guidelines for Overhead Accounting for ATM (Cisco 10000 Series Router)

When configuring ATM overhead accounting, you must specify the BRAS-DSLAM, DSLAM-CPE, and subscriber line encapsulation types. The router supports the following subscriber line encapsulation types:

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

The router calculates the offset size unless you specify the **user-defined** *offset* option.

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

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

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

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

Examples

Cisco 10000 Series Router

In the following example, the policy map named VLAN guarantees 30 percent of the bandwidth to the class named Customer1 and 60 percent of the bandwidth to the class named Customer2. If you apply the VLAN policy map to a 1–Mbps link, 300 kbps (30 percent of 1 Mbps) is guaranteed to class Customer1 and 600 kbps (60 percent of 1 Mbps) is guaranteed to class Customer2, with 100 kbps remaining for the class-default class. If the class-default class does not need additional bandwidth, the unused 100 kbps is available for use by class Customer1 and class Customer2. If both classes need the bandwidth, they share it in proportion to the configured rates. In this example, the sharing ratio is 30:60 or 1:2:

```
Router(config)# policy-map VLAN
Router(config-pmap)# class Customer1
Router(config-pmap-c)# bandwidth percent 30
Router(config-pmap-c)# exit
```

```
Router(config-pmap)# class Customer2
Router(config-pmap-c)# bandwidth percent 60
```

CBWFQ Bandwidth Guarantee Example

The following example creates a policy map with two classes, shows how bandwidth is guaranteed when only CBWFQ is configured, and attaches the policy to serial interface 3/2/1:

```
Router(config)# policy-map policy1
Router(config-pmap)# class class1
Router(config-pmap-c)# bandwidth percent 50
Router(config-pmap-c)# exit
Router(config-pmap)# class class2
Router(config-pmap-c)# bandwidth percent 25
Router(config-pmap-c)# exit
Router(config-pmap)# exit
Router(config)# interface serial3/2/1
Router(config-if)# service output policy1
Router(config-if)# end
```

The following output from the **show policy-map** command shows the configuration for the policy map called policy1:

```
Router# show policy-map policy1

  Policy Map policy1
    Class class1
      Weighted Fair Queueing
            Bandwidth 50 (%) Max Threshold 64 (packets)
    Class class2
      Weighted Fair Queueing
            Bandwidth 25 (%) Max Threshold 64 (packets)
```

The output from the **show policy-map interface** command shows that 50 percent of the interface bandwidth is guaranteed for the class called class1, and 25 percent is guaranteed for the class called class2. The output displays the amount of bandwidth as both a percentage and a number of kbps.

```
Router# show policy-map interface serial3/2

 Serial3/2

  Service-policy output:policy1

    Class-map:class1 (match-all)
      0 packets, 0 bytes
      5 minute offered rate 0 bps, drop rate 0 bps
      Match:none
      Weighted Fair Queueing
        Output Queue:Conversation 265
        Bandwidth 50 (%)
        Bandwidth 772 (kbps) Max Threshold 64 (packets)
        (pkts matched/bytes matched) 0/0
        (depth/total drops/no-buffer drops) 0/0/0

    Class-map:class2 (match-all)
      0 packets, 0 bytes
      5 minute offered rate 0 bps, drop rate 0 bps
      Match:none
      Weighted Fair Queueing
        Output Queue:Conversation 266
        Bandwidth 25 (%)
        Bandwidth 386 (kbps) Max Threshold 64 (packets)
        (pkts matched/bytes matched) 0/0
        (depth/total drops/no-buffer drops) 0/0/0
```

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

In this example, serial interface 3/2 has a total bandwidth of 1544 kbps. During periods of congestion, 50 percent (or 772 kbps) of the bandwidth is guaranteed to the class called class1, and 25 percent (or 386 kbps) of the link bandwidth is guaranteed to the class called class2.

CBWFQ and LLQ Bandwidth Allocation Example

In the following example, the interface has a total bandwidth of 1544 kbps. During periods of congestion, 50 percent (or 772 kbps) of the bandwidth is guaranteed to the class called class1, and 25 percent (or 386 kbps) of the link bandwidth is guaranteed to the class called class2.

The following sample output from the **show policy-map** command shows the configuration of a policy map called p1:

```
Router# show policy-map p1

  Policy Map p1
    Class voice
      Weighted Fair Queueing
            Strict Priority
            Bandwidth 500 (kbps) Burst 12500 (Bytes)
    Class class1
      Weighted Fair Queueing
            Bandwidth remaining 50 (%) Max Threshold 64 (packets)
    Class class2
      Weighted Fair Queueing
            Bandwidth remaining 25 (%) Max Threshold 64 (packets)
```

The following output from the **show policy-map interface** command on serial interface 3/2 shows that 500 kbps of bandwidth is guaranteed for the class called voice1. The classes called class1 and class2 receive 50 percent and 25 percent of the remaining bandwidth, respectively. Any unallocated bandwidth is divided proportionally among class1, class2, and any best-effort traffic classes.

Note Note that in this sample output (unlike many of the others earlier in this section) the bandwidth is displayed only as a percentage for class 1 and class 2. Bandwidth expressed as a number of kbps is not displayed because the **percent** keyword was used with the **bandwidth remaining** command. The **bandwidth remaining percent** command allows you to allocate bandwidth as a relative percentage of the total bandwidth available on the interface..

```
Router# show policy-map interface serial3/2

 Serial3/2

  Service-policy output:p1

    Class-map:voice (match-all)
      0 packets, 0 bytes
      5 minute offered rate 0 bps, drop rate 0 bps
      Match:ip precedence 5
      Weighted Fair Queueing
        Strict Priority
        Output Queue:Conversation 264
        Bandwidth 500 (kbps) Burst 12500 (Bytes)
        (pkts matched/bytes matched) 0/0
        (total drops/bytes drops) 0/0
```

```
Class-map:class1 (match-all)
      0 packets, 0 bytes
      5 minute offered rate 0 bps, drop rate 0 bps
      Match:none
      Weighted Fair Queueing
        Output Queue:Conversation 265
        Bandwidth remaining 50 (%) Max Threshold 64 (packets)
        (pkts matched/bytes matched) 0/0
        (depth/total drops/no-buffer drops) 0/0/0

    Class-map:class2 (match-all)
      0 packets, 0 bytes
      5 minute offered rate 0 bps, drop rate 0 bps
      Match:none
      Weighted Fair Queueing
        Output Queue:Conversation 266
        Bandwidth remaining 25 (%) Max Threshold 64 (packets)
        (pkts matched/bytes matched) 0/0
        (depth/total drops/no-buffer drops) 0/0/0

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

Traffic Shaping Overhead Accounting for ATM Example

When a parent policy has ATM overhead accounting enabled, you are not required to enable ATM overhead accounting on a child traffic class that does not contain the **bandwidth** or **shape** command. In the following configuration example, ATM overhead accounting is enabled for bandwidth on the gaming and class-default class of the child policy map named subscriber_classes, and on the class-default class of the parent policy map named subscriber_line. The voip and video classes do not have ATM overhead accounting explicitly enabled; these priority queues have overhead accounting implicitly enabled because ATM overhead accounting is enabled on the parent policy. Notice that the features in the parent and child policies use the same encapsulation type.

```
policy-map subscriber_classes
    class voip
        priority level 1
        police 8000
    class video
        priority level 2
        police 20
    class gaming
        bandwidth remaining percent 80 account aal5 snap-rbe-dot1q
    class class-default
        bandwidth remaining percent 20 account aal5 snap-rbe-dot1q
        policy-map subscriber_line
    class class-default
        bandwidth remaining ratio 10 account aal5 snap-rbe-dot1q
        shape average 512 account aal5 snap-rbe-dot1q
        service policy subscriber_classes
```

In the following example, the router will use 20 overhead bytes and ATM cell tax in calculating ATM overhead. The child and parent policies contain the required matching offset values. The parent policy is attached to virtual template 1.

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

```
        shape average 30000 account user-defined 20 atm
policy-map parent
    class class-default
        shape average 30000 account user-defined 20 atm
        service-policy child
interface virtual-template 1
        service-policy output parent
```

Related Commands

Command	Description
class (policy-map)	Specifies the name of the class whose policy you want to create or change, and the default class (commonly known as the class-default class) before you configure its policy.
class-map	Creates a class map to be used for matching packets to a specified class.
max-reserved-bandwidth	Changes the percent of interface bandwidth allocated for CBWFQ, LLQ, and IP RTP Priority.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
priority	Specifies the priority of a class of traffic belonging to a policy map.
queue-limit	Specifies or modifies the maximum number of packets the queue can hold for a class policy configured in a policy map.
random-detect (interface)	Enables WRED or DWRED.
random-detect exponential-weighting-constant	Configures the WRED and DWRED exponential weight factor for the average queue size calculation.
random-detect precedence	Configures WRED and DWRED parameters for a particular IP precedence.
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.

shape (policy-map class)

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

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

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

Cisco 10000 Series Router (PRE1)

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

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

Cisco 10000 Series Router (PRE2)

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

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

Cisco 10000 Series Router (PRE3)

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

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

Syntax Description

average	(Optional) Committed Burst (Bc) is the maximum number of bits sent out in each interval.
peak	(Optional) Bc + Excess Burst (Be) is the maximum number of bits sent out in each interval.
mean-rate	(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.
unit	Specifies the unit of the specified bit rate (for example, kbps).
burst-size	(Optional) The number of bits in a measurement interval (Bc).
excess-burst-size	(Optional) The acceptable number of bits permitted to go over the Be.
account	(Optional) Enables ATM overhead accounting. **Note** This keyword is required if you configure ATM overhead accounting.

qinq	Specifies queue-in-queue (qinq) encapsulation as the broadband aggregation system (BRAS) to digital subscriber line access multiplexer (DSLAM) encapsulation type for ATM overhead accounting.
dot1q	Specifies IEEE 802.1Q VLAN encapsulation as the BRAS-DSLAM encapsulation type for ATM overhead accounting.
aal5	Specifies the ATM Adaptation Layer 5 service for ATM overhead accounting. AAL5 supports connection-oriented variable bit rate (VBR) services.
aal3	Specifies the ATM Adaptation Layer 5 that supports both connectionless and connection-oriented links. You must specify either **aal3** or **aal5**.
subscriber-encap	Specifies the encapsulation type at the subscriber line. • snap-rbe • mux-rbe • snap-dot1q-rbe • mux-dot1q-rbe • snap-pppoa • mux-pppoa • snap-1483routed • mux-1483routed
user-defined	Specifies that the router is to use an offset size when calculating ATM overhead.
offset	Specifies the offset size when calculating ATM overhead. Valid values are from -63 to 63 bytes. **Note** The router configures the offset size if you do not specify the **user-defined** *offset* option.
atm	**A**pplies ATM cell tax in the ATM overhead calculation. **Note** Configuring both the *offset* and **atm** options adjusts the packet size to the offset size and then adds ATM cell tax.

Command Default

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

Traffic shaping overhead accounting for ATM is disabled.

Command Modes

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

Command History

Release	Modification
12.0(5)XE	This command was introduced.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.
12.0(17)SL	This command was integrated into Cisco IOS Release 12.0(17)SL and implemented on the PRE1 for the Cisco 10000 series router.
12.2(16)BX	This command was integrated into Cisco IOS Release 12.2(16)BX and implemented on the PRE2 for the Cisco 10000 series router.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(31)SB2	This command was enhanced for ATM overhead accounting and implemented on the Cisco 10000 series router for the PRE3.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
12.2(31)SB6	This command was enhanced to specify an offset size when calculating ATM overhead and implemented on the Cisco 10000 series router for the PRE3.
12.2(1st)SRC	This command was integrated into Cisco IOS Release 12.2(1st)SRC and support for the Cisco 7600 series router was added.

Usage Guidelines

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

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

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

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

Traffic Shaping on the Cisco 10000 Series Performance Routing Engine

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

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

```
shape 128000 bps
```

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

```
shape 1000
```

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

Traffic Shaping Overhead Accounting for ATM (Cisco 10000 Series Router)

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

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

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

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

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

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

Examples

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

```
policy-map dts-interface-all-action
 class class-interface-all
  shape average 1000000

interface pos1/0/0
 service-policy output dts-interface-all-action
```

Traffic Shaping Overhead Accounting for ATM

When a parent policy has ATM overhead accounting enabled for shaping, you are not required to enable accounting at the child level using the **police** command. In the following configuration example, ATM overhead accounting is enabled for bandwidth on the gaming and class-default class of the child policy map named subscriber_classes, and on the class-default class of the parent policy map named subscriber_line. The voip and video classes do not have ATM overhead accounting explicitly enabled. These priority classes have ATM overhead accounting implicitly enabled because the parent policy has ATM overhead accounting enabled. Notice that the features in the parent and child policies use the same encapsulation type.

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

```
  bandwidth remaining percent 20 account aal5 snap-rbe-dot1q
policy-map subscriber_line
 class class-default
  bandwidth remaining ratio 10 account aal5 snap-rbe-dot1q
  shape average 512 account aal5 snap-rbe-dot1q
  service policy subscriber_classes
```

In the following example, the router will use 20 overhead bytes and ATM cell tax in calculating ATM overhead. The child and parent policies contain the required matching offset values. The parent policy is attached to virtual template 1.

```
policy-map child
 class class1
  bandwidth 500 account user-defined 20 atm
 class class2
  shape average 30000 account user-defined 20 atm
policy-map parent
 class class-default
  shape average 30000 account user-defined 20 atm
  service-policy child
interface virtual-template 1
 service-policy output parent
```

Related Commands

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

show policy-map

To display the configuration of all classes for a specified service policy map or of all classes for all existing policy maps, use the **show policy-map** command in user EXEC or privileged 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. The name can be a maximum of 40 characters.

Command Default

All existing policy map configurations are displayed.

Command Modes

User EXEC (>)
Privileged EXEC (#)

Command History

Release	Modification
12.0(5)T	This command was introduced.
12.0(5)XE	This command was incorporated into Cisco IOS Release 12.0(5)XE.
12.0(7)S	This command was incorporated into Cisco IOS Release 12.0(7)S.
12.1(1)E	This command was incorporated into Cisco IOS Release 12.1(1)E.
12.2(4)T	This command was modified for two-rate traffic policing to display burst parameters and associated actions.
12.2(8)T	The command was modified for the Policer Enhancement—Multiple Actions feature and the WRED—Explicit Congestion Notification (ECN) feature.
12.2(13)T	The following modifications were made: • The output was modified for the Percentage-Based Policing and Shaping feature. • This command was modified as part of the Modular QoS CLI (MQC) Unconditional Packet Discard feature. Traffic classes can now be configured to discard packets belonging to a specified class. • This command was modified for the Enhanced Packet Marking feature. A mapping table (table map) can now be used to convert and propagate packet-marking values.
12.2(15)T	This command was modified to support display of Frame Relay voice-adaptive traffic-shaping information.
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(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	This command was implemented on the Supervisor Engine 2 and integrated into Cisco IOS Release 12.2(17d)SXB.

Release	Modification
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB, and the command was modified to display information about Layer 2 Tunnel Protocol Version 3 (L2TPv3) tunnel marking.
12.2(31)SB2	This command was enhanced to display bandwidth-remaining ratios configured on traffic classes and ATM overhead accounting, and was implemented on the Cisco 10000 series router for the PRE3.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(1st)SRC	This command was integrated into Cisco IOS Release 12.2(1st)SRC and support for the Cisco 7600 series router was added.

Usage Guidelines

The **show policy-map** command displays the configuration of a 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 policy map has been attached to an interface. The command displays:

- ECN marking information only if ECN is enabled on the interface.
- Bandwidth-remaining ratio configuration and statistical information, if configured and used to determine the amount of unused (excess) bandwidth to allocate to a class queue during periods of congestion.

Examples

This section provides sample output from typical **show policy-map** commands. Depending upon the interface or platform in use and the options enabled (for example, Weighted Fair Queueing [WFQ]), the output you see may vary slightly from the ones shown below.

- Weighted Fair Queueing: Example, page 30
- Frame Relay Voice-Adaptive Traffic-Shaping: Example, page 31
- Traffic Policing: Example, page 32
- Two-Rate Traffic Policing: Example, page 32
- Multiple Traffic Policing Actions: Example, page 33
- Explicit Congestion Notification: Example, page 34
- Modular QoS CLI (MQC) Unconditional Packet Discard: Example, page 35
- Percentage-Based Policing and Shaping: Example, page 35
- Enhanced Packet Marking: Example, page 37
- Bandwidth-Remaining Ratio: Example, page 37
- ATM Overhead Accounting: Example, page 38
- Tunnel Marking: Example, page 38

Weighted Fair Queueing: Example

The following example displays the contents of the service policy map called po1. In this example, WFQ is enabled.

```
Router# show policy-map po1

Policy Map po1
 Weighted Fair Queueing
    Class class1
       Bandwidth 937 (kbps) Max thresh 64 (packets)
    Class class2
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class3
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class4
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class5
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class6
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class7
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class8
         Bandwidth 937 (kbps)  Max thresh 64 (packets)
```

The following example displays the contents of all policy maps on the router. Again, WFQ is enabled.

```
Router# show policy-map

Policy Map poH1
 Weighted Fair Queueing
    Class class1
       Bandwidth 937 (kbps) Max thresh 64 (packets)
    Class class2
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class3
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class4
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class5
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class6
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class7
Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class8
         Bandwidth 937 (kbps)  Max thresh 64 (packets)
Policy Map policy2
 Weighted Fair Queueing
    Class class1
       Bandwidth 300 (kbps) Max thresh 64 (packets)
    Class class2
        Bandwidth 300  (kbps)  Max thresh 64 (packets)
    Class class3
        Bandwidth 300 (kbps)  Max thresh 64 (packets)
    Class class4
        Bandwidth 300 (kbps)  Max thresh 64 (packets)
    Class class5
        Bandwidth 300 (kbps)  Max thresh 64 (packets)
    Class class6
        Bandwidth 300 (kbps)  Max thresh 64 (packets)
```

Table 3 describes the significant fields shown in the display.

Table 3 show policy-map Field Descriptions—Configured for WFQ

Field	Description
Policy Map	Policy map name.
Class	Class name.
Bandwidth	Amount of bandwidth in kbps allocated to class.
Max thresh	Maximum threshold in number of packets.

Frame Relay Voice-Adaptive Traffic-Shaping: Example

The following sample output for the **show-policy map** command indicates that Frame Relay voice-adaptive traffic-shaping is configured in the class-default class in the policy map "MQC-SHAPE-LLQ1" and that the deactivation timer is set to 30 seconds.

```
Router# show policy-map

  Policy Map VSD1
    Class VOICE1
      Strict Priority
      Bandwidth 10 (kbps) Burst 250 (Bytes)
    Class SIGNALS1
      Bandwidth 8 (kbps) Max Threshold 64 (packets)
    Class DATA1
      Bandwidth 15 (kbps) Max Threshold 64 (packets)

  Policy Map MQC-SHAPE-LLQ1
    Class class-default
      Traffic Shaping
         Average Rate Traffic Shaping
                 CIR 63000 (bps) Max. Buffers Limit 1000 (Packets)
                 Adapt to 8000 (bps)
                 Voice Adapt Deactivation Timer 30 Sec
      service-policy VSD1
```

Table 4 describes the significant fields shown in the display.

Table 4 show policy-map Field Descriptions—Configured for Frame Relay Voice-Adaptive Traffic-Shaping

Field	Description
Strict Priority	Indicates the queueing priority assigned to the traffic in this class.
Burst	Specifies the traffic burst size in bytes.
Traffic Shaping	Indicates that Traffic Shaping is enabled.
Average Rate Traffic Shaping	Indicates the type of Traffic Shaping enabled. Choices are Peak Rate Traffic Shaping or Average Rate Traffic Shaping.
CIR	Committed Information Rate (CIR) in bps.
Max. Buffers Limit	Maximum memory buffer size in packets.

Table 4 show policy-map Field Descriptions—Configured for Frame Relay Voice-Adaptive Traffic-Shaping (continued)

Field	Description
Adapt to	Traffic rate when shaping is active.
Voice Adapt Deactivation Timer	Indicates that Frame Relay voice-adaptive traffic-shaping is configured, and that the deactivation timer is set to 30 seconds.
service-policy	Name of the service policy configured in the policy map "MQC-SHAPE-LLQ1".

Traffic Policing: Example

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 5 describes the significant fields shown in the display.

Table 5 show policy-map Field Descriptions—Configured for Traffic Policing

Field	Description
Policy Map	Name of policy map displayed.
Class	Name of the class configured in the 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.

Two-Rate Traffic Policing: Example

The following is sample output from the **show policy-map** command when two-rate traffic policing has been configured. As shown below, two-rate traffic policing has been configured for a class called "police." In turn, the class called police has been configured in a policy map called "policy1." Two-rate traffic policing has been configured to limit traffic to an average committed rate of 500 kbps and a peak rate of 1 Mbps.

```
Router(config)# class-map police
Router(config-cmap)# match access-group 101
Router(config-cmap)# policy-map policy1
Router(config-pmap)# class police
Router(config-pmap-c)# police cir 500000 bc 10000 pir 1000000 be 10000 conform-action
transmit exceed-action set-prec-transmit 2 violate-action drop
Router(config-pmap-c)# interface serial3/0
Router(config-pmap-c)# exit
Router(config-pmap)# exit
```

```
Router(config)# interface serial3/0
Router(config-if)# service-policy output policy1
Router(config-if)# end
```

The following sample output shows the contents of the policy map called “policy1”:

```
Router# show policy-map policy1

 Policy Map policy1
  Class police
   police cir 500000 conform-burst 10000 pir 1000000 peak-burst 10000 conform-action
   transmit exceed-action set-prec-transmit 2 violate-action drop
```

Traffic marked as conforming to the average committed rate (500 kbps) will be sent as is. Traffic marked as exceeding 500 kbps, but not exceeding 1 Mbps, will be marked with IP Precedence 2 and then sent. All traffic exceeding 1 Mbps will be dropped. The burst parameters are set to 10000 bytes.

Table 6 describes the significant fields shown in the display.

Table 6 show policy-map Field Descriptions—Configured for Two-Rate Traffic Policing

Field	Description
police	Indicates that the **police** command has been configured to enable traffic policing. Also, displays the specified CIR, conform burst size (bc), peak information rate (PIR), and peak burst (BE) size used for marking packets.
conform-action	Displays the action to be taken on packets conforming to a specified rate.
exceed-action	Displays the action to be taken on packets exceeding a specified rate.
violate-action	Displays the action to be taken on packets violating a specified rate.

Multiple Traffic Policing Actions: Example

The following is sample output from the **show policy-map** command when the Policer Enhancement—Multiple Actions feature has been configured. The following sample output from the **show policy-map** command displays the configuration for a service policy called “police.” In this service policy, traffic policing has been configured to allow multiple actions for packets marked as conforming to, exceeding, or violating the CIR or the PIR shown in the example.

```
Router# show policy-map police

  Policy Map police
    Class class-default
     police cir 1000000 bc 31250 pir 2000000 be 31250
       conform-action transmit
       exceed-action set-prec-transmit 4
       exceed-action set-frde-transmit

       violate-action set-prec-transmit 2
       violate-action set-frde-transmit
```

Packets conforming to the specified CIR (1000000 bps) are marked as conforming packets. These are transmitted unaltered.

Packets exceeding the specified CIR (but not the specified PIR, 2000000 bps) are marked as exceeding packets. For these packets, the IP Precedence level is set to 4, the discard eligibility (DE) bit is set to 1, and the packet is transmitted.

Packets exceeding the specified PIR are marked as violating packets. For these packets, the IP Precedence level is set to 2, the DE bit is set to 1, and the packet is transmitted.

Note Actions are specified by using the *action* argument of the **police** command. For more information about the available actions, see the **police** command reference page.

Table 7 describes the significant fields shown in the display.

Table 7 show policy-map Field Descriptions—Configured for Multiple Traffic Policing Actions

Field	Description
police	Indicates that the **police** command has been configured to enable traffic policing. Also, displays the specified CIR, BC, PIR, and BE used for marking packets.
conform-action	Displays the one or more actions to be taken on packets conforming to a specified rate.
exceed-action	Displays the one or more actions to be taken on packets exceeding a specified rate.
violate-action	Displays the one or more actions to be taken on packets violating a specified rate.

Explicit Congestion Notification: Example

The following is sample output from the **show policy-map** command when the WRED—Explicit Congestion Notification (ECN) feature has been configured. The words "explicit congestion notification" (along with the ECN marking information) included in the output indicate that ECN has been enabled.

```
Router# show policy-map

   Policy Map pol1
     Class class-default
       Weighted Fair Queueing
             Bandwidth 70 (%)
             exponential weight 9
             explicit congestion notification
             class    min-threshold    max-threshold    mark-probability
             ------------------------------------------------------------
             ------------------------------------------------------------

             0        -                -                1/10
             1        -                -                1/10
             2        -                -                1/10
             3        -                -                1/10
             4        -                -                1/10
             5        -                -                1/10
             6        -                -                1/10
             7        -                -                1/10
             rsvp     -                -                1/10
```

Table 8 describes the significant fields shown in the display.

Table 8 show policy-map Field Descriptions—Configured for ECN

Field	Description
explicit congestion notification	Indication that Explicit Congestion Notification is enabled.
class	IP precedence value.
min-threshold	Minimum threshold. Minimum WRED threshold in number of packets.
max-threshold	Maximum threshold. Maximum WRED threshold in number of packets.
mark-probability	Fraction of packets dropped when the average queue depth is at the maximum threshold.

Modular QoS CLI (MQC) Unconditional Packet Discard: Example

The following example displays the contents of the policy map called "policy1." All the packets belonging to the class called "c1" are discarded.

```
Router# show policy-map policy1

 Policy Map policy1
  Class c1
   drop
```

Table 9 describes the significant fields shown in the display.

Table 9 show policy-map Field Descriptions—Configured for MQC Unconditional Packet Discard

Field	Description
Policy Map	Name of the policy map being displayed.
Class	Name of the class in the policy map being displayed.
drop	Indicates that the packet discarding action for all the packets belonging to the specified class has been configured.

Percentage-Based Policing and Shaping: Example

The following example displays the contents of two service policy maps—one called "policy1" and one called "policy2." In policy1, traffic policing based on a CIR of 50 percent has been configured. In policy 2, traffic shaping based on an average rate of 35 percent has been configured.

```
Router# show policy-map policy1

Policy Map policy1
 class class1
    police cir percent 50

Router# show policy-map policy2

Policy Map policy2
 class class2
    shape average percent 35
```

The following example displays the contents of the service policy map called “po1”:

```
Router# show policy-map po1

Policy Map po1
 Weighted Fair Queueing
    Class class1
Bandwidth 937 (kbps) Max thresh 64 (packets)
    Class class2
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class3
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class4
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
```

The following example displays the contents of all policy maps on the router:

```
Router# show policy-map

Policy Map poH1
 Weighted Fair Queueing
    Class class1
       Bandwidth 937 (kbps) Max thresh 64 (packets)
    Class class2
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class3
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
    Class class4
        Bandwidth 937 (kbps)  Max thresh 64 (packets)
Policy Map policy2
 Weighted Fair Queueing
    Class class1
       Bandwidth 300 (kbps) Max thresh 64 (packets)
    Class class2
        Bandwidth 300  (kbps)  Max thresh 64 (packets)
    Class class3
        Bandwidth 300 (kbps)  Max thresh 64 (packets)
    Class class4
        Bandwidth 300 (kbps)  Max thresh 64 (packets)
```

Table 10 describes the significant fields shown in the display.

Table 10 show policy-map Field Descriptions—Configured for Percentage-Based Policing and Shaping

Field	Description
Policy Map	Name of policy map displayed.
Weighted Fair Queueing	Indicates that weighted fair queueing (WFQ) has been enabled.
Class	Name of class configured in policy map displayed.
Bandwidth	Bandwidth, in kbps, configured for this class.
Max threshold	Maximum threshold. Maximum WRED threshold in number of packets.

Enhanced Packet Marking: Example

The following sample output from the **show policy-map** command displays the configuration for policy maps called “policy1” and “policy2”.

In “policy1”, a table map called “table-map-cos1” has been configured to determine the precedence based on the class of service (CoS) value. Policy map “policy 1” converts and propagates the packet markings defined in the table map called “table-map-cos1”.

The following sample output from the **show policy-map** command displays the configuration for service polices called “policy1” and “policy2”. In “policy1”, a table map called “table-map1” has been configured to determine the precedence according to the CoS value. In “policy2”, a table map called “table-map2” has been configured to determine the CoS value according to the precedence value.

```
Router# show policy-map policy1

  Policy Map policy1
    Class class-default
      set precedence cos table table-map1

Router# show policy-map policy2

   Policy Map policy2
    Class class-default
      set cos precedence table table-map2
```

Table 11 describes the fields shown in the display.

Table 11 show policy-map Field Descriptions—Configured for Enhanced Packet Marking

Field	Description
Policy Map	Name of the policy map being displayed.
Class	Name of the class in the policy map being displayed.
set precedence cos table table-map1 or set cos precedence table table-map2	Name of the set command used to set the specified value. For instance, set precedence cos table-map1 indicates that a table map called “table-map1” has been configured to set the precedence value on the basis of the values defined in the table map. Alternately, set cos table table-map2 indicates that a table map called “table-map2” has been configured to set the CoS value on the basis of the values defined in the table map.

Bandwidth-Remaining Ratio: Example

The following sample output for the **show policy-map** command indicates that the class-default class of the policy map named vlan10_policy has a bandwidth-remaining ratio of 10. When congestion occurs, the scheduler allocates class-default traffic 10 times the unused bandwidth allocated in relation to other subinterfaces.

```
Router# show policy-map vlan10_policy

  Policy Map vlan10_policy
    Class class-default
      Average Rate Traffic Shaping
      cir 1000000 (bps)
      bandwidth remaining ratio 10
      service-policy child_policy
```

Table 12 describes the fields shown in the display.

Table 12 show policy-map Field Descriptions—Configured for Bandwidth-Remaining Ratio

Field	Description
Policy Map	Name of the policy map being displayed.
Class	Name of the class in the policy map being displayed.
Average Rate Traffic Shaping	Indicates Average Rate Traffic Shaping is configured.
cir	Committed information rate (CIR) used to shape traffic.
bandwidth remaining ratio	Indicates ratio used to allocate excess bandwidth.

ATM Overhead Accounting: Example

The following sample output for the **show policy-map** command indicates that ATM overhead accounting is enabled for the class-default class. The BRAS-DSLAM encapsulation is dot1q and the subscriber encapsulation is snap-rbe for the AAL5 service.

```
Policy Map unit-test
    Class class-default
        Average Rate Traffic Shaping
        cir 10% account dot1q aal5 snap-rbe
```

Table 13 describes the significant fields shown in the display.

Table 13 show policy-map Field Descriptions—Configured for ATM Overhead Accounting

Field	Description
Average Rate	Committed burst (Bc) is the maximum number of bits sent out in each interval.
cir 10%	Committed information rate (CIR) is 10 percent of the available interface bandwidth.
dot1q	BRAS-DSLAM encapsulation is 802.1Q VLAN.
aal5	DSLAM-CPE encapsulation type is based on the ATM Adaptation Layer 5 service. AAL5 supports connection-oriented variable bit rate (VBR) services.
snap-rbe	Subscriber encapsulation type.

Tunnel Marking: Example

In this sample output of the **show policy-map** command, the character string “ip precedence tunnel 4” indicates that L2TPv3 tunnel marking has been configured to set the IP precedence value to 4 in the header of a tunneled packet.

```
Router# show policy-map

Policy Map TUNNEL_MARKING
    Class MATCH_FRDE
      set ip precedence tunnel 4
```

Table 14 describes the fields shown in the display.

Table 14 show policy-map Field Descriptions—Configured for Tunnel Marking

Field	Description
Policy Map	Name of the policy map being displayed.
Class	Name of the class in the policy map being displayed.
set ip precedence tunnel	Indicates that tunnel marking has been configured.

Related Commands

Command	Description
bandwidth	Specifies or modifies the bandwidth allocated for a class belonging to a policy map, and enables ATM overhead accounting.
bandwidth remaining ratio	Specifies a bandwidth-remaining ratio for class queues and subinterface-level queues to determine the amount of unused (excess) bandwidth to allocate to the queue during congestion.
class (policy map)	Specifies the name of the class whose policy you want to create or change, and the default class (commonly known as the class-default class) before you configure its policy.
class–map	Creates a class map to be used for matching packets to a specified class.
drop	Configures a traffic class to discard packets belonging to a specific class.
police	Configures traffic policing.
police (two rates)	Configures traffic policing using two rates, the CIR and the PIR.
policy-map	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
random-detect ecn	Enables ECN.
shape	Shapes traffic to the indicated bit rate according to the algorithm specified, and enables ATM overhead accounting.
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 running-config	Displays the current configuration of the router. If configured, the command output includes information about ATM overhead accounting.
show table-map	Displays the configuration of a specified table map or of all table maps.
table-map (value mapping)	Creates and configures a mapping table for mapping and converting one packet-marking value to another.

show running-config

To display the contents of the current running configuration file or the configuration for a specific module, Layer 2 VLAN, class map, interface, map class, policy map, or virtual circuit (VC) class, use the **show running-config** command in user EXEC or privileged EXEC mode.

Supported Platforms Other than the Cisco 7600 Series Router

show running-config [*options*]

Cisco 7600 Series Router

show running-config [**module** *number* | **vlan** *vlan-id*]

Syntax Description

Supported Commands Other than the Cisco 7600 Series Router	
options	(Optional) One of the following options can be entered with the command: • **brief**—Displays the configuration without certification data. • **class-map** *name*—Displays class map information. The **linenum** keyword can be used with the **class-map** *name* option. • **full**—Displays the full configuration. • **interface** *type number*—Displays interface-specific configuration information. If you use the **interface** keyword, you must specify the interface type and the interface number (for example, **interface ethernet 0**). Common interfaces include **async**, **ethernet**, **fastEthernet**, **group-async**, **loopback**, **null**, **serial**, and **virtual-template**. Use the **show run interface ?** command to determine the interfaces available on your system. • **linenum**—Displays line numbers in the output. The **brief** or **full** keyword can be used with the **linenum** keyword. • **map-class**—Displays map class information. This option is described separately; see the **show running-config map-class** command page. • **policy-map** *name*—Displays policy map information. The **linenum** keyword can be used with the **policy-map** *name* option. • **vc-class** *name*—Displays VC class information (display available only on limited routers such as the Cisco 7500 series). The **linenum** keyword can be used with the **vc-class** *name* option. • **view full**—Enables the display of a full running configuration. This is for view-based users who typically can view only configuration commands that they are entitled to access for that particular view. • **|**—Allows addition of output modifiers and is available with all the keywords for this command.
Cisco 7600 Series Router	
module *number*	(Optional) Specifies the module number.
vlan *vlan-id*	(Optional) Specifies the VLAN information to display; valid values are from 1 to 4094.

Command Default Displays the entire contents of the running configuration file.

Command Modes
User EXEC (>)
Privileged EXEC (#)

Command History

Release	Modification
11.0	This command was introduced.
12.0	This command was replaced by the **more system:running-config** command.
12.0(1)T	The output modifier (|) was added.
12.2(4)T	The **linenum** keyword was added.
12.3(8)T	The **view full** option was added.
12.2(14)SX	The **module** *number* and **vlan** *vlan-id* keywords and arguments were added for the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was integrated into Release 12.2(17d)SXB.
12.2(31)SB2	This command was enhanced to display traffic shaping ATM overhead accounting configuration information and was implemented on the Cisco 10000 series router for the PRE3.
12.2(1st)SRC	This command was integrated into Cisco IOS Release 12.2(1st)SRC.

Usage Guidelines The **show running-config** command is technically a command alias of the **more system:running-config** command. Although **more** commands are recommended (due to their uniform structure across platforms and their expandable syntax), the **show running-config** command remains enabled to accommodate its widespread use, and to allow typing shortcuts such as **show run**.

The **show running-config interface** command is useful when there are multiple interfaces and you want to look at the configuration of a specific interface.

The **linenum** keyword causes line numbers to be displayed in the output. This option is useful for identifying a particular portion of a very large configuration.

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In some cases, you might see a difference in the duplex mode that is displayed between the **show interfaces** command and the **show running-config** command. The duplex mode that is displayed in the **show interfaces** command is the actual duplex mode that the interface is running. The **show interfaces** command shows the operating mode for an interface, while the **show running-config** command shows the configured mode for an interface.

The **show running-config** command output for an interface might display the duplex mode but no configuration for the speed. This output indicates that the interface speed is configured as auto and that the duplex mode shown becomes the operational setting once the speed is configured to something other than auto. With this configuration, it is possible that the operating duplex mode for that interface does not match the duplex mode that is shown with the **show running-config** command.

Examples

For Platforms Other than the Cisco 7600 Router

The following example applies shows the configuration for serial interface 1:

```
Router# show running-config interface serial 1

Building configuration...

Current configuration:
!
interface Serial1
 no ip address
 no ip directed-broadcast
 no ip route-cache
 no ip mroute-cache
 shutdown
end
```

The following example shows the configuration for Ethernet interface 0/0. Line numbers are displayed in the output.

```
Router# show running-config interface ethernet 0/0 linenum

Building configuration...

Current configuration : 104 bytes
 1 : !
 2 : interface Ethernet0/0
 3 :  ip address 10.4.2.63 255.255.255.0
 4 :  no ip route-cache
 5 :  no ip mroute-cache
 6 : end
```

The following example shows how to set line numbers in the command output and then use the output modifier to start the display at line 10:

```
Router# show running-config linenum | begin 10

   10 : boot-start-marker
   11 : boot-end-marker
   12 : !
   13 : no logging buffered
   14 : enable password #####
   15 : !
   16 : spe 1/0 1/7
   17 :  firmware location bootflash:mica-modem-pw.172.6.0.0.bin
   18 : !
   19 : !
   20 : resource-pool disable
   21 : !
   22 : no aaa new-model
   23 : ip subnet-zero
   24 : ip domain name cisco.com
   25 : ip name-server 172.16.11.48
   26 : ip name-server 172.16.2.133
   27 : !
   28 : !
   29 : isdn switch-type primary-5ess
   30 : !
   .
   .
   .
   126 : end
```

ATM Overhead Accounting Example

The following sample output for the **show running-config** command indicates that accounting is enabled for shaping. The BRAS-DSLAM encapsulation is qinq and the subscriber line encapsulation is snap-rbe based on the AAL5 service.

```
subscriber policy recording rules limit 64
no mpls traffic-eng auto-bw timers frequency 0
call rsvp-sync
!
controller T1 2/0
    framing sf
    linecode ami
!
controller T1 2/1
    framing sf
    linecode ami
!
!
policy-map unit-test
    class class-default
        shape average percent 10 account qinq aal5 snap-rbe
!
```

Cisco 7600 Series Router Example

This example shows how to display the module and status configuration for all modules:

```
Router# show running-config

Building configuration...

Current configuration:
!
version 12.0
service timestamps debug datetime localtime
service timestamps log datetime localtime
no service password-encryption
!
hostname Router
!
boot buffersize 126968
boot system flash slot0:halley
boot bootldr bootflash:c6msfc-boot-mz.120-6.5T.XE1.0.83.bin
enable password lab
!
clock timezone Pacific -8
clock summer-time Daylight recurring
redundancy
 main-cpu
  auto-sync standard
!
ip subnet-zero
!
ip multicast-routing
ip dvmrp route-limit 20000
ip cef
mls flow ip destination
mls flow ipx destination
cns event-service server
!
spanning-tree portfast bpdu-guard
spanning-tree uplinkfast
spanning-tree vlan 200 forward-time 21
port-channel load-balance sdip
```

```
!
!
!
 shutdown
!
!
.
.
.
```

Related Commands

Command	Description
bandwidth	Specifies or modifies the bandwidth allocated for a class belonging to a policy map, and enables ATM overhead accounting.
boot config	Specifies the device and filename of the configuration file from which the router configures itself during initialization (startup).
configure terminal	Enters global configuration mode.
copy running-config startup-config	Copies the running configuration to the startup configuration. (Command alias for the **copy system:running-config nvram:startup-config** command.)
shape	Shapes traffic to the indicated bit rate according to the algorithm specified, and enables ATM overhead accounting.
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, and displays ATM overhead accounting information, if configured.
show startup-config	Displays the contents of NVRAM (if present and valid) or displays the configuration file pointed to by the CONFIG_FILE environment variable. (Command alias for the **more:nvram startup-config** command.)

Feature Information for MQC—Traffic Shaping Overhead Accounting for ATM

Table 15 lists the release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 15 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 15 Feature Information for MQC—Traffic Shaping Overhead Accounting for ATM

Feature Name	Releases	Feature Information
MQC—Traffic Shaping Overhead Accounting for ATM	12.2(31)SB2 12.2(1st)SRC	The MQC—Traffic Shaping Overhead Accounting for ATM feature enables a broadband aggregation system (BRAS) to account for various encapsulation types when applying quality of service (QoS) functionality to packets. In 12.2(31)SB2, this feature was introduced and implemented on the Cisco 10000 series router for the PRE3. In 12.2(1st)SRC, support was added for the Cisco 7600 series router.