Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation

The Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation feature helps ensure voice quality by adjusting the rate of traffic and activating fragmentation on the basis of the presence of voice on the permanent virtual circuit (PVC). Frame Relay voice-adaptive traffic shaping enables a PVC to adjust the rate of traffic if packets are detected in the priority queue or if H.323 call setup signaling packets are detected. Frame Relay voice-adaptive fragmentation allows fragmentation to be activated when priority-queue or H.323 signaling packets are detected. When priority-queue traffic and signaling packets are not present, Frame Relay voice-adaptive fragmentation allows fragmentation to be deactivated.

Feature Specifications for Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation

Feature History	
Release	**Modification**
12.2(15)T	This feature was introduced.
Supported Platforms	
Cisco 1700 series, Cisco 2600 series, Cisco 3600 series, Cisco 3700 series, Cisco 4500, Cisco 7200 series, Cisco 7400 series, Cisco 7500 series (without Versatile Interface Processor.)	

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

Prerequisites for Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation

Prerequisites for Frame Relay Voice-Adaptive Traffic Shaping

- Traffic shaping and low latency queueing must be configured using the Modular QoS CLI (MQC).

Prerequisites for Frame Relay Voice-Adaptive Fragmentation

- End-to-end fragmentation must be configured in a map class or on the interface.
- Frame Relay traffic shaping or traffic shaping using the MQC must be configured. If end-to-end fragmentation is configured on the interface, traffic shaping must be configured using the MQC.
- Low latency queueing must be configured.
- End-to-end fragmentation must be configured on the peer router. Although the peer router may not see the expected fragmented packets from the router doing voice-adaptive fragmentation, the peer will be able to handle large unfragmented packets in addition to fragmented packets.

Restrictions for Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation

The feature supports FRF.12 fragmentation only. Neither FRF.11 Annex C nor Cisco proprietary fragmentation is supported.

Information About Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation

Benefits of Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation

Before the introduction of this new feature, Frame Relay adaptive shaping could be used to reduce the sending rate when a network was congested. Because the adaptive shaping mechanism was triggered by network congestion, voice traffic might already have been delayed by the time the sending rate was reduced. The Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation feature helps to ensure voice quality by adjusting the rate of traffic based on the presence of voice on the PVC.

Frame Relay voice-adaptive traffic shaping and fragmentation

- Prevents delay of voice packets when network congestion occurs by reducing the traffic rate to the minimum committed information rate (minCIR) and turning on fragmentation when voice packets are present on a PVC.
- Maximizes utilization of the PVC by increasing the traffic rate to committed information rate (CIR) when voice packets are not present.
- Reduces CPU utilization by turning off fragmentation when there are no voice packets present.

Frame Relay Voice-Adaptive Traffic Shaping

Frame Relay voice-adaptive traffic shaping enables a router to reduce the PVC sending rate to the minCIR whenever packets (usually voice) are detected in the low latency queueing priority queue or H.323 call setup signaling packets are present. When there are no packets in the priority queue and signaling packets are not present for a configured period of time, the router increases the PVC sending rate from minCIR to CIR to maximize throughput.

Note Although the priority queue is generally used for voice traffic, Frame Relay voice-adaptive traffic shaping will respond to any packets (voice or data) in the priority queue.

Frame Relay voice-adaptive traffic shaping can be used at the same time as other types of adaptive traffic shaping. For example, if both Frame Relay voice-adaptive traffic shaping and adaptive shaping based on interface congestion are configured, the router will reduce the sending rate to minCIR if there are packets in the priority queue or the interface queue size exceeds the configured threshold.

Frame Relay voice-adaptive traffic shaping can be used in conjunction with or independently of voice-adaptive fragmentation.

Frame Relay Voice-Adaptive Fragmentation

Frame Relay voice-adaptive fragmentation enables a router to fragment large data packets whenever packets (usually voice) are detected in the low latency queueing priority queue or H.323 call setup signaling packets are present. When there are no packets in the priority queue for a configured period of time and signaling packets are not present, fragmentation is stopped.

Note Although the priority queue is generally used for voice traffic, Frame Relay voice-adaptive fragmentation will respond to any packets (voice or data) in the priority queue.

Frame Relay voice-adaptive fragmentation can be used in conjunction with or independent of voice-adaptive traffic shaping.

To use voice-adaptive fragmentation, you must also have end-to-end fragmentation configured in a map class or on the interface.

How to Configure Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation

The following tasks describe how to configure low latency queueing in addition to Frame Relay voice-adaptive traffic shaping and fragmentation.

Note The following tasks enable both Frame Relay voice-adaptive traffic shaping and fragmentation. These two features can also be used separately. If you choose to use voice-adaptive fragmentation by itself, you can configure either MQC traffic shaping (as in the tasks that follow) or Frame Relay traffic shaping. If you use Frame Relay traffic shaping, end-to-end fragmentation must be configured in a map class.

Configuring Class Policy for the Priority Queue and Bandwidth Queues

Perform this task to configure a policy map for the priority class and other classes.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **policy-map** *policy-map*
4. **class** *class-name*
5. **priority** *bandwidth-kbps*
6. **exit**
7. **class** *class-name*
8. **bandwidth** *bandwidth-kbps*
9. **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* **Example:** `Router(config)# policy-map FR-VATS`	Specifies the name of the policy map to be created or modified. • Use this command to define the queueing policy for the priority queue.
Step 4	**class** *class-name* **Example:** `Router(config-pmap)# class VOICE`	Specifies the name of a class to be created and included in the service policy. • The class name that you specify in the policy map defines the characteristics for that class and its match criteria as configured using the **class-map** command.
Step 5	**priority** *bandwidth-kbps* **Example:** `Router(config-pmap-c)# priority 10`	Creates a strict priority class and specifies the amount of bandwidth, in kbps, to be assigned to the class.
Step 6	**exit** **Example:** `Router(config-pmap-c)# exit`	Returns to policy map configuration mode.
Step 7	**class** *class-name* **Example:** `Router(config-pmap)# class DATA`	Specifies the name of a class to be created and included in the service policy. • The class name that you specify in the policy map defines the characteristics for that class and its match criteria as configured using the **class-map** command.
Step 8	**bandwidth** *bandwidth-kbps* **Example:** `Router(config-pmap-c)# bandwidth 10`	Specifies the amount of bandwidth to be assigned to the class, in kbps or as a percentage of the available bandwidth. Bandwidth must be specified in kbps or as a percentage consistently across classes. (Bandwidth of the priority queue must be specified in kbps.)
Step 9	**end** **Example:** `Router(config-pmap-c)# end`	Exits to privileged EXEC mode.

Configuring Frame Relay Voice-Adaptive Traffic Shaping Using the Class-Default Class

Perform the following task to configure the shaping policy, including Frame Relay voice-adaptive traffic shaping, in the class-default class.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **policy-map** *policy-map*
4. **class class-default**
5. **shape** [**average** | **peak**] *mean-rate* [[*burst-size*] [*excess-burst-size*]]
6. **shape adaptive** *mean-rate-lower-bound*
7. **shape fr-voice-adapt** [**deactivation** *seconds*]
8. **service-policy** *policy-map-name*
9. **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* **Example:** `Router(config)# policy-map SHAPE`	Specifies the name of the policy map to be created or modified. • Use this command to define the shaping policy.
Step 4	**class class-default** **Example:** `Router(config-pmap)# class class-default`	Specifies the default class so that you can configure or modify its policy.
Step 5	**shape** [**average** | **peak**] *mean-rate* [[*burst-size*] [*excess-burst-size*]] **Example:** `Router(config-pmap-c)# shape average 60000`	Shapes traffic to the indicated bit rate according to the algorithm specified.

	Command or Action	Purpose
Step 6	**shape adaptive** *mean-rate-lower-bound* **Example:** `Router(config-pmap-c)# shape adaptive 30000`	(Optional) Configures a Frame Relay interface or a point-to-point subinterface to estimate the available bandwidth while traffic shaping is active.
Step 7	**shape fr-voice-adapt** [**deactivation** *seconds*] **Example:** `Router(config-pmap-c)# shape fr-voice-adapt deactivation 10`	Enables Frame Relay voice-adaptive traffic shaping.
Step 8	**Service-policy** *policy-map-name* **Example:** `Router(config-pmap-c)#service-policy FR-VATS`	Specifies the name of a policy map to be used as a matching criterion (for nesting traffic policies [hierarchical traffic policies] within one another). • Use this command to attach the policy map for the priority queue and bandwidth queues (the child policies) to the shaping policy (the parent policy).
Step 9	**end**	(Optional) Exits to privileged EXEC mode.

Configuring a Map Class for Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation

Perform the following task to configure a map class for Frame Relay voice-adaptive traffic shaping and fragmentation.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **map-class frame-relay** *map-class-name*
4. **frame-relay fragment** *fragment_size*
5. **service-policy output** *policy-map-name*
6. **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.

	Command or Action	Purpose
Step 3	**map-class frame-relay** *map-class-name* **Example:** `Router(config)# map-class frame-relay VOICE-CLASS`	Specifies the name of a Frame Relay map class that is to be created or modified.
Step 4	**frame-relay fragment** *fragment_size* **Example:** `Router(config-map-class)# frame-relay fragment 80`	Enables Frame Relay fragmentation. **Note** For voice-adaptive fragmentation to work, fragmentation must be enabled here in a map class, or it can be configured directly on the interface.
Step 5	**service-policy output** *policy-map-name* **Example:** `Router(config-map-class)# service-policy output SHAPE`	Attaches a policy map to an output interface, to be used as the service policy for that interface. • Use this command to attach the shaping policy to the map class.
Step 6	**end** **Example:** `Router(config-map-class)# end`	Exits to privileged EXEC mode.

Enabling Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation on the Interface

Perform the following task to enable Frame Relay voice-adaptive traffic shaping and fragmentation on the interface.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **encapsulation frame-relay**
5. **frame-relay fragmentation voice-adaptive** [**deactivation** *seconds*]
6. **frame-relay fragment** *fragment-size* **end-to-end**
7. **frame-relay interface-dlci** *dlci* [**ietf** | **cisco**] [**voice-cir** *cir*]
8. **class** *name*
9. **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	**interface** *type number* **Example:** `Router(config)# interface serial0`	Specifies the interface to be configured and enters interface configuration mode.
Step 4	**encapsulation frame-relay** **Example:** `Router(config-if)# encapsulation frame-relay`	Enables Frame Relay encapsulation.
Step 5	**frame-relay fragmentation voice-adaptive** [**deactivation** *seconds*] **Example:** `Router(config-if)# frame-relay fragmentation voice-adaptive deactivation 50`	Enables Frame Relay voice-adaptive fragmentation.
Step 6	**frame-relay fragment** *fragment-size* **end-to-end** **Example:** `Router(config-if)# frame-relay fragment 80 end-to-end`	Enables Frame Relay fragmentation on an interface. **Note** For voice-adaptive fragmentation to work, fragmentation must be enabled here on the interface, or it can be configured in a map class. • When fragmentation is enabled on an interface, all PVCs on the main interface and its subinterfaces will have fragmentation enabled with the same configured fragment size. • To maintain low latency and low jitter for priority queue traffic, configure the fragment size to be greater than the largest high-priority frame that would be expected.
Step 7	**frame-relay interface-dlci** *dlci* [**ietf** | **cisco**] [**voice-cir** *cir*] **Example:** `Router(config-if)#`	Specifies a PVC to be configured.

	Command or Action	Purpose
Step 8	**class** *name* **Example:** `Router(config-fr-dlci)#`	Associates a map class with a specified data-link connection identifier (DLCI). • Use this command to assign the map class that was configured with Frame Relay voice-adaptive traffic shaping to the PVC.
Step 9	**end** **Example:** `Router(config-fr-dlci)# end`	Exits to privileged EXEC mode.
Step 10		

Verifying Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation

Perform this task to verify the configuration and operation of Frame Relay voice-adaptive traffic shaping and fragmentation.

SUMMARY STEPS

1. **enable**
2. **show policy-map** [*policy-map*]
3. **show policy-map interface** *interface-name* [**dlci** *dlci*] [**input** | **output**]
4. **show frame-relay pvc** [**interface** *interface*] [*dlci*] [**64-bit**]

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*] **Example:** `Router# show policy-map`	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.

	Command or Action	Purpose
Step 3	**show policy-map interface** *interface-name* [**dlci** *dlci*] [**input** | **output**] **Example:** `Router# show policy interface Serial3/1.1`	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 permanent virtual circuit (PVC) on the interface.
Step 4	**show frame-relay pvc** [**interface** *interface*] [*dlci*] [**64-bit**] **Example:** `Router# show frame-relay pvc 202`	Displays statistics about permanent virtual circuits (PVCs) for Frame Relay interface.

Configuration Examples for Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation

Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation Examples

The following examples show the configuration of Frame Relay voice-adaptive traffic shaping and fragmentation. The first example shows end-to-end fragmentation configured in a map class that is associated with PVC 100. In the second example, end-to-end fragmentation is configured directly on the interface.

With both example configurations, priority-queue packets or H.323 call setup signaling packets destined for PVC 100 will result in the reduction of the sending rate from CIR to minCIR and the activation of FRF.12 end-to-end fragmentation. If signaling packets and priority-queue packets are not detected for 50 seconds, the sending rate will increase to CIR and fragmentation will be deactivated.

Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation with End-to-End Fragmentation Configured in a Map Class

```
interface serial0
 encapsulation frame-relay
 frame-relay fragmentation voice-adaptive deactivation 50
 frame-relay interface-dlci 100
  class voice_adaptive_class
!
map-class frame-relay voice_adaptive_class
 frame-relay fragment 80
 service-policy output shape

class-map match-all voice
 match access-group 102
class-map match-all data
 match access-group 101

policy-map vats
 class voice
  priority 10
 class data
```

```
  bandwidth 10

policy-map shape
 class class-default
  shape average 60000
  shape adaptive 30000
  shape fr-voice-adapt deactivation 50
  service-policy vats
```

Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation with End-to-End Fragmentation Configured on the Interface

```
interface serial0
 encapsulation frame-relay
 frame-relay fragmentation voice-adaptive deactivation 50
 frame-relay interface-dlci 100
  class voice_adaptive_class
  frame-relay fragment 80 end-to-end
!
map-class frame-relay voice_adaptive_class
 service-policy output shape

class-map match-all voice
 match access-group 102
class-map match-all data
 match access-group 101

policy-map vats
 class voice
  priority 10
 class data
  bandwidth 10

policy-map shape
 class class-default
  shape average 60000
  shape adaptive 30000
  shape fr-voice-adapt deactivation 50
  service-policy vats
```

Verifying Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation Example

Sample Output for the show policy-map Command

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 at 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
```

Sample Output for the show policy interface Command

The following sample output shows that Frame Relay voice-adaptive traffic shaping is active and has 29 seconds left on the deactivation timer. This means that the current sending rate on DLCI 201 is minCIR, but if no voice packets are detected for 29 seconds, the sending rate will increase to CIR.

```
Router# show policy interface Serial3/1.1

 Serial3/1.1:DLCI 201 -

  Service-policy output:MQC-SHAPE-LLQ1

    Class-map:class-default (match-any)
      1434 packets, 148751 bytes
      30 second offered rate 14000 bps, drop rate 0 bps
      Match:any
      Traffic Shaping
           Target/Average   Byte   Sustain   Excess    Interval  Increment
             Rate           Limit  bits/int  bits/int  (ms)      (bytes)
            63000/63000     1890   7560      7560      120       945

        Adapt  Queue     Packets   Bytes     Packets   Bytes     Shaping
        Active Depth                         Delayed   Delayed   Active
        BECN   0         1434      162991    26        2704      yes
        Voice Adaptive Shaping active, time left 29 secs

      Service-policy :VSD1

        Class-map:VOICE1 (match-all)
          9 packets, 621 bytes
          30 second offered rate 0 bps, drop rate 0 bps
          Match:access-group 111
          Match:not access-group 112
          Queueing
            Strict Priority
            Output Queue:Conversation 24
            Bandwidth 10 (kbps) Burst 250 (Bytes)
            (pkts matched/bytes matched) 18/1242
            (total drops/bytes drops) 0/0

        Class-map:SIGNALS1 (match-all)
          0 packets, 0 bytes
          30 second offered rate 0 bps, drop rate 0 bps
          Match:access-group 112
          Queueing
            Output Queue:Conversation 25
            Bandwidth 8 (kbps) Max Threshold 64 (packets)
            (pkts matched/bytes matched) 0/0
        (depth/total drops/no-buffer drops) 0/0/0

        Class-map:DATA1 (match-all)
          1424 packets, 148096 bytes
          30 second offered rate 14000 bps, drop rate 0 bps
          Match:access-group 113
          Queueing
```

```
    Output Queue:Conversation 26
    Bandwidth 15 (kbps) Max Threshold 64 (packets)
    (pkts matched/bytes matched) 1442/149968
(depth/total drops/no-buffer drops) 0/0/0

Class-map:class-default (match-any)
  1 packets, 34 bytes
  30 second offered rate 0 bps, drop rate 0 bps
  Match:any
```

Sample Output for the show frame-relay pvc Command

The following sample output indicates that Frame Relay voice-adaptive fragmentation is active on DLCI 202 and there are 29 seconds left on the deactivation timer. If no packets are detected in the priority queue and no H.323 signaling packets are detected in the next 29 seconds, fragmentation will stop.

```
Router# show frame-relay pvc 202

PVC Statistics for interface Serial3/1 (Frame Relay DTE)

DLCI = 202, DLCI USAGE = LOCAL, PVC STATUS = STATIC, INTERFACE = Serial3/1.2

  input pkts 0             output pkts 479          in bytes 0
  out bytes 51226          dropped pkts 0           in pkts dropped 0
  out pkts dropped 0                 out bytes dropped 0
  in FECN pkts 0           in BECN pkts 0           out FECN pkts 0
  out BECN pkts 0          in DE pkts 0             out DE pkts 0
  out bcast pkts 0         out bcast bytes 0
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 5000 bits/sec, 5 packets/sec
  pvc create time 00:23:36, last time pvc status changed 00:23:31
  fragment type end-to-end fragment size 80 adaptive active, time left 29 secs
```

Additional References

The following sections provide additional information related to Frame Relay voice-adaptive traffic shaping and fragmentation:

Related Documents

Related Topic	Document Title
Traffic shaping, low latency queueing for Frame Relay, and Modular QoS CLI configuration tasks	*Cisco IOS Quality of Service Configuration Guide*, Release 12.2
Traffic shaping, low latency queueing for Frame Relay, and Modular QoS CLI commands	*Cisco IOS Quality of Service Command Reference*, Release 12.2 T
Frame Relay fragmentation configuration tasks	*Cisco IOS Wide-Area Networking Configuration Guide*, Release 12.2

Related Topic	Document Title
Frame Relay fragmentation commands	*Cisco IOS Wide-Area Networking Command Reference*, Release 12.2 T
Frame Relay interface queueing and fragmentation configuration tasks and commands	"Frame Relay Queueing and Fragmentation at the Interface," Cisco IOS Release 12.2(13)T feature module
Adaptive Frame Relay traffic shaping for interface congestion configuration tasks and commands	"Adaptive Frame Relay Traffic Shaping for Interface Congestion," Cisco IOS Release 12.2(4)T feature module

Standards

Standards	Title
No new or modified standards are supported by this feature. 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. Support for existing MIBs has not been modified by this feature.	To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at the following URL: http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:

http://tools.cisco.com/ITDIT/MIBS/servlet/index

If Cisco MIB Locator does not support the MIB information that you need, you can also obtain a list of supported MIBs and download MIBs from the Cisco MIBs page at the following URL:

http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

To access Cisco MIB Locator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

http://www.cisco.com/register

RFCs

RFCs	Title
No new or modified RFCs are supported by this feature. Support for existing RFCs has not been modified by this feature.	—

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 new and modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.2 T command reference publications.

New Commands

- **frame-relay fragmentation voice-adaptive**
- **shape fr-voice-adapt**

Modified Commands

- **show frame-relay pvc**
- **show policy-map**
- **show policy-map interface**

frame-relay fragmentation voice-adaptive

To enable voice-adaptive Frame Relay fragmentation, use the **frame-relay fragmentation voice-adaptive** command in interface configuration mode. To disable voice-adaptive Frame Relay fragmentation, use the **no** form of this command.

frame-relay fragmentation voice-adaptive [**deactivation** *seconds*]

no frame-relay fragmentation voice-adaptive

Syntax Description

deactivation *seconds*	(Optional) Number of seconds that must elapse after the last voice packet is transmitted before fragmentation is deactivated. The range is from 1 to 10000.

Defaults

Voice-adaptive Frame Relay fragmentation is not enabled.
Seconds: 30

Command Modes

Interface configuration

Command History

Release	Modification
12.2(15)T	This command was introduced.

Usage Guidelines

Frame Relay voice-adaptive fragmentation can be used in conjunction with Frame Relay voice-adaptive traffic shaping to reduce network congestion and improve voice transmission quality.

The **frame-relay fragmentation voice-adaptive** command can be used only on main interfaces. This command is not supported on subinterfaces.

Frame Relay voice-adaptive fragmentation enables a router to fragment large packets whenever packets (usually voice) are detected in the low latency queueing priority queue or H.323 call setup signaling packets are present. When there are no packets in priority queue for a configured period of time and signaling packets are not present, fragmentation is stopped.

Note Although the priority queue is generally used for voice traffic, Frame Relay voice-adaptive fragmentation will respond to any packets (voice or data) in the priority queue.

Note the following prerequisites for Frame Relay voice-adaptive fragmentation:

- End-to-end fragmentation must be configured in a map class by using the **frame-relay fragment** command or on the interface by using the **frame-relay fragment end-to-end** command.
- Frame Relay traffic shaping or traffic shaping using the Modular QoS CLI (MQC) must be configured. If end-to-end fragmentation is configured on the interface, traffic shaping using the MQC must be configured.
- Low latency queueing must be configured.

Frame Relay voice-adaptive fragmentation supports FRF.12 fragmentation only. Neither FRF.11 Annex C nor Cisco proprietary fragmentation is supported.

Examples

The following examples show the configuration of Frame Relay voice-adaptive traffic shaping and fragmentation. The first example shows end-to-end fragmentation configured in a map class that is associated with PVC 100. In the second example, end-to-end fragmentation is configured directly on the interface.

With both example configurations, priority-queue packets or H.323 call setup signaling packets destined for PVC 100 will result in the reduction of the sending rate from CIR to minCIR and the activation of FRF.12 end-to-end fragmentation. If signaling packets and priority-queue packets are not detected for 50 seconds, the sending rate will increase to CIR and fragmentation will be deactivated.

Frame Relay Voice-Adaptive Fragmentation with End-to-End Fragmentation Configured in a Map Class

```
interface serial0
 encapsulation frame-relay
 frame-relay fragmentation voice-adaptive deactivation 50
 frame-relay interface-dlci 100
  class voice_adaptive_class
!
map-class frame-relay voice_adaptive_class
 frame-relay fair-queue
 frame-relay fragment 80
 service-policy output shape
```

Frame Relay Voice-Adaptive Fragmentation with End-to-End Fragmentation Configured on the Interface

```
interface serial0
 encapsulation frame-relay
 frame-relay fragmentation voice-adaptive deactivation 50
 frame-relay fragment 80 end-to-end
 frame-relay interface-dlci 100
  class voice_adaptive_class
```

Related Commands

Command	Description
frame-relay fragment	Enables fragmentation of Frame Relay frames for a Frame Relay map class.
frame-relay fragment end-to-end	Enables fragmentation of Frame Relay frames on an interface.
shape fr-voice-adapt	Enables Frame Relay voice-adaptive traffic shaping.
show frame-relay pvc	Displays statistics about PVCs for Frame Relay interfaces.

shape fr-voice-adapt

To enable Frame Relay voice-adaptive traffic shaping, use the **shape fr-voice-adapt** command in policy-map class configuration mode. To disable Frame Relay voice-adaptive traffic shaping, use the **no** form of this command.

shape fr-voice-adapt [**deactivation** *seconds*]

no shape fr-voice-adapt

Syntax Description

deactivation *seconds*	(Optional) Number of seconds that must elapse after the last voice packet is transmitted before the sending rate is increased to the committed information rate (CIR). The range is from 1 to 10000.

Defaults

Frame Relay voice-adaptive traffic shaping is not enabled.
Seconds: 30

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.2(15)T	This command was introduced.

Usage Guidelines

Frame Relay voice-adaptive traffic shaping enables a router to reduce the permanent virtual circuit (PVC) sending rate to the minimum CIR (minCIR) whenever packets (usually voice) are detected in the low latency queueing priority queue or H.323 call setup signaling packets are present. When there are no packets in priority queue and signaling packets are not present for a configured period of time, the router increases the PVC sending rate from minCIR to CIR to maximize throughput.

The **shape fr-voice-adapt** command can be configured only in the class-default class. If you configure the **shape fr-voice-adapt** command in another class, the associated Frame Relay map class will be rejected when you attach it to the interface.

Frame Relay voice-adaptive traffic shaping can be used with other types of adaptive traffic shaping. For example, when both voice-adaptive traffic shaping and adaptive shaping based on interface congestion are configured, the sending rate will change to minCIR if there are packets in the priority queue or the interface queue size exceeds the configured threshold.

Note Although the priority queue is generally used for voice traffic, Frame Relay voice-adaptive traffic shaping will respond to any packets (voice or data) in the priority queue.

In order to use Frame Relay voice-adaptive traffic shaping, you must have low latency queueing and traffic shaping configured using the Modular QoS CLI.

Examples

The following example shows the configuration of Frame Relay voice-adaptive traffic shaping and fragmentation. With this configuration, priority- queue packets or H.323 call setup signaling packets destined for PVC 100 will result in the reduction of the sending rate from CIR to minCIR and the activation of FRF.12 end-to-end fragmentation. If signaling packets and priority-queue packets are not detected for 50 seconds, the sending rate will increase to CIR and fragmentation will be turned off.

```
interface serial0
 encapsulation frame-relay
 frame-relay fragmentation voice-adaptive deactivation 50
 frame-relay fragment 80 end-to-end
 frame-relay interface-dlci 100
  class voice_adaptive_class
!
map-class frame-relay voice_adaptive_class
 frame-relay fair-queue
 service-policy output shape

class-map match-all voice
 match access-group 102
class-map match-all data
 match access-group 101

policy-map vats
 class voice
  priority 10
 class data
  bandwidth 10

policy-map shape
 class class-default
  shape average 60000
  shape adaptive 30000
  shape fr-voice-adapt deactivation 50
  service-policy vats
```

Related Commands

Command	Description
frame-relay fragmentation voice-adaptive	Enables voice-adaptive Frame Relay fragmentation.
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 frame-relay pvc

To display statistics about permanent virtual circuits (PVCs) for Frame Relay interfaces, use the **show frame-relay pvc** command in privileged EXEC mode.

show frame-relay pvc [**interface** *interface*] [*dlci*] [**64-bit**]

Syntax Description

interface	(Optional) Indicates a specific interface for which PVC information will be displayed.
interface	(Optional) Interface number containing the data-link connection identifiers (DLCIs) for which you wish to display PVC information.
dlci	(Optional) A specific DLCI number used on the interface. Statistics for the specified PVC are displayed when a DLCI is also specified.
64-bit	(Optional) Displays 64-bit counter statistics.

Command Modes

Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.
12.0(1)T	This command was modified to display statistics about virtual access interfaces used for PPP connections over Frame Relay.
12.0(3)XG	This command was modified to include the fragmentation type and size associated with a particular PVC when fragmentation is enabled on the PVC.
12.0(4)T	This command was modified to include the fragmentation type and size associated with a particular PVC when fragmentation is enabled on the PVC.
12.0(5)T	This command was modified to include information on the special voice queue that is created using the **queue** keyword of the **frame-relay voice bandwidth** command.
12.1(2)T	This command was modified to display the following information: • Details about the policy map attached to a specific PVC. • The priority configured for PVCs within Frame Relay PVC interface priority queueing. • Details about Frame Relay traffic shaping and policing on switched PVCs.
12.0(12)S	This command was modified to display reasons for packet drops and complete status information for switched NNI PVCs.
12.1(5)T	This command was modified to display the following information: • The number of packets in the post-hardware-compression queue. • The reasons for packet drops and complete status information for switched network-to-network PVCs.
12.0(17)S	This command was modified to display the number of outgoing packets dropped and the number of outgoing bytes dropped because of QoS policy.

Release	Modification
12.2(4)T	The **64-bit** keyword was added.
12.2(11)T	This command was modified to display the number of outgoing packets dropped and the number of outgoing bytes dropped because of QoS policy.
12.2(13)T	This command was modified to display Frame Relay PVC bundle information.
12.2(15)T	This command was modified to support display of Frame Relay voice-adaptive fragmentation information.

Usage Guidelines

Use this command to monitor the PPP link control protocol (LCP) state as being open with an UP state or closed with a DOWN state.

When "vofr" or "vofr cisco" has been configured on the PVC, and a voice bandwidth has been allocated to the class associated with this PVC, configured voice bandwidth and used voice bandwidth are also displayed.

Statistics Reporting

To obtain statistics about PVCs on all Frame Relay interfaces, use this command with no arguments.

To obtain statistics about a PVC that include policy-map configuration or the priority configured for that PVC, use this command with the *dlci* argument.

Per-VC counters are not incremented at all when either autonomous or silicon switching engine (SSE) switching is configured; therefore, PVC values will be inaccurate if either switching method is used.

You can change the period of time over which a set of data is used for computing load statistics. If you decrease the load interval, the average statistics are computed over a shorter period of time and are more responsive to bursts of traffic. To change the length of time for which a set of data is used to compute load statistics for a PVC, use the **load-interval** command in Frame-Relay DLCI configuration mode.

Traffic Shaping

Congestion control mechanisms are currently not supported on terminated PVCs nor on PVCs over ISDN. Where congestion control mechanisms are supported, the switch passes forward explicit congestion notification (FECN) bits, backward explicit congestion notification (BECN) bits, and discard eligible (DE) bits unchanged from entry points to exit points in the network.

Examples

The various displays in this section show sample output for a variety of PVCs. Some of the PVCs carry data only; some carry a combination of voice and data.

Frame Relay Generic Configuration Example

The following sample output shows a generic Frame Relay configuration on DLCI 100:

```
Router# show frame-relay pvc 100

PVC Statistics for interface Serial4/0/1:0 (Frame Relay DTE)

DLCI = 100, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE (EEK UP), INTERFACE = Serial4/0/1:0.1

  input pkts 4360          output pkts 4361         in bytes 146364
  out bytes 130252         dropped pkts 3735        in pkts dropped 0
  out pkts dropped 3735              out bytes dropped 1919790
  late-dropped out pkts 3735         late-dropped out bytes 1919790
```

```
  in FECN pkts 0           in BECN pkts 0           out FECN pkts 0
  out BECN pkts 0          in DE pkts 0             out DE pkts 0
  out bcast pkts 337       out bcast bytes 102084
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
  pvc create time 05:34:06, last time pvc status changed 05:33:38
```

Frame-Relay Voice-Adaptive Fragmentation Example

The following sample output indicates that Frame Relay voice-adaptive fragmentation is active on DLCI 202 and there are 29 seconds left on the deactivation timer. If no voice packets are detected in the next 29 seconds, Frame Relay voice-adaptive fragmentation will become inactive.

```
Router# show frame-relay pvc 202

PVC Statistics for interface Serial3/1 (Frame Relay DTE)

DLCI = 202, DLCI USAGE = LOCAL, PVC STATUS = STATIC, INTERFACE = Serial3/1.2

  input pkts 0             output pkts 479          in bytes 0
  out bytes 51226          dropped pkts 0           in pkts dropped 0
  out pkts dropped 0                 out bytes dropped 0
  in FECN pkts 0           in BECN pkts 0           out FECN pkts 0
  out BECN pkts 0          in DE pkts 0             out DE pkts 0
  out bcast pkts 0         out bcast bytes 0
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 5000 bits/sec, 5 packets/sec
  pvc create time 00:23:36, last time pvc status changed 00:23:31
  fragment type end-to-end fragment size 80 adaptive active, time left 29 secs
```

Frame Relay 64-Bit Counter Example

The following sample output displays the Frame Relay 64-bit counters:

```
Router# show frame-relay pvc 35 64-bit

DLCI = 35, INTERFACE = Serial0/0
  input pkts 0                       output pkts 0
  in bytes 0                         out bytes 0
```

Frame Relay Fragmentation and Hardware Compression Example

The following is sample output for the **show frame-relay pvc** command for a PVC configured with Cisco-proprietary fragmentation and hardware compression:

```
Router# show frame-relay pvc 110

PVC Statistics for interface Serial0/0 (Frame Relay DTE)

DLCI = 110, DLCI USAGE = LOCAL, PVC STATUS = STATIC, INTERFACE = Serial0/0

  input pkts 409           output pkts 409          in bytes 3752
  out bytes 4560           dropped pkts 1           in FECN pkts 0
  in BECN pkts 0           out FECN pkts 0          out BECN pkts 0
  in DE pkts 0             out DE pkts 0
  out bcast pkts 0          out bcast bytes 0
  pvc create time 3d00h, last time pvc status changed 2d22h
  Service type VoFR-cisco
   Voice Queueing Stats: 0/100/0 (size/max/dropped)
  Post h/w compression queue: 0
  Current fair queue configuration:
   Discard     Dynamic      Reserved
   threshold   queue count  queue count
   64          16           2
  Output queue size 0/max total 600/drops 0
```

```
  configured voice bandwidth 16000, used voice bandwidth 0
  fragment type VoFR-cisco         fragment size 100
  cir 64000     bc   640       be 0         limit 80     interval 10
  mincir 32000     byte increment 80    BECN response no
  frags 428       bytes 4810      frags delayed 24        bytes delayed 770
  shaping inactive
  traffic shaping drops 0
  ip rtp priority parameters 16000 32000 20000
```

Switched PVC Example

The following is sample output from the **show frame-relay pvc** command for a switched Frame Relay PVC. This output displays detailed information about Network-to-Network Interface (NNI) status and why packets were dropped from switched PVCs.

```
Router# show frame-relay pvc

 PVC Statistics for interface Serial2/2 (Frame Relay NNI)

 DLCI = 16, DLCI USAGE = SWITCHED, PVC STATUS = INACTIVE, INTERFACE = Serial2/2
 LOCAL PVC STATUS = INACTIVE, NNI PVC STATUS = INACTIVE

   input pkts 0             output pkts 0            in bytes 0
   out bytes 0              dropped pkts 0           in FECN pkts 0
   in BECN pkts 0           out FECN pkts 0          out BECN pkts 0
   in DE pkts 0             out DE pkts 0
   out bcast pkts 0         out bcast bytes 0
   switched pkts0
   Detailed packet drop counters:
   no out intf 0            out intf down 0          no out PVC 0
   in PVC down 0            out PVC down 0           pkt too big 0
   shaping Q full 0         pkt above DE 0           policing drop 0
   pvc create time 00:00:07, last time pvc status changed 00:00:07
```

Frame Relay Congestion Management on a Switched PVC Example

The following is sample output from the **show frame-relay pvc** command that shows the statistics for a switched PVC on which Frame Relay congestion management is configured:

```
Router# show frame-relay pvc 200

PVC Statistics for interface Serial3/0 (Frame Relay DTE)

DLCI = 200, DLCI USAGE = SWITCHED, PVC STATUS = ACTIVE, INTERFACE = Serial3/0

  input pkts 341           output pkts 390          in bytes 341000
  out bytes 390000         dropped pkts 0           in FECN pkts 0
  in BECN pkts 0           out FECN pkts 0          out BECN pkts 0
  in DE pkts 0             out DE pkts 390
  out bcast pkts 0          out bcast bytes 0            Num Pkts Switched 341

  pvc create time 00:10:35, last time pvc status changed 00:10:06
  Congestion DE threshold 50
  shaping active
  cir 56000     bc 7000      be 0         byte limit 875    interval 125
  mincir 28000     byte increment 875   BECN response no
  pkts 346       bytes 346000    pkts delayed 339       bytes delayed 339000
  traffic shaping drops 0
  Queueing strategy:fifo
  Output queue 48/100, 0 drop, 339 dequeued
```

Frame Relay Policing on a Switched PVC Example

The following is sample output from the **show frame-relay pvc** command that shows the statistics for a switched PVC on which Frame Relay policing is configured:

```
Router# show frame-relay pvc 100

PVC Statistics for interface Serial1/0 (Frame Relay DCE)

DLCI = 100, DLCI USAGE = SWITCHED, PVC STATUS = ACTIVE, INTERFACE = Serial1/0

  input pkts 1260          output pkts 0            in bytes 1260000
  out bytes 0              dropped pkts 0           in FECN pkts 0
  in BECN pkts 0           out FECN pkts 0          out BECN pkts 0
  in DE pkts 0             out DE pkts 0
  out bcast pkts 0          out bcast bytes 0            Num Pkts Switched 1260

  pvc create time 00:03:57, last time pvc status changed 00:03:19
  policing enabled, 180 pkts marked DE
  policing Bc  6000        policing Be  6000        policing Tc  125 (msec)
  in Bc pkts   1080        in Be pkts   180         in xs pkts   0
  in Bc bytes  1080000     in Be bytes  180000      in xs bytes  0
```

Frame Relay PVC Priority Queueing Example

The following is sample output for a PVC that has been assigned high priority:

```
Router# show frame-relay pvc 100

PVC Statistics for interface Serial0 (Frame Relay DTE)

DLCI = 100, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial0

  input pkts 0             output pkts 0            in bytes 0
  out bytes 0              dropped pkts 0           in FECN pkts 0
  in BECN pkts 0           out FECN pkts 0          out BECN pkts 0
  in DE pkts 0             out DE pkts 0
  out bcast pkts 0          out bcast bytes 0
  pvc create time 00:00:59, last time pvc status changed 00:00:33
  priority high
```

Low Latency Queueing for Frame Relay Example

The following is sample output from the **show frame-relay pvc** command for a PVC shaped to a 64K committed information rate (CIR) with fragmentation. A policy map is attached to the PVC and is configured with a priority class for voice, two data classes for IP precedence traffic, and a default class for best-effort traffic. Weighted Random Early Detection (WRED) is used as the drop policy on one of the data classes.

```
Router# show frame-relay pvc 100

PVC Statistics for interface Serial1/0 (Frame Relay DTE)

DLCI = 100, DLCI USAGE = LOCAL, PVC STATUS = INACTIVE, INTERFACE = Serial1/0.1

  input pkts 0             output pkts 0            in bytes 0
  out bytes 0              dropped pkts 0           in FECN pkts 0
  in BECN pkts 0           out FECN pkts 0          out BECN pkts 0
  in DE pkts 0             out DE pkts 0
  out bcast pkts 0          out bcast bytes 0
  pvc create time 00:00:42, last time pvc status changed 00:00:42
  service policy mypolicy
 Class voice
  Weighted Fair Queueing
      Strict Priority
```

```
     Output Queue: Conversation 72
       Bandwidth 16 (kbps) Packets Matched 0
       (pkts discards/bytes discards) 0/0
 Class immediate-data
  Weighted Fair Queueing
     Output Queue: Conversation 73
       Bandwidth 60 (%) Packets Matched 0
       (pkts discards/bytes discards/tail drops) 0/0/0
       mean queue depth: 0
       drops: class  random   tail     min-th   max-th   mark-prob
              0      0        0        64       128      1/10
              1      0        0        71       128      1/10
              2      0        0        78       128      1/10
              3      0        0        85       128      1/10
              4      0        0        92       128      1/10
              5      0        0        99       128      1/10
              6      0        0        106      128      1/10
              7      0        0        113      128      1/10
              rsvp   0        0        120      128      1/10
 Class priority-data
  Weighted Fair Queueing
     Output Queue: Conversation 74
       Bandwidth 40 (%) Packets Matched 0 Max Threshold 64 (packets)
       (pkts discards/bytes discards/tail drops) 0/0/0
 Class class-default
  Weighted Fair Queueing
     Flow Based Fair Queueing
     Maximum Number of Hashed Queues 64  Max Threshold 20 (packets)
  Output queue size 0/max total 600/drops 0
  fragment type end-to-end         fragment size 50
  cir 64000     bc   640       be 0         limit 80     interval 10
  mincir 64000     byte increment 80    BECN response no
  frags 0         bytes 0         frags delayed 0         bytes delayed 0
  shaping inactive
  traffic shaping drops 0
```

PPP over Frame Relay Example

The following is sample output from the **show frame-relay pvc** command that shows the PVC statistics for serial interface 5 (slot 1 and DLCI 55 are up) during a PPP session over Frame Relay:

```
Router# show frame-relay pvc 55

PVC Statistics for interface Serial5/1 (Frame Relay DTE)
DLCI = 55, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial5/1.1
     input pkts 9             output pkts 16           in bytes 154
     out bytes 338            dropped pkts 6           in FECN pkts 0
     in BECN pkts 0           out FECN pkts 0          out BECN pkts 0
     in DE pkts 0             out DE pkts 0
     out bcast pkts 0         out bcast bytes 0
     pvc create time 00:35:11, last time pvc status changed 00:00:22
     Bound to Virtual-Access1 (up, cloned from Virtual-Template5)
```

Voice over Frame Relay Example

The following is sample output from the **show frame-relay pvc** command for a PVC carrying Voice over Frame Relay (VoFR) traffic configured via the **vofr cisco** command. The **frame-relay voice bandwidth** command has been configured on the class associated with this PVC, as has fragmentation. The fragmentation type employed is proprietary to Cisco.

A sample configuration for this situation is shown first, followed by the output for the **show frame-relay pvc** command.

```
interface serial 0
```

```
 encapsulation frame-relay
 frame-relay traffic-shaping
 frame-relay interface-dlci 108
  vofr cisco
  class vofr-class
map-class frame-relay vofr-class
 frame-relay fragment 100
 frame-relay fair-queue
 frame-relay cir 64000
 frame-relay voice bandwidth 25000

Router# show frame-relay pvc 108

PVC Statistics for interface Serial0 (Frame Relay DTE)
DLCI = 108, DLCI USAGE = LOCAL, PVC STATUS = STATIC, INTERFACE = Serial0
  input pkts 1260          output pkts 1271         in bytes 95671
  out bytes 98604          dropped pkts 0           in FECN pkts 0
  in BECN pkts 0           out FECN pkts 0          out BECN pkts 0
  in DE pkts 0             out DE pkts 0
  out bcast pkts 1271       out bcast bytes 98604
  pvc create time 09:43:17, last time pvc status changed 09:43:17
  Service type VoFR-cisco
  configured voice bandwidth 25000, used voice bandwidth 0
  voice reserved queues 24, 25
  fragment type VoFR-cisco         fragment size 100
  cir 64000     bc 64000     be 0         limit 1000   interval 125
  mincir 32000     byte increment 1000  BECN response no
  pkts 2592      bytes 205140    pkts delayed 1296      bytes delayed 102570
  shaping inactive
  shaping drops 0
  Current fair queue configuration:
   Discard     Dynamic      Reserved
   threshold   queue count  queue count
    64          16           2
  Output queue size 0/max total 600/drops 0
```

FRF.12 Fragmentation Example

The following is sample output from the **show frame-relay pvc** command for an application employing pure FRF.12 fragmentation. A sample configuration for this situation is shown first, followed by the output for the **show frame-relay pvc** command.

```
interface serial 0
 encapsulation frame-relay
 frame-relay traffic-shaping
 frame-relay interface-dlci 110
  class frag
map-class frame-relay frag
 frame-relay fragment 100
 frame-relay fair-queue
 frame-relay cir 64000

Router# show frame-relay pvc 110

PVC Statistics for interface Serial0 (Frame Relay DTE)
DLCI = 110, DLCI USAGE = LOCAL, PVC STATUS = STATIC, INTERFACE = Serial0
  input pkts 0             output pkts 243          in bytes 0
  out bytes 7290           dropped pkts 0           in FECN pkts 0
  in BECN pkts 0           out FECN pkts 0          out BECN pkts 0
  in DE pkts 0             out DE pkts 0
  out bcast pkts 243        out bcast bytes 7290
  pvc create time 04:03:17, last time pvc status changed 04:03:18
  fragment type end-to-end         fragment size 100
  cir 64000     bc 64000     be 0         limit 1000   interval 125
```

```
 mincir 32000     byte increment 1000  BECN response no
 pkts 486       bytes 14580     pkts delayed 243       bytes delayed 7290
 shaping inactive
 shaping drops 0
 Current fair queue configuration:
  Discard     Dynamic      Reserved
  threshold   queue count  queue count
  64          16           2
 Output queue size 0/max total 600/drops 0
```

Note that when voice is not configured, voice bandwidth output is not displayed.

Multipoint Subinterfaces Transporting Data

The following is sample output from the **show frame-relay pvc** command for multipoint subinterfaces carrying data only. The output displays both the subinterface number and the DLCI. This display is the same whether the PVC is configured for static or dynamic addressing. Note that neither fragmentation nor voice is configured on this PVC.

```
Router# show frame-relay pvc

DLCI = 300, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial0.103
input pkts 10  output pkts 7  in bytes 6222
out bytes 6034  dropped pkts 0  in FECN pkts 0
in BECN pkts 0  out FECN pkts 0  out BECN pkts 0
in DE pkts 0  out DE pkts 0
outbcast pkts 0  outbcast bytes 0
pvc create time 0:13:11  last time pvc status changed 0:11:46
DLCI = 400, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial0.104
input pkts 20  output pkts 8  in bytes 5624
out bytes 5222  dropped pkts 0  in FECN pkts 0
in BECN pkts 0  out FECN pkts 0  out BECN pkts 0
in DE pkts 0  out DE pkts 0
outbcast pkts 0  outbcast bytes 0
pvc create time 0:03:57  last time pvc status changed 0:03:48
```

PVC Transporting Voice and Data

The following is sample output from the **show frame-relay pvc** command for a PVC carrying voice and data traffic, with a special queue specifically for voice traffic created using the **frame-relay voice bandwidth** command **queue** keyword:

```
Router# show frame-relay pvc interface serial 1 45

 PVC Statistics for interface Serial1 (Frame Relay DTE)

 DLCI = 45, DLCI USAGE = LOCAL, PVC STATUS = STATIC, INTERFACE = Serial1

   input pkts 85            output pkts 289          in bytes 1730
   out bytes 6580           dropped pkts 11          in FECN pkts 0
   in BECN pkts 0           out FECN pkts 0          out BECN pkts 0
   in DE pkts 0             out DE pkts 0
   out bcast pkts 0          out bcast bytes 0
   pvc create time 00:02:09, last time pvc status changed 00:02:09
   Service type VoFR
   configured voice bandwidth 25000, used voice bandwidth 22000
   fragment type VoFR         fragment size 100
   cir 20000     bc   1000      be 0         limit 125    interval 50
   mincir 20000     byte increment 125   BECN response no
   fragments 290       bytes 6613      fragments delayed 1         bytes delayed 33
   shaping inactive
   traffic shaping drops 0
    Voice Queueing Stats: 0/100/0 (size/max/dropped)
   ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

```
Current fair queue configuration:
 Discard     Dynamic      Reserved
 threshold   queue count  queue count
 64          16           2
Output queue size 0/max total 600/drops 0
```

Table 1 provides a listing of the fields in these displays and a description of each field.

Table 1 show frame-relay pvc Field Descriptions

Field	Description
DLCI	One of the DLCI numbers for the PVC.
DLCI USAGE	Lists SWITCHED when the router or access server is used as a switch, or LOCAL when the router or access server is used as a DTE device.
PVC STATUS	Status of the PVC: ACTIVE, INACTIVE, or DELETED.
INTERFACE	Specific subinterface associated with this DLCI.
LOCAL PVC STATUS[1]	Status of PVC configured locally on the NNI interface.
NNI PVC STATUS[1]	Status of PVC learned over the NNI link.
input pkts	Number of packets received on this PVC.
output pkts	Number of packets sent on this PVC.
in bytes	Number of bytes received on this PVC.
out bytes	Number of bytes sent on this PVC.
dropped pkts	Number of incoming and outgoing packets dropped by the router at the Frame Relay level.
in pkts dropped	Number of incoming packets dropped. Incoming packets may be dropped for a number of reasons, including the following: • Inactive PVC • Policing • Packets received above DE discard level • Dropped fragments • Memory allocation failures • Configuration problems
out pkts dropped	Number of outgoing packets dropped, including shaping drops and late drops.
out bytes dropped	Number of outgoing bytes dropped.
late-dropped out pkts	Number of outgoing packets dropped because of QoS policy (such as with VC queuing or Frame Relay traffic shaping). This field is not displayed when the value is zero.
late-dropped out bytes	Number of outgoing bytes dropped because of QoS policy (such with as VC queuing or Frame Relay traffic shaping). This field is not displayed when the value is zero.
in FECN pkts	Number of packets received with the FECN bit set.
in BECN pkts	Number of packets received with the BECN bit set.
out FECN pkts	Number of packets sent with the FECN bit set.

Table 1 show frame-relay pvc Field Descriptions (continued)

Field	Description
out BECN pkts	Number of packets sent with the BECN bit set.
in DE pkts	Number of DE packets received.
out DE pkts	Number of DE packets sent.
out bcast pkts	Number of output broadcast packets.
out bcast bytes	Number of output broadcast bytes.
switched pkts	Number of switched packets.
no out intf[2]	Number of packets dropped because there is no output interface.
out intf down[2]	Number of packets dropped because the output interface is down.
no out PVC[2]	Number of packets dropped because the outgoing PVC is not configured.
in PVC down[2]	Number of packets dropped because the incoming PVC is inactive.
out PVC down[2]	Number of packets dropped because the outgoing PVC is inactive.
pkt too big[2]	Number of packets dropped because the packet size is greater than media MTU[3].
shaping Q full[2]	Number of packets dropped because the Frame Relay traffic-shaping queue is full.
pkt above DE[2]	Number of packets dropped because they are above the DE level when Frame Relay congestion management is enabled.
policing drop[2]	Number of packets dropped because of Frame Relay traffic policing.
pvc create time	Time at which the PVC was created.
last time pvc status changed	Time at which the PVC changed status.
priority	Priority assigned to the PVC.
pkts marked DE	Number of packets marked DE because they exceeded the Bc.
policing Bc	Committed burst size.
policing Be	Excess burst size.
policing Tc	Measurement interval for counting Bc and Be.
in Bc pkts	Number of packets received within the committed burst.
in Be pkts	Number of packets received within the excess burst.
in xs pkts	Number of packets dropped because they exceeded the combined burst.
in Bc bytes	Number of bytes received within the committed burst.
in Be bytes	Number of bytes received within the excess burst.
in xs bytes	Number of bytes dropped because they exceeded the combined burst.
Congestion DE threshold	PVC queue percentage at which packets with the DE bit are dropped.
Congestion ECN threshold	PVC queue percentage at which packets are set with the BECN and FECN bits.
Service type	Type of service performed by this PVC. Can be VoFR or VoFR-cisco.
Post h/w compression queue	Number of packets in the post-hardware-compression queue when hardware compression and Frame Relay fragmentation are configured.

Table 1 show frame-relay pvc Field Descriptions (continued)

Field	Description
configured voice bandwidth	Amount of bandwidth in bits per second (bps) reserved for voice traffic on this PVC.
used voice bandwidth	Amount of bandwidth in bps currently being used for voice traffic.
service policy	Name of the output service policy applied to the VC.
Class	Class of traffic being displayed. Output is displayed for each configured class in the policy.
Output Queue	The WFQ[4] conversation to which this class of traffic is allocated.
Bandwidth	Bandwidth in kbps or percentage configured for this class.
Packets Matched	Number of packets that matched this class.
Max Threshold	Maximum queue size for this class when WRED is not used.
pkts discards	Number of packets discarded for this class.
bytes discards	Number of bytes discarded for this class.
tail drops	Number of packets discarded for this class because the queue was full.
mean queue depth	Average queue depth, based on the actual queue depth on the interface and the exponential weighting constant. It is a moving average. The minimum and maximum thresholds are compared against this value to determine drop decisions.
drops:	WRED parameters.
class	IP precedence value.
random	Number of packets randomly dropped when the mean queue depth is between the minimum threshold value and the maximum threshold value for the specified IP precedence value.
tail	Number of packets dropped when the mean queue depth is greater than the maximum threshold value for the specified IP precedence value.
min-th	Minimum WRED threshold in number of packets.
max-th	Maximum WRED threshold in number of packets.
mark-prob	Fraction of packets dropped when the average queue depth is at the maximum threshold.
Maximum Number of Hashed Queues	(Applies to class default only) Number of queues available for unclassified flows.
fragment type	Type of fragmentation configured for this PVC. Possible types are as follows: • end-to-end—Fragmented packets contain the standard FRF.12 header. • VoFR—Fragmented packets contain the FRF.11 Annex C header. • VoFR-cisco—Fragmented packets contain the Cisco proprietary header.
fragment size	Size of the fragment payload, in bytes.
adaptive active/inactive	Indicates whether Frame Relay voice-adaptive fragmentation is active or inactive.

Table 1 show frame-relay pvc Field Descriptions (continued)

Field	Description
time left	Number of seconds left on the Frame Relay voice-adaptive fragmentation deactivation timer. When this timer expires, Frame Relay fragmentation turns off.
cir	Current CIR in bps.
bc	Current committed burst (Bc) size, in bits.
be	Current excess burst (Be) size, in bits.
limit	Maximum number of bytes sent per internal interval (excess plus sustained).
interval	Interval being used internally (may be smaller than the interval derived from Bc/CIR; this happens when the router determines that traffic flow will be more stable with a smaller configured interval).
mincir	Minimum CIR for the PVC.
byte increment	Number of bytes that will be sustained per internal interval.
BECN response	Indication that Frame Relay has BECN adaptation configured.
pkts	Number of packets associated with this PVC that have gone through the traffic-shaping system.
frags	Total number of fragments shaped on this VC. When Frame Relay voice-adaptive fragmentation is configured, this field will continue to increment when fragmentation is inactive.
bytes	Number of bytes associated with this PVC that have gone through the traffic-shaping system.
pkts delayed	Number of packets associated with this PVC that have been delayed by the traffic-shaping system.
frags delayed	Number of fragments delayed in the shaping queue before being sent.
bytes delayed	Number of bytes associated with this PVC that have been delayed by the traffic-shaping system.
shaping	Indication that shaping will be active for all PVCs that are fragmenting data; otherwise, shaping will be active if the traffic being sent exceeds the CIR for this circuit.
shaping drops	Number of packets dropped by the traffic-shaping process.
Voice Queueing Stats	Statistics showing the size of packets, the maximum number of packets, and the number of packets dropped in the special voice queue created using the **frame-relay voice bandwidth** command **queue** keyword.
Discard threshold	Maximum number of packets that can be stored in each packet queue. Additional packets received after a queue is full will be discarded.
Dynamic queue count	Number of packet queues reserved for best-effort traffic.
Reserved queue count	Number of packet queues reserved for voice traffic.
Output queue size	Size in bytes of each output queue.
max total	Maximum number of packets of all types that can be queued in all queues.
drops	Number of frames dropped by all output queues.

1. The LOCAL PVC STATUS and NNI PVC STATUS fields are displayed only for PVCs configured on Frame Relay NNI interface types. These fields are not displayed if the PVC is configured on DCE or DTE interface types.
2. The detailed packet drop fields are displayed for switched Frame Relay PVCs only. These fields are not displayed for terminated PVCs.
3. MTU = maximum transmission unit.
4. WFQ = weighted fair queueing.

Related Commands

Command	Description
frame-relay interface-queue priority	Enables FR PIPQ on a Frame Relay interface and assigns priority to a PVC within a Frame Relay map class.
frame-relay pvc	Configures Frame Relay PVCs for FRF.8 Frame Relay-ATM Service Interworking.
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 dial-peer voice	Displays configuration information and call statistics for dial peers.
show frame-relay fragment	Displays Frame Relay fragmentation details.
show frame-relay map	Displays the current Frame Relay map entries and information about the connections.
show frame-relay pvc	Displays statistics about permanent virtual circuits (PVCs) for Frame Relay interfaces.

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) The 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 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. It now can 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	This command was integrated into Cisco IOS Release 12.2(13)T, and 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.

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 that make up any existing service policy map, whether or not that policy map has been attached to an interface.

The **show policy-map** command will display ECN marking information only if ECN is enabled on the interface.

Examples

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)
    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:

```
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 2 describes the significant fields shown in the display.

Table 2 show policy-map Field Descriptions

Field	Description
Policy map	Policy map name.
Class	Class name.
Bandwidth	Amount of bandwidth, in kbps, allocated to class.
Max thresh	Maximum threshold. Maximum Weighted Random Early Detection (WRED) 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
```

Two-Rate Traffic Policing show policy-map Command Example

In the following example, 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 s3/0
Router(config-if)# service-policy output policy1
Router(config-if)# end
```

The following sample output from the **show policy-map** command 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 3 describes the significant fields shown in the display.

Table 3 show policy-map Field Descriptions — Configuration for Two-Rate Traffic Policing

Field	Description
police	Indicates that the **police** command has been configured to enable traffic policing. Also displays the specified committed information rate (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 that conform to a specified rate.
exceed-action	Displays the action to be taken on packets that exceed a specified rate.
violate-action	Displays the action to be taken on packets that violate a specified rate.

Multiple Traffic Policing Actions show policy-map Command 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 of 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 peak information rate (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, refer to the **police** command page.

Table 4 describes the significant fields shown in the display.

Table 4 show policy-map Field Descriptions — Configuration 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 that conform to a specified rate.
exceed-action	Displays the one or more actions to be taken on packets that exceed a specified rate.
violate-action	Displays the one or more actions to be taken on packets that violate a specified rate.

Explicit Congestion Notification show policy-map Command 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 5 describes the significant fields shown in the display.

Table 5 show policy-map Field Descriptions — Configuration for ECN

Field	Description
explicit congestion notification	Indication that explicit congestion notification (ECN) 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 show policy-map Command 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 6 describes the significant fields shown in the display.

Table 6 show policy-map Field Descriptions — Configuration 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 show policy-map Command Example

The following example displays the contents of two service policy maps—one called "policy1" and the other 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 7 describes the significant fields shown in the display.

Table 7 show policy-map Field Descriptions — Configuration 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 show policy-map Command Example

The following sample output of 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 “policy1” converts and propagates the packet markings defined in the table map called “table-map-cos1”.

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 8 describes the fields shown in the display.

Table 8 show policy-map Field Descriptions — Configuration for Enhanced Packet Marking

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

Related Commands

Command	Description
drop	Configures a traffic class to discard packets that belong 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.
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 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 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 *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 that policy configuration will be displayed for a specific PVC.
dlci	(Optional) A 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

The absence of both the forward slash (/) and a *vpi* value causes the *vpi* value to default to 0. If this value is omitted, information for all virtual circuits (VCs) on the specified ATM interface or subinterface is displayed.

Command Modes

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.
12.1(2)T	This command was integrated into Cisco IOS Release 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 Quality of Service (QoS) set action.
12.1(3)T	This command was integrated into Cisco IOS Release 12.1(3)T. This command was modified to display per-class accounting statistics.
12.2(4)T	This command was modified for two-rate traffic policing. It now can 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	This command was integrated into Cisco IOS Release 12.2(13)T and the following modifications were made: • The output was modified for the Percentage-Based Policing and Shaping feature. • This command was modified for the Class-Based RTP and TCP Header Compression feature. • This command was modified as part of the Modular QoS CLI (MQC) Unconditional Packet Discard feature. Traffic classes in policy maps can now be configured to discard packets belonging to a specified class. • This command was modified to display the Frame Relay DLCI number as a criterion for matching traffic inside a class map. • This command was modified to display Layer 3 packet length as a criterion for matching traffic inside a class map. • 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.

Usage Guidelines

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

You can use the *interface-name* argument to display output for a PVC only for enhanced ATM port adapters (PA-A3) that support per-VC queueing.

The counters displayed after the **show policy-map interface** command is entered are updated only if congestion is present on the interface.

The **show policy-map interface** command will display policy information about Frame Relay PVCs only if Frame Relay traffic shaping (FRTS) is enabled on the interface.

The **show policy-map interface** command displays ECN marking information only if ECN is enabled on the interface.

Examples

This section provides sample output of a typical **show policy-map interface** command. Depending upon the interface in use and the options enabled, the output you see may vary slightly from the ones shown below. See Table 9 for an explanation of the significant fields that commonly appear in the command output.

The following sample output of the **show policy-map interface** command displays the statistics for the serial 3/1 interface, to which a service policy called "mypolicy" (configured as shown below) is attached.

```
policy-map mypolicy
  class voice
    priority 128
  class gold
   bandwidth 100
  class silver
   bandwidth 80
   random-detect

Router# show policy-map output interface s3/1

 Serial3/1

  Service-policy output: mypolicy

    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 128 (kbps) Burst 3200 (Bytes)
        (pkts matched/bytes matched) 0/0
        (total drops/bytes drops) 0/0

    Class-map: gold (match-all)
      0 packets, 0 bytes
      5 minute offered rate 0 bps, drop rate 0 bps
      Match: ip precedence 2
      Weighted Fair Queueing
        Output Queue: Conversation 265
        Bandwidth 100 (kbps) Max Threshold 64 (packets)
        (pkts matched/bytes matched) 0/0
        (depth/total drops/no-buffer drops) 0/0/0

    Class-map: silver (match-all)
      0 packets, 0 bytes
      5 minute offered rate 0 bps, drop rate 0 bps
      Match: ip precedence 1
      Weighted Fair Queueing
        Output Queue: Conversation 266
        Bandwidth 80 (kbps)
        (pkts matched/bytes matched) 0/0
        (depth/total drops/no-buffer drops) 0/0/0
         exponential weight: 9
         mean queue depth: 0
```

```
class     Transmitted       Random drop      Tail drop    Minimum Maximum  Mark
          pkts/bytes        pkts/bytes       pkts/bytes    thresh  thresh  prob
0             0/0               0/0              0/0          20      40  1/10
1             0/0               0/0              0/0          22      40  1/10
2             0/0               0/0              0/0          24      40  1/10
3             0/0               0/0              0/0          26      40  1/10
4             0/0               0/0              0/0          28      40  1/10
5             0/0               0/0              0/0          30      40  1/10
6             0/0               0/0              0/0          32      40  1/10
7             0/0               0/0              0/0          34      40  1/10
rsvp          0/0               0/0              0/0          36      40  1/10

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

The following sample output of the **show policy-map interface** command displays the statistics for the serial 3/2 interface, to which a service policy called p1 (configured as shown below) is attached. Traffic shaping has been enabled on this interface.

```
policy-map p1
  class c1
   shape average 320000

Router# show policy-map output interface s3/2

 Serial3/2

  Service-policy output: p1

    Class-map: c1 (match-all)
      0 packets, 0 bytes
      5 minute offered rate 0 bps, drop rate 0 bps
      Match: ip precedence 0
      Traffic Shaping
        Target    Byte   Sustain   Excess    Interval  Increment Adapt
        Rate      Limit  bits/int  bits/int  (ms)      (bytes)   Active
        320000    2000   8000      8000      25        1000      -

        Queue     Packets   Bytes     Packets   Bytes     Shaping
        Depth                         Delayed   Delayed   Active
        0         0         0         0         0         no

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

Table 9 describes the significant fields shown in the displays. The fields in the table are grouped according to the relevant QoS feature.

Table 9 show policy-map interface Field Descriptions [1]

Field	Description
Fields Associated with Classes or Service Policies	
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. **Note** If the packets are compressed over an outgoing interface, the improved packet rate achieved by packet compression is not reflected in the offered rate. Also, if the packets are classified *before* they enter a combination of tunnels (for example, a generic routing encapsulation (GRE) tunnel and an IP Security (IPSec) tunnel), the offered rate does not include all the extra overhead associated with tunnel encapsulation in general. Depending on the configuration, the offered rate may include no overhead, may include the overhead for only *one* tunnel encapsulation, or may include the overhead for *all* tunnel encapsulations. In most of the GRE and IPSec tunnel configurations, the offered rate includes the overhead for GRE tunnel encapsulation only.
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 IP precedence, IP differentiated services code point (DSCP) value, Multiprotocol Label Switching (MPLS) experimental (EXP) value, access groups, and QoS groups. For more information about the variety of match criteria options available, refer to the chapter "Configuring the Modular Quality of Service Command-Line Interface" in the *Cisco IOS Quality of Service Solutions Configuration Guide*, Release 12.2.
Fields Associated with Queueing (If Enabled)	
Output Queue	The weighted fair queueing (WFQ) conversation to which this class of traffic is allocated.
Bandwidth	Bandwidth, in either kbps or percentage, configured for this class and the burst size.
pkts matched/bytes matched	Number of packets (also shown in bytes) matching this class that were placed in the queue. This number reflects the total number of matching packets queued at any time. Packets matching this class are queued only when congestion exists. If packets match the class but are never queued because the network was not congested, those packets are not included in this total. However, if process switching is in use, the number of packets is always incremented even if the network is not congested.
depth/total drops/no-buffer drops	Number of packets discarded for this class. "No-buffer" indicates that no memory buffer exists to service the packet.

Table 9 show policy-map interface Field Descriptions [1] (continued)

Field	Description
Fields Associated with Weighted Random Early Detection (WRED) (If Enabled)	
exponential weight	Exponent used in the average queue size calculation for a WRED parameter group.
mean queue depth	Average queue depth, based on the actual queue depth on the interface and the exponential weighting constant. It is a fluctuating average. The minimum and maximum thresholds are compared against this value to determine drop decisions.
class	IP precedence level.
Transmitted pkts/bytes	Number of packets (also shown in bytes) transmitted.
Random drop pkts/bytes	Number of packets (also shown in bytes) randomly dropped when the mean queue depth is between the minimum threshold value and the maximum threshold value for the specified IP precedence level.
Tail drop pkts/bytes	Number of packets dropped when the mean queue depth is greater than the maximum threshold value for the specified IP precedence level.
Minimum thresh	Minimum threshold. Minimum WRED threshold in number of packets.
Maximum thresh	Maximum threshold. Maximum WRED threshold in number of packets.
Mark prob	Mark probability. Fraction of packets dropped when the average queue depth is at the maximum threshold.
Fields Associated with Traffic Shaping (If Enabled)	
Target Rate	Rate used for shaping traffic.
Byte Limit	Maximum number of bytes that can be transmitted per interval, calculated as follows: ((Bc+Be) /8) × 1
Sustain bits/int	Committed burst (Bc) rate.
Excess bits/int	Excess burst (Be) rate.
Interval (ms)	Time interval value, in milliseconds (ms).
Increment (bytes)	Number of credits (in bytes) received in the token bucket of the traffic shaper during each time interval.
Queue Depth	Current queue depth of the traffic shaper.
Packets	Total number of packets that have entered the traffic-shaper system.
Bytes	Total number of bytes that have entered the traffic-shaper system.
Packets Delayed	Total number of packets delayed in the queue of the traffic-shaper before being transmitted.
Bytes Delayed	Total number of bytes delayed in the queue of the traffic-shaper before being transmitted.
Shaping Active	Indicates whether the traffic shaper is active. For example, if a traffic shaper is active, and the traffic being sent exceeds the traffic shaping rate, “yes” appears in this field.

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.

Frame Relay Voice-Adaptive Traffic Shaping show policy interface Command Example

The following sample output shows that Frame Relay voice-adaptive traffic shaping is currently active and has 29 seconds left on the deactivation timer. This means that the current sending rate on DLCI 201 is minCIR, but if no voice packets are detected for 29 seconds, the sending rate will increase to CIR.

```
Router# show policy interface Serial3/1.1

 Serial3/1.1:DLCI 201 -

  Service-policy output:MQC-SHAPE-LLQ1

    Class-map:class-default (match-any)
      1434 packets, 148751 bytes
      30 second offered rate 14000 bps, drop rate 0 bps
      Match:any
      Traffic Shaping
           Target/Average   Byte   Sustain   Excess    Interval  Increment
             Rate           Limit  bits/int  bits/int  (ms)      (bytes)
            63000/63000     1890   7560      7560      120       945

        Adapt  Queue     Packets   Bytes     Packets   Bytes     Shaping
        Active Depth                         Delayed   Delayed   Active
        BECN   0         1434      162991    26        2704      yes
        Voice Adaptive Shaping active, time left 29 secs
```

Table 10 describes the significant fields shown in the display. Significant fields that are not described in Table 10 are described in Table 9, "show policy-map interface Field Descriptions."

Table 10 show policy-map interface Field Descriptions — Configuration for Frame Relay Voice-Adaptive Traffic Shaping

Field	Description
Voice Adaptive Shaping active/inactive	Indicates whether Frame Relay voice-adaptive traffic shaping is active or inactive.
time left	Number of seconds left on the Frame Relay voice-adaptive traffic shaping deactivation timer.

Two-Rate Traffic Policing show policy-map interface Command Example

The following is sample output from the **show policy-map interface** command when two-rate traffic policing has been configured. In the example below, 1.25 Mbps of traffic is sent ("offered") to a policer class.

```
Router# show policy-map interface s3/0

 Serial3/0

  Service-policy output: policy1

   Class-map: police (match all)
    148803 packets, 36605538 bytes
    30 second offered rate 1249000 bps, drop rate 249000 bps
    Match: access-group 101
    police:
     cir 500000 bps, conform-burst 10000, pir 1000000, peak-burst 100000
     conformed 59538 packets, 14646348 bytes; action: transmit
     exceeded 59538 packets, 14646348 bytes; action: set-prec-transmit 2
     violated 29731 packets, 7313826 bytes; action: drop
     conformed 499000 bps, exceed 500000 bps violate 249000 bps
   Class-map: class-default (match-any)
```

```
    19 packets, 1990 bytes
    30 seconds offered rate 0 bps, drop rate 0 bps
    Match: any
```

The two-rate traffic policer marks 500 kbps of traffic as conforming to the specified rate, 500 kbps of traffic as exceeding the rate, and 250 kbps of traffic as violating the specified rate. Packets marked as conforming will be sent as is, and packets marked as exceeding will be marked with IP Precedence 2 and then sent. Packets marked as violating the specified rate are dropped.

Table 11 describes the significant fields shown in the display.

Table 11 show policy-map interface Field Descriptions — Configuration for Two-Rate Traffic Policing

Field	Description
police	Indicates that the **police** command has been configured to enable traffic policing. Also displays the specified committed information rate (CIR), conform burst size, peak information rate (PIR), and peak burst size used for marking packets.
conformed	Displays the action to be taken on packets that conform to a specified rate. Displays the number of packets and bytes on which the action was taken.
exceeded	Displays the action to be taken on packets that exceed a specified rate. Displays the number of packets and bytes on which the action was taken.
violated	Displays the action to be taken on packets that violate a specified rate. Displays the number of packets and bytes on which the action was taken.

Multiple Traffic Policing Actions show policy-map interface Command Example

The following is sample output from the **show policy-map** command when the Policer Enhancement — Multiple Actions feature has been configured. The sample output of the **show policy-map interface** command displays the statistics for the serial 3/2 interface, to which a service policy called “police” (configured as shown below) is attached.

```
policy-map police
  class class-default
   police cir 1000000 pir 2000000
     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

Router# show policy-map interface s3/2

Serial3/2: DLCI 100 -

Service-policy output: police

    Class-map: class-default (match-any)
      172984 packets, 42553700 bytes
      5 minute offered rate 960000 bps, drop rate 277000 bps
      Match: any
     police:
         cir 1000000 bps, bc 31250 bytes, pir 2000000 bps, be 31250 bytes
       conformed 59679 packets, 14680670 bytes; actions:
         transmit
```

```
exceeded 59549 packets, 14649054 bytes; actions:
         set-prec-transmit 4
         set-frde-transmit
       violated 53758 packets, 13224468 bytes; actions:
         set-prec-transmit 2
         set-frde-transmit
       conformed 340000 bps, exceed 341000 bps, violate 314000 bps
```

The sample output of the **show policy-map interface** command shows the following:

- 59679 packets were marked as conforming packets (that is, packets conforming to the CIR) and were transmitted unaltered.
- 59549 packets were marked as exceeding packets (that is, packets exceeding the CIR but not exceeding the PIR). Therefore, the IP Precedence value of these packets was changed to an IP Precedence level of 4, the discard eligibility (DE) bit was set to 1, and the packets were transmitted with these changes.
- 53758 packets were marked as violating packets (that is, exceeding the PIR). Therefore, the IP Precedence value of these packets was changed to an IP Precedence level of 2, the DE bit was set to 1, and the packets were transmitted with these changes.

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

Table 12 describes the significant fields shown in the display.

Table 12 show policy-map interface Field Descriptions — Configuration 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, conform burst size (Bc), PIR, and peak burst size (Be) used for marking packets.
conformed, packets, bytes, actions	Displays the number of packets (also shown in bytes) marked as conforming to a specified rate and the actions taken on the packet. If there are multiple actions, each action is listed separately.
exceeded, packets, bytes, actions	Displays the number of packets (also shown in bytes) marked as exceeding a specified rate and the actions taken on the packet. If there are multiple actions, each action is listed separately.
violated, packets, bytes, actions	Displays the number of packets (also shown in bytes) marked as violating a specified rate and the actions taken on the packet. If there are multiple actions, each action is listed separately.

Explicit Congestion Notification show policy-map interface Command Example

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

```
Router# show policy-map interface Serial4/1

 Serial4/1

  Service-policy output:policy_ecn
        Class-map:prec1 (match-all)
```

```
      1000 packets, 125000 bytes
      30 second offered rate 14000 bps, drop rate 5000 bps
      Match:ip precedence 1
      Weighted Fair Queueing
        Output Queue:Conversation 42
        Bandwidth 20 (%)
        Bandwidth 100 (kbps)
         (pkts matched/bytes matched) 989/123625
    (depth/total drops/no-buffer drops) 0/455/0
         exponential weight:9
         explicit congestion notification
         mean queue depth:0

class   Transmitted  Random drop  Tail drop   Minimum     Maximum     Mark
        pkts/bytes   pkts/bytes    pkts/bytes threshold   threshold   probability
  0       0/0          0/0          0/0          20          40         1/10
  1     545/68125      0/0          0/0          22          40         1/10
  2       0/0          0/0          0/0          24          40         1/10
  3       0/0          0/0          0/0          26          40         1/10
  4       0/0          0/0          0/0          28          40         1/10
  5       0/0          0/0          0/0          30          40         1/10
  6       0/0          0/0          0/0          32          40         1/10
  7       0/0          0/0          0/0          34          40         1/10
rsvp      0/0          0/0          0/0          36          40         1/10
class   ECN Mark
        pkts/bytes
  0      0/0
  1     43/5375
  2      0/0
  3      0/0
  4      0/0
  5      0/0
  6      0/0
  7      0/0
rsvp     0/0
```

Table 13 describes the significant fields shown in the display.

Table 13 show policy-map interface Field Descriptions — Configuration for ECN

Field	Description
explicit congestion notification	Indication that explicit congestion notification is enabled.
mean queue depth	Average queue depth based on the actual queue depth on the interface and the exponential weighting constant. It is a moving average. The minimum and maximum thresholds are compared against this value to determine drop decisions.
class	IP precedence value.
Transmitted pkts/bytes	Number of packets (also shown in bytes) transmitted.
Random drop pkts/bytes	Number of packets (also shown in bytes) randomly dropped when the mean queue depth is between the minimum threshold value and the maximum threshold value for the specified IP precedence value.
Tail drop pkts/bytes	Number of packets dropped when the mean queue depth is greater than the maximum threshold value for the specified IP precedence value.
Minimum threshold	Minimum WRED threshold, in number of packets.

Table 13 show policy-map interface Field Descriptions — Configuration for ECN (continued)

Field	Description
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.
ECN Mark pkts/bytes	Number of packets (also shown in bytes) marked by ECN.

Class-Based RTP and TCP Header Compression show policy-map interface Command Example

The following sample output of the **show policy-map interface** command shows that RTP header compression has been configured for a class called "prec2" in the policy map called "p1".

The **show policy-map interface** command output displays the type of header compression configured (RTP), the interface to which the policy map called "p1" is attached (Serial 4/1), the total number of packets, the number of packets compressed, the number of packets saved, the number of packets sent, and the rate at which the packets were compressed (in bits per second (bps)).

In this example, User Datagram Protocol (UDP)/RTP header compressions have been configured, and the compression statistics are included at the end of the display.

```
Router# show policy-map interface Serial 4/1

Serial4/1

Service-policy output:p1

    Class-map:class-default (match-any)
      1005 packets, 64320 bytes
      30 second offered rate 16000 bps, drop rate 0 bps
      Match:any
compress:
          header ip rtp
          UDP/RTP Compression:
          Sent:1000 total, 999 compressed,
                41957 bytes saved, 17983 bytes sent
                3.33 efficiency improvement factor
                99% hit ratio, five minute miss rate 0 misses/sec, 0 max
                 rate 5000 bps
```

Table 14 describes the significant fields shown in the display.

Table 14 show policy-map interface Field Descriptions — Configuration for Class-Based RTP and TCP Header Compression[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, bytes	Number of packets (also shown in bytes) identified as belonging to the class of traffic being displayed.

Table 14 show policy-map interface Field Descriptions — Configuration for Class-Based RTP and TCP Header Compression[1] (continued)

Field	Description
offered rate	Rate, in kbps, of packets coming into the class. **Note** If the packets are compressed over an outgoing interface, the improved packet rate achieved by packet compression is not reflected in the offered rate. Also, if the packets are classified *before* they enter a combination of tunnels (for example, a generic routing encapsulation (GRE) tunnel and an IP Security (IPSec) tunnel), the offered rate does not include all the extra overhead associated with tunnel encapsulation in general. Depending on the configuration, the offered rate may include no overhead, may include the overhead for only *one* tunnel encapsulation, or may include the overhead for *all* tunnel encapsulations. In most of the GRE and IPSec tunnel configurations, the offered rate includes the overhead for GRE tunnel encapsulation only.
UDP/RTP Compression	Indicates that RTP header compression has been configured for the class.
Sent total	Count of every packet sent, both compressed packets and full-header packets.
Sent compressed	Count of number of compressed packets sent.
bytes saved	Total number of bytes saved (that is, bytes not needing to be sent).
bytes sent	Total number of bytes sent for both compressed and full-header packets.
efficiency improvement factor	The percentage of increased bandwidth efficiency as a result of header compression. For example, with RTP streams, the efficiency improvement factor can be as much as 2.9 (or 290 percent).
hit ratio	Used mainly for troubleshooting purposes, this is the percentage of packets found in the context database. In most instances, this percentage should be high.
five minute miss rate	The number of new traffic flows found in the last five minutes.
misses/sec max	The average number of new traffic flows found per second, and the highest rate of new traffic flows to date.
rate	The actual traffic rate (in bits per second) after the packets are compressed.

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

Modular QoS CLI (MQC) Unconditional Packet Discard show policy-map interface Command Example

The following sample output of the **show policy-map interface** command displays the statistics for the Serial2/0 interface, to which a policy map called “policy1” is attached. The discarding action has been specified for all the packets belonging to a class called “c1”. In this example, 32000 bps of traffic are sent (“offered”) to the class, and all of them are dropped. Therefore, the drop rate shows 32000 bps.

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

 Serial2/0

  Service-policy output: policy1

    Class-map: c1 (match-all)
       10184 packets, 1056436 bytes
       5 minute offered rate 32000 bps, drop rate 32000 bps
       Match: ip precedence 0
       drop
```

Table 15 describes the significant fields shown in the display.

Table 15 show policy-map interface Field Descriptions — Configuration for MQC Unconditional Packet Discard[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, 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 into the class. **Note** If the packets are compressed over an outgoing interface, the improved packet rate achieved by packet compression is not reflected in the offered rate. Also, if the packets are classified *before* they enter a combination of tunnels (for example, a generic routing encapsulation (GRE) tunnel and an IP Security (IPSec) tunnel), the offered rate does not include all the extra overhead associated with tunnel encapsulation in general. Depending on the configuration, the offered rate may include no overhead, may include the overhead for only *one* tunnel encapsulation, or may include the overhead for *all* tunnel encapsulations. In most of the GRE and IPSec tunnel configurations, the offered rate includes the overhead for GRE tunnel encapsulation only.
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 DSCP value, MPLS experimental value, access groups, and QoS groups. For more information about the variety of match criteria options available, refer to the chapter "Configuring the Modular Quality of Service Command-Line Interface" in the *Cisco IOS Quality of Service Solutions Configuration Guide*, Release 12.2.
drop	Indicates that the packet-discarding action for all the packets belonging to the specified class has been configured.

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

Percentage-Based Policing and Shaping show policy-map interface Command Example

The following sample output of the **show policy-map interface** command shows traffic policing configured using a CIR based on a bandwidth of 20 percent. The CIR and committed burst (Bc) in milliseconds (ms) are included in the display.

```
Router# show policy-map interface Serial3/1

 Serial3/1

  Service-policy output: mypolicy

    Class-map: gold (match-any)
      0 packets, 0 bytes
      5 minute offered rate 0 bps, drop rate 0 bps
      Match: any
      police:
          cir 20 % bc 10 ms
          cir 2000000 bps, bc 2500 bytes
          pir 40 % be 20 ms
          pir 4000000 bps, be 10000 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
```

Table 16 describes the significant fields shown in the display.

Table 16 show policy-map interface Field Descriptions — Configuration for Percentage-Based Policing and Shaping[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, 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 into the class. **Note** If the packets are compressed over an outgoing interface, the improved packet rate achieved by packet compression is not reflected in the offered rate. Also, if the packets are classified *before* they enter a combination of tunnels (for example, a generic routing encapsulation (GRE) tunnel and an IP Security (IPSec) tunnel), the offered rate does not include all the extra overhead associated with tunnel encapsulation in general. Depending on the configuration, the offered rate may include no overhead, may include the overhead for only *one* tunnel encapsulation, or may include the overhead for *all* tunnel encapsulations. In most of the GRE and IPSec tunnel configurations, the offered rate includes the overhead for GRE tunnel encapsulation only.

Table 16 show policy-map interface Field Descriptions — Configuration for Percentage-Based Policing and Shaping[1] (continued)

Field	Description
police	Indicates that traffic policing based on a percentage of bandwidth has been enabled. Also displays the bandwidth percentage, the CIR, and the committed burst (Bc) size in ms.
conformed, actions	Displays the number of packets and bytes marked as conforming to the specified rates, and the action to be taken on those packets.
exceeded, actions	Displays the number of packets and bytes marked as exceeding the specified rates, and the action to be taken on those packets.

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

The second sample output of the **show policy-map interface** command (shown below) displays the statistics for the serial 3/2 interface. Traffic shaping has been enabled on this interface, and an average rate of 20 percent of the bandwidth has been specified.

```
Router# show policy-map interface Serial3/2

Serial3/2

  Service-policy output: p1

    Class-map: c1 (match-all)
      0 packets, 0 bytes
      5 minute offered rate 0 bps, drop rate 0 bps
      Match: any
      Traffic Shaping
        Target/Average      Byte   Sustain    Excess      Interval  Increment  Adapt
        Rate               Limit  bits/int  bits/int    (ms)     (bytes)   Active
         20 %                          10 (ms)    20 (ms)
        201500/201500       1952   7808       7808        38         976       -

        Queue     Packets   Bytes     Packets   Bytes     Shaping
        Depth                         Delayed   Delayed   Active
        0         0         0         0         0         no
```

Table 17 describes the significant fields shown in the display.

Table 17 show policy-map interface Field Descriptions — Configuration for Percentage-Based Policing and Shaping (with Traffic Shaping Enabled)[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, bytes	Number of packets (also shown in bytes) identified as belonging to the class of traffic being displayed.

Table 17 show policy-map interface Field Descriptions — Configuration for Percentage-Based Policing and Shaping (with Traffic Shaping Enabled)[1] (continued)

Field	Description
offered rate	Rate, in kbps, of packets coming into the class. **Note** If the packets are compressed over an outgoing interface, the improved packet rate achieved by packet compression is not reflected in the offered rate. Also, if the packets are classified *before* they enter a combination of tunnels (for example, a generic routing encapsulation (GRE) tunnel and an IP Security (IPSec) tunnel), the offered rate does not include all the extra overhead associated with tunnel encapsulation in general. Depending on the configuration, the offered rate may include no overhead, may include the overhead for only *one* tunnel encapsulation, or may include the overhead for *all* tunnel encapsulations. In most of the GRE and IPSec tunnel configurations, the offered rate includes the overhead for GRE tunnel encapsulation only.
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 DSCP value, 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 chapter "Configuring the Modular Quality of Service Command-Line Interface" in the *Cisco IOS Quality of Service Solutions Configuration Guide*, Release 12.2.
Traffic Shaping	Indicates that traffic shaping based on a percentage of bandwidth has been enabled.
Target /Average Rate	Rate (percentage) used for shaping traffic and the number of packets meeting that rate.
Byte Limit	Maximum number of bytes that can be transmitted per interval, calculated as follows: ((Bc+Be) /8) × 1
Sustain bits/int	Committed burst (Bc) rate.
Excess bits/int	Excess burst (Be) rate.
Interval (ms)	Time interval value, in milliseconds (ms).
Increment (bytes)	Number of credits (in bytes) received in the token bucket of the traffic shaper during each time interval.
Adapt Active	Indicates whether adaptive shaping is enabled.
Queue Depth	Current queue depth of the traffic shaper.
Packets	Total number of packets that have entered the traffic-shaper system.
Bytes	Total number of bytes that have entered the traffic- shaper system.

Table 17 show policy-map interface Field Descriptions — Configuration for Percentage-Based Policing and Shaping (with Traffic Shaping Enabled)[1] (continued)

Field	Description
Packets Delayed	Total number of packets delayed in the queue of the traffic shaper before being transmitted.
Bytes Delayed	Total number of bytes delayed in the queue of the traffic shaper before being transmitted.
Shaping Active	Indicates whether the traffic shaper is active. For example, if a traffic shaper is active, and the traffic being sent exceeds the traffic shaping rate, "yes" appears in this field.

1. A number may appear in parentheses 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.

Packet Classification Based on Layer 3 Packet Length show policy-map interface Example

The following sample output of the **show policy-map interface** command displays the packet statistics for the Ethernet4/1 interface, to which a service policy called "mypolicy" is attached. The Layer 3 packet length has been specified as a match criterion for the traffic in the class called "class1".

```
Router# show policy-map interface Ethernet4/1

 Ethernet4/1

  Service-policy input: mypolicy

    Class-map: class1 (match-all)
       500 packets, 125000 bytes
       5 minute offered rate 4000 bps, drop rate 0 bps
       Match: packet length min 100 max 300
       QoS Set
         qos-group 20
           Packets marked 500
```

Table 18 describes the significant fields shown in the display.

Table 18 show policy-map interface Field Descriptions — Configured for Packet Classification Based on Layer 3 Packet Length[1]

Field	Description
Service-policy input	Name of the input 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, bytes	Number of packets (also shown in bytes) identified as belonging to the class of traffic being displayed.

Table 18 show policy-map interface Field Descriptions — Configured for Packet Classification Based on Layer 3 Packet Length[1] (continued)

Field	Description
offered rate	Rate, in kbps, of packets coming into the class. **Note** If the packets are compressed over an outgoing interface, the improved packet rate achieved by packet compression is not reflected in the offered rate. Also, if the packets are classified *before* they enter a combination of tunnels (for example, a generic routing encapsulation (GRE) tunnel and an IP Security (IPSec) tunnel), the offered rate does not include all the extra overhead associated with tunnel encapsulation in general. Depending on the configuration, the offered rate may include no overhead, may include the overhead for only *one* tunnel encapsulation, or may include the overhead for *all* tunnel encapsulations. In most of the GRE and IPSec tunnel configurations, the offered rate includes the overhead for GRE tunnel encapsulation only.
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 DSCP value, MPLS experimental value, access groups, and QoS groups.
QoS Set, qos-group, Packets marked	Indicates that class-based packet marking based on the QoS group has been configured. Includes the QoS group number and the number of packets marked.

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

Enhanced Packet Marking show policy-map interface Example

The sample output of the **show table-map** command shows the contents of a table map called “map 1”. In “map1”, a “to–from” relationship has been established and a default value has been defined. The fields for establishing the “to–from” mappings are further defined by the policy map in which the table map will be configured. (Configuring a policy map is the next logical step after creating a table map.)

For instance, a precedence or DSCP value of 0 could be mapped to a class of service (CoS) value of 1, or vice versa, depending on the how the values are defined in the table map. Any values not explicitly defined in a “to–from” relationship will be set to a default value.

The following sample output of the **show table-map** command displays the contents of a table map called “map1”. In this table map, a packet-marking value of 0 is mapped to a packet-marking value of 1. All other packet-marking values are mapped to the default value 3.

```
Router# show table-map map1

 Table Map map1
 from 0 to 1
 default 3
```

Table 19 describes the fields shown in the display.

Table 19 show policy-map interface Field Descriptions — Configuration for Enhanced Packet Marking

Field	Description
Table Map	The name of the table map being displayed.
from, to	The values of the "to–from" relationship established by the **table-map** (value mapping) command and further defined by the policy map in which the table map will be configured.
default	The default action to be used for any values not explicitly defined in a "to–from" relationship by the **table-map** (value mapping) command. If a default action is not specified in the table-map (value mapping) command, the default action is "copy".

Related Commands

Command	Description
compression header ip	Configures RTP or TCP IP header compression for a specific class.
drop	Configures a traffic class to discard packets belonging to a specific class.
match fr-dlci	Specifies the Frame Relay DLCI number as a match criterion in a class map.
match packet length (class-map)	Specifies the length of the Layer 3 packet in the IP header as a match criterion in a class map.
police	Configures traffic policing.
police (percent)	Configures traffic policing based on a percentage of bandwidth available on an interfaces.
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 (percent)	Specifies average or peak rate traffic shaping based on a percentage of bandwidth available on an interface.
show frame-relay pvc	Displays statistics about PVCs for Frame Relay interfaces.
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.
show policy-map class	Displays the configuration for the specified class of the specified policy map.
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.