



# Policer Enhancement — Multiple Actions

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## Feature History

Release	Modification
12.2(8)T	This feature was introduced.

This document describes the Policer Enhancement — Multiple Actions feature in Cisco IOS Release 12.2(8)T. It includes the following sections:

- [Feature Overview, page 1](#)
- [Supported Platforms, page 3](#)
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- [Prerequisites, page 5](#)
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## Feature Overview

This feature further extends the functionality of the Cisco IOS Traffic Policing feature (a single-rate policer) and the Two-Rate Policer feature. The Traffic Policing and Two-Rate Policer features are traffic policing mechanisms that allow you to control the maximum rate of traffic sent or received on an interface. Both of these traffic policing mechanisms mark packets as either conforming to, exceeding, or violating a specified rate. After a packet is marked, you can specify an action to be taken on the packet based on that marking.

With both the Traffic Policing feature and the Two-Rate Policer feature, you can specify only one conform action, one exceed action, and one violate action. Now with the new Policer Enhancement — Multiple Actions feature, you can specify multiple conform, exceed, and violate actions for the marked packets.



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You specify the multiple actions by using the *action* argument of the **police** command. The resulting actions are listed in [Table 1](#).

**Table 1** *police Command Action Arguments*

Specified Action	Result
<b>drop</b>	Drops the packet.
<b>set-clp-transmit</b>	Sets the ATM Cell Loss Priority (CLP) bit from 0 to 1 on the ATM cell and transmits the packet.
<b>set-dscp-transmit</b> <i>new-dscp</i>	Sets the IP differentiated services code point (DSCP) value and transmits the packet with the ATM CLP bit set to 1.
<b>set-frde-transmit</b>	Sets the Frame Relay Discard Eligibility (DE) bit from 0 to 1 on the Frame Relay frame and transmits the packet.
<b>set-mpls-exp-transmit</b>	Sets the Multiprotocol Label Switching (MPLS) experimental (EXP) bits from 0 to 7 and transmits the packet.
<b>set-prec-transmit</b> <i>new-prec</i>	Sets the IP Precedence level and transmits the packet.
<b>set-qos-transmit</b> <i>new-qos</i>	Sets the Quality of Service (QoS) group value and transmits the packet.
<b>transmit</b>	Transmits the packet.

For more information about the **police** command, see the [Cisco IOS Quality of Service Solutions Command Reference](#).

For more information about traffic policing, see the “[Policing and Shaping Overview](#)” module. For more information about the Two-Rate Policer feature, see the “[Two-Rate Policer](#)” module.

## Benefits

Before this feature, you could specify only *one* marking action for a packet, in addition to transmitting the packet. This feature provides enhanced flexibility by allowing you to specify *multiple* marking actions for a packet, as required. For example, if you know the packet will be transmitted through both a TCP/IP and a Frame Relay environment, you can change the DSCP value of the exceeding or violating packet, and also set the Frame Relay Discard Eligibility (DE) bit from 0 to 1 to indicate lower priority.

## Restrictions

- On a Cisco 7500 series router, traffic policing can monitor Cisco Express Forwarding (CEF) or distributed CEF (dCEF) switching paths only. To use the Two-Rate Policer, CEF or dCEF must be configured on both the interface receiving the packet and the interface sending the packet.
- On a Cisco 7500 series router, traffic policing cannot be applied to packets that originated from or are destined to a router.
- Multiple policer actions can be configured on an interface, a subinterface, a Frame Relay data-link connection identifier (DLCI), and an ATM permanent virtual circuit (PVC) only.
- When using this feature, you can specify a maximum of four actions at one time.
- Multiple policer actions are not supported on the following interfaces:

- Fast EtherChannel
- PRI
- Any interface on a Cisco 7500 series router that does not support CEF or dCEF

## Related Features and Technologies

- Modular Quality of Service (QoS) Command-Line Interface (CLI) (MQC)
- Class-Based Weighted Fair Queueing (CBWFQ)
- Class-Based Packet Marking
- Traffic Policing
- Two-Rate Policing

## Related Documents

- [“Applying QoS Features Using the MQC”](#) module
- [“Configuring Weighted Fair Queueing”](#) module
- [“Marking Network Traffic”](#) module
- [“Policing and Shaping Overview”](#) module
- [“Traffic Policing”](#) module
- [“Two-Rate Policer”](#) module
- [Cisco IOS Quality of Service Solutions Command Reference](#).
- RFC 2697, *A Single Rate Three Color Marker*
- RFC 2698, *A Two Rate Three Color Marker*

## Supported Platforms

- Cisco 1700 series
- Cisco 2600 series
- Cisco 3620
- Cisco 3640
- Cisco 3660
- Cisco 7100 series
- Cisco 7200 series
- Cisco 7500 series (VIP-based platform only)
- Cisco MC3810

**Note**

To use the *set-clp-transmit* action available with this feature, the Enhanced ATM Port Adapter (PA-A3) is required. Therefore, the *set-clp-transmit* action is not supported on any platform that does not support the PA-A3 adapter (such as the Cisco 2600 series router and the Cisco 3640 router). For more information, refer to the documentation for your specific router.

**Determining Platform Support Through Cisco Feature Navigator**

Cisco IOS software is packaged in feature sets that support specific platforms. To get updated information regarding platform support for this feature, access Cisco Feature Navigator. Cisco Feature Navigator dynamically updates the list of supported platforms as new platform support is added for the feature.

Cisco Feature Navigator is a web-based tool that enables you to quickly determine which Cisco IOS software images support a specific set of features and which features are supported in a specific Cisco IOS image. You can search by feature or release. Under the release section, you can compare releases side by side to display both the features unique to each software release and the features in common.

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Cisco Feature Navigator is updated regularly when major Cisco IOS software releases and technology releases occur. For the most current information, go to the Cisco Feature Navigator home page at the following URL:

<http://www.cisco.com/go/fn>

## Supported Standards, MIBs, and RFCs

**Standards**

No new or modified standards are supported by this feature.

**MIBs**

- CISCO-CLASS-BASED-QOS-MIB
- CISCO-CLASS-BASED-QOS-CAPABILITY-MIB

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>

**RFCs**

- RFC 2697, *A Single Rate Three Color Marker*
- RFC 2698, *A Two Rate Three Color Marker*

## Prerequisites

- Before configuring the Policer Enhancement — Multiple Actions feature, you should read and be familiar with the information in the following modules:
  - [“Policing and Shaping Overview”](#) module
  - [“Traffic Policing”](#) module
  - [“Two-Rate Policer”](#) module
- On a Cisco 7500 series router, CEF or dCEF must be configured on the interface before you can use the Policer Enhancement — Multiple Actions feature. For additional information on CEF or dCEF, see the [“Cisco Express Forwarding Overview”](#) module.
- To configure the Policer Enhancement — Multiple Actions feature, a traffic class and a service policy must be created, and the service policy must be attached to a specified interface. These tasks are performed using the MQC. For about the MQC, see the [“Applying QoS Features Using the MQC”](#) module.

## Configuration Tasks

See the following sections for configuration tasks for the Police Enhancement — Multiple Actions feature. Each task in the list is identified as either required or optional.

- [Configuring Multiple Policer Actions, page 5](#) (required)
- [Verifying the Multiple Policer Actions Configuration, page 5](#) (optional)

## Configuring Multiple Policer Actions

To configure multiple policer actions, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# <b>policy-map</b> <i>policy-map-name</i>	Creates a policy map. Enters policy-map configuration mode.
Step 2	Router(config-pmap)# <b>class</b> <i>class-default</i>	Specifies the default traffic class for a service policy. Enters policy-map class configuration mode.
Step 3	Router(config-pmap-c)# <b>police</b> { <i>cir cir</i> } [ <b>bc conform-burst</b> ] { <b>pir pir</b> } [ <b>be</b> <i>peak-burst</i> ] [ <b>conform-action</b> <i>action</i> [ <b>exceed-action</b> <i>action</i> [ <b>violate-action</b> <i>action</i> ]]]	Configures traffic policing and specifies multiple actions applied to packets marked as conforming to, exceeding, or violating a specific rate. Use one line per action that you want to specify. Enters policy-map class police configuration mode.

## Verifying the Multiple Policer Actions Configuration

To verify that the multiple policer actions have been configured on the interface, use the following command in EXEC or privileged EXEC mode:

Command	Purpose
Router# <b>show policy-map interface</b>	Displays statistics and configurations of all input and output policies attached to an interface.

## Troubleshooting Tips

- Check the interface type. Verify that your interface is not listed as a nonsupported interface in the “Restrictions” section of this document.
- For input traffic policing on a Cisco 7500 series router, verify that CEF or dCEF is configured on the interface on which traffic policing is configured.
- For output traffic policing on a Cisco 7500 series router, ensure that the incoming traffic is CEF-switched or dCEF-switched. Traffic policing cannot be used on the switching path unless CEF or dCEF switching is enabled.

## Monitoring and Maintaining the Multiple Policer Actions

To monitor and maintain the multiple policer actions, use the following EXEC or privileged EXEC mode commands, as needed:

Command	Purpose
Router# <b>show policy-map</b>	Displays all configured policy maps.
Router# <b>show policy-map</b> <i>policy-map-name</i>	Displays the user-specified policy map.
Router# <b>show policy-map interface</b>	Displays statistics and configurations of all input and output policies that are attached to an interface.

## Configuration Examples

This section provides the following configuration examples:

- [Multiple Actions in a Two-Rate Policer: Example, page 6](#)
- [Verifying the Multiple Policer Actions: Example, page 7](#)

### Multiple Actions in a Two-Rate Policer: Example

In the following example, a policy map called `police` is configured to use a two-rate policer to police traffic leaving an interface. Two rates, a committed information rate (CIR) of 1 Mbps and a peak information rate (PIR) of 2 Mbps, have been specified.

```
Router(config)# policy-map police
Router(config-pmap)# class class-default
Router(config-pmap-c)# police cir 1000000 pir 2000000
Router(config-pmap-c-police)# conform-action transmit
Router(config-pmap-c-police)# exceed-action set-prec-transmit 4
Router(config-pmap-c-police)# exceed-action set-frde
```

```
Router(config-pmap-c-police)# violate-action set-prec-transmit 2
Router(config-pmap-c-police)# violate-action set-frde-transmit
Router(config-pmap-c-police)# end
```

The following actions will be performed on packets associated with the policy map called police:

- All packets marked as conforming to these rates (that is, packets conforming to the CIR) will be transmitted unaltered.
- All packets marked as exceeding these rates (that is, packets exceeding the CIR but not exceeding the PIR) will be assigned an IP Precedence level of 4, the DE bit will be set to 1, and then transmitted.
- All packets marked as violating the rate (that is, exceeding the PIR) will be assigned an IP Precedence level of 2, the DE bit will be set to 1, and then transmitted.

## Verifying the Multiple Policer Actions: Example

The following sample output of the **show policy-map** command displays the configuration for a service policy called police. In this service policy, multiple actions for packets marked as exceeding the specified CIR rate have been configured. For those packets, the IP Precedence level is set to 4, the DE bit is set to 1, and the packet is transmitted. Multiple actions for packets marked as violating the specified PIR rate have also been configured. For those packets, the IP Precedence level is set to 2, the DE bit is set to 1, and the packet is transmitted.

```
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
```

## Command Reference

The following commands are introduced or modified in the feature or features documented in this module. For information about these commands, see the *Cisco IOS Quality of Service Solutions Command Reference* at [http://www.cisco.com/en/US/docs/ios/qos/command/reference/qos\\_book.html](http://www.cisco.com/en/US/docs/ios/qos/command/reference/qos_book.html). For information about all Cisco IOS commands, use the Command Lookup Tool at <http://tools.cisco.com/Support/CLILookup> or a Cisco IOS master commands list.

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

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