Traffic Policing

This feature module describes the Traffic Policing feature. Traffic policing allows you to control the maximum rate of traffic transmitted or received on an interface.

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

Contents

This document includes the following sections:

- Feature Overview, page 1
- Supported Platforms, page 3
- Supported Standards, MIBs, and RFCs, page 4
- Prerequisites, page 4
- Configuration Tasks, page 4
- Monitoring and Maintaining Traffic Policing, page 5
- Configuration Examples, page 5
- Command Reference, page 6

Feature Overview

The Traffic Policing feature performs the following functions:

- Limits the input or output transmission rate of a class of traffic based on user-defined criteria
- Marks packets by setting the ATM Cell Loss Priority (CLP) bit, Frame Relay Discard Eligibility (DE) bit, IP precedence value, IP differentiated services code point (DSCP) value, MPLS experimental value, and Quality of Service (QoS) group.
The Traffic Policing feature is applied when you attach a traffic policy containing the Traffic Policing configuration to an interface. A traffic policy is configured using the Modular Quality of Service (QoS) Command-Line Interface (CLI) (MQC).

Table 1 lists the feature history.

<table>
<thead>
<tr>
<th>Cisco IOS Release</th>
<th>Enhancement</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(5)T</td>
<td>This command was introduced for Cisco IOS Release 12.1 T. A new Traffic Policing algorithm was introduced. The violate-action option became available. This feature became available on Cisco 2600, 3600, 4500, 7200, and 7500 series routers.</td>
</tr>
<tr>
<td>12.2(2)T</td>
<td>The set-clp-transmit option for the action argument was added to the police command. The set-frde-transmit option for the action argument was added to the police command. However, the set-frde-transmit option is not supported for Any Transport over Multiprotocol Label Switching (MPLS) (AToM) traffic in this release. The set-mpls-exp-transmit option for the action argument was added to the police command.</td>
</tr>
<tr>
<td></td>
<td>Cisco IOS</td>
</tr>
</tbody>
</table>

**Benefits**

**Bandwidth Management Through Rate Limiting**

Traffic policing allows you to control the maximum rate of traffic transmitted or received on an interface. Traffic policing is often configured on interfaces at the edge of a network to limit traffic into or out of the network. In most Traffic Policing configurations, traffic that falls within the rate parameters is transmitted, whereas traffic that exceeds the parameters is dropped or transmitted with a different priority.

**Packet Marking**

Packet marking allows you to partition your network into multiple priority levels or classes of service (CoS). A packet is marked and these markings can be used to identify and classify traffic for downstream devices. In some cases, such as ATM Cell Loss Priority (CLP) marking or Frame Relay Discard Eligibility (DE) marking, the marking is used to classify traffic.

- Use traffic policing to set the IP precedence or DSCP values for packets entering the network. Networking devices within your network can then use the adjusted IP precedence values to determine how the traffic should be treated. For example, the Weighted Random Early Detection (WRED) feature uses the IP precedence values to determine the probability that a packet will be dropped.
- Use traffic policing to assign packets to a QoS group. The router uses the QoS group to determine how to prioritize packets within the router.

Traffic can be marked without using the Traffic Policing feature. If you want to mark traffic but do not want to use Traffic Policing, see the “Marking Network Traffic” module.
Packet Prioritization for Frame Relay Frames
The Traffic Policing feature allows users to mark the Frame Relay DE bit of the Frame Relay frame. The Frame Relay DE bit is one bit and, therefore, can be set to either 0 or 1. In congested environments, frames with the DE bit set to 1 are discarded before frames with the DE bit set to 0.

Packet Prioritization for ATM Cells
The Traffic Policing feature allows users to mark the ATM CLP bit in ATM cells. The ATM CLP bit is used to prioritize packets in ATM networks. The ATM CLP bit is one bit and, therefore, can be set to either 0 or 1. In congested environments, cells with the ATM CLP bit set to 1 are discarded before cells with the ATM CLP bit set to 0.

Restrictions

- On a Cisco 7500 series router, traffic policing can monitor Cisco Express Forwarding (CEF) switching paths only. In order to use the Traffic Policing feature, Cisco Express Forwarding 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.
- Traffic policing can be configured on an interface or a subinterface.
- Traffic policing is not supported on the following interfaces:
  - Fast EtherChannel
  - Tunnel

Note: Traffic policing is supported on tunnels that are using the Cisco generic routing encapsulation (GRE) tunneling protocol.

- PRI
- Any interface on a Cisco 7500 series router that does not support Cisco Express Forwarding

Supported Platforms

- Cisco 2500 series

Note: Cisco IOS Release 12.2(2)T or later does not run on Cisco 2500 series routers.

- Cisco 2600 series
- Cisco 3640 routers
- Cisco 4500 series
- Cisco 7000 series with RSP7000
- Cisco 7100 series
- Cisco 7200 series
- Cisco 7500 series
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, the Cisco 3640 router, and the 4500 series router). For more information, see the documentation for your specific router.

## Supported Standards, MIBs, and RFCs

### Standards
No new or modified standards are supported by this feature.

### MIBs

**Class-Based Quality of Service MIB**
- CISCO-CLASS-BASED-QOS-MIB
- CISCO-CLASS-BASED-QOS-CAPABILITY-MIB


### RFCs
- RFC 2697, *A Single Rate Three Color Marker*

## Prerequisites

On a Cisco 7500 series router, Cisco Express Forwarding (CEF) must be configured on the interface before traffic policing can be used.

## Configuration Tasks

See the following sections for configuration tasks for the Traffic Policing feature.

- **Configuring Traffic Policing** (Required)
Configuring Traffic Policing

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>Router(config-pmap-c)# police bps burst-normal burst-max conform-action action exceed-action action violate-action action</code></td>
<td>Specifies a maximum bandwidth usage by a traffic class.</td>
</tr>
</tbody>
</table>

**Note** The Traffic Policing feature works with a token bucket mechanism. There are currently two types of token bucket algorithms: a single token bucket algorithm and a two token bucket algorithm. A single token bucket system is used when the `violate-action` option is not specified, and a two token bucket system is used when the `violate-action` option is specified.

Troubleshooting Tips

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

Monitoring and Maintaining Traffic Policing

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>Router# show policy-map</code></td>
<td>Displays all configured policy maps.</td>
</tr>
<tr>
<td><code>Router# show policy-map policy-map-name</code></td>
<td>Displays the user-specified policy map.</td>
</tr>
<tr>
<td><code>Router# show policy-map interface</code></td>
<td>Displays statistics and configurations of all input and output policies that are attached to an interface.</td>
</tr>
</tbody>
</table>

Configuration Examples

This section provides the following configuration example:

- Example: Configuring a Service Policy that Includes Traffic Policing, page 6
Example: Configuring a Service Policy that Includes Traffic Policing

The following configuration shows how to define a traffic class (with the class-map command) and associate that traffic class with a traffic policy (with the policy-map command). Traffic policing is applied in the traffic policy. The service-policy command is then used to attach the traffic policy to the interface.

In this example, traffic policing is configured with the average rate at 8000 bits per second, the normal burst size at 1500 bytes, and the excess burst size at 4000 bytes. Packets coming into Fast Ethernet interface 0/0 are evaluated by the token bucket algorithm to analyze whether packets conform, exceed, or violate the parameters. Packets that conform are transmitted, packets that exceed are assigned a QoS group value of 4 and are transmitted, packets that violate are dropped.

Router(config)# class-map acgroup2
Router(config-cmap)# match access-group 2
Router(config-cmap)# exit
Router(config)# policy-map police
Router(config-pmap)# class acgroup2
Router(config-pmap-c)# police 8000 1500 4000 conform-action transmit exceed-action set-qos-transmit 4 violate-action drop
Router(config-pmap-c)# exit
Router(config-pmap)# exit
Router(config)# interface fastethernet 0/0
Router(config-if)# service-policy input police

Command Reference

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