



# QoS—Partial Support for Ingress Hierarchical Policing for the Cisco 12000 4-port Gigabit Ethernet ISE Line Card

This feature creates the result of a 2-level hierarchical traffic policing policy by combining the **rate-limit** interface configuration command with a flat policy map. This feature is implemented only for the ingress interfaces and subinterfaces of the Cisco 12000 4-port Gigabit Ethernet ISE line card.

## Feature History for QoS—Partial Support for Ingress Hierarchical Policing for the Cisco 12000 4-port Gigabit Ethernet ISE Line Card

Release	Modification
12.0(30)S1	The feature was introduced for the Cisco 12000 4-port GE ISE line card.
12.0(31)S	This feature was marketed as part of the major release.

## 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.

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## Restrictions for QoS—Partial Support for Ingress Hierarchical Policing for the Cisco 12000 4-port Gigabit Ethernet ISE Line Card

- This feature is supported only on ingress interfaces or subinterfaces of the Cisco 12000 4-port Gigabit Ethernet ISE line card.
- Nested policy maps (also known as, hierarchical policy maps) are not supported.
- Do not use the ACL-based **rate-limit**, **continue**, and **set** actions with this feature.
- Percentage-based policing is not supported.
- Only the **transmit** and **drop** actions are supported for the **rate-limit** command.
- **Random-detect** and **police** cannot be configured in the same class if **rate-limit** is also configured on the interface.
- The implementation of the **police** and **rate-limit** interface configuration commands described in this feature are not supported for IPv6.
- Any Transport over MPLS (AToM) is not supported.

## Information About QoS—Partial Support for Ingress Hierarchical Policing for the Cisco 12000 4-port Gigabit Ethernet ISE Line Card

When applied to Service Provider edge and core routers (termed PE and P routers respectively), Cisco IOS Modular Quality of Service CLI (MQC) configurations can police and shape service provider bandwidth in accordance with service level agreements (SLAs). For installations in which the customer edge router (CE) is unmanaged, service providers may choose to classify and police traffic on the ingress interfaces of the PE routers. Hierarchical MQC policy maps can ordinarily be configured for these cases, but hierarchical policy maps are not supported on the ingress interfaces of the Cisco 12000 4-port Gigabit Ethernet ISE line card.

Beginning with Cisco IOS Release 12.0(30)S1, you can combine the **rate-limit** interface configuration command with a flat policy map to attain the same result as a 2-level hierarchical policy for policing ingress interfaces. In addition, the **rate-limit** command can now be applied to Gigabit Ethernet subinterfaces. An example of a 2-level hierarchical policy map is shown in the left column of [Table 1](#). The implementation for the Cisco 12000 4-port Gigabit Ethernet ISE line card is shown in the right column.

**Table 1 Comparison of Unsupported and Supported Hierarchical Policing**

Unsupported 2-Level Policing with Hierarchical Policy Map	Supported 2-Level Policing with the Rate-limit Command
<pre> policy-map parent   Class class-default     police cir 200000000 bc 100000 be 100000     exceed-action drop     service-policy child  policy-map child   class prec1     police cir 100000000 bc 3125000 be 3125000     conform-action set-prec-transmit 3     exceed-action drop   class prec2     police cir 100000000 bc 3125000 be 3125000     conform-action transmit     exceed-action drop   class prec3     police cir 100000000 bc 3125000 be 3125000     conform-action transmit     exceed-action drop  class-map match-any Prec1   Match ip precedence 1 class-map match-any Prec2   Match ip precedence 2 class-map match-any Prec3   Match ip precedence 3  interface gigabitEthernet 1/0.1   service-policy input parent </pre>	<pre> policy-map 3class   class prec1     police cir 100000000 bc 3125000 be 3125000     conform-action set-prec-transmit 3     exceed-action drop   class prec2     police cir 100000000 bc 3125000 be 3125000     conform-action transmit     exceed-action drop   class prec3     police cir 100000000 bc 3125000 be 3125000     conform-action transmit     exceed-action drop  class-map match-any Prec1   Match ip precedence 1 class-map match-any Prec2   Match ip precedence 2 class-map match-any Prec3   Match ip precedence 3  interface gigabitEthernet 1/0.1   service-policy input 3class   rate-limit input 200000000 100000 100000   conform-action transmit exceed-action drop </pre>

The hierarchical policing policy map in the left column of [Table 1](#) first executes the police action of the nested policy map, “child,” and secondly, the main policy map, “parent.” The action invoked in the parent policy is the **police** command with only **conform-action** and **exceed-action** options specified for class-default traffic. The child level consists of a flat policy that can be configured with any action or class within the current restrictions of the hardware and the Cisco IOS release version. Thus, precedence 1 traffic from the customer edge router is policed to 100 megabits per second, with conforming packets retransmitted and remarked as precedence 3. Precedence 2 and precedence 3 traffic is policed to 100 megabits per second and is retransmitted, and all other traffic is policed to 200 megabits per second and retransmitted.

The supported workaround in the right column of [Table 1](#) simulates the functionality of the 2-level policing hierarchical policy. Because the rate-limit feature can police traffic, the **rate-limit** command simulates the parent level and a flat policy-map simulates the child level. The flat policy-map is always executed before the **rate-limit** command, and packets not dropped by the policy-map are then filtered by the **rate-limit** feature. Packets dropped by the policy map filters are not counted in the rate-limit statistics.

# Configuration Examples for QoS—Partial Support for Ingress Hierarchical Policing for the Cisco 12000 4-port Gigabit Ethernet ISE Line Card

No changes are introduced in the CLI for the **rate-limit** and **police** commands.

Use the **show interfaces rate-limit** command to display rate limit counters. Use the **show policy-map interface gigabitEthernet slot/port** command to display the policy map statistics.

## Police and Rate Limit:—Example

In this example, a policy map defines four classes of traffic as Class-1, Class-2, Class-3, and Class-4. The defined classes are policed to 9 Mbps each with a rate-limit on the entire Gigabit Ethernet interface set to 30 Mbps. When 10 Mbps of traffic is generated for 5 seconds (50,000 packets) for classes 1, 2, 4, and default class, the police and rate-limit commands filter the 40 Mbps of total traffic to approximately 30 Mbps total throughput, with each class of traffic contributing only the allowed 9 Mbps of traffic each. No traffic is generated for class-3 in this example.

### The Policy Map

```
policy-map Police-1
class Class-1
police cir 9000000 bc 4500 be 4500
class Class-2
police cir 9000000 bc 4500 be 4500
class Class-3
police cir 9000000 bc 4500 be 4500
class Class-4
police cir 9000000 bc 4500 be 4500
```

### Running Configuration File of the Interface

```
Router# show running-conf interface g2/0
Building configuration...
Current configuration : 284 bytes
!
interface GigabitEthernet2/0
ip address 10.0.0.0 255.255.255.255

no ip directed-broadcast
rate-limit input 30000000 100000 200000 conform-action transmit exceed-action
drop
no ip mroute-cache
load-interval 30
negotiation auto
no cdp enable
service-policy input Police-1
end
```

**Policy Map Definitions, Byte, and Packet Counters**

```

Router# show policy-map interface gigabitEthernet 2/0
GigabitEthernet2/0

Service-policy input: Police-1 (1182)

Class-map: Class-1 (match-any) (1183/3)
 50000 packets, 6000000 bytes
 30 second offered rate 1366000 bps, drop rate 85000 bps
Match: mpls experimental 1 (1184)
Match: precedence 1 (1185)
police:
 9008000 bps, 4504 limit, 4504 extended limit
 conformed 46951 packets, 5634120 bytes; actions:
  transmit
 exceeded 3049 packets, 365880 bytes; actions:
  drop
 conformed 1283000 bps, exceed 85000 bps

Class-map: Class-2 (match-any) (1187/2)
 50000 packets, 6000000 bytes
 30 second offered rate 1366000 bps, drop rate 85000 bps
Match: mpls experimental 2 (1188)
Match: precedence 2 (1189)
police:
 9008000 bps, 4504 limit, 4504 extended limit
 conformed 46952 packets, 5634240 bytes; actions:
  transmit
 exceeded 3048 packets, 365760 bytes; actions:
  drop
 conformed 1283000 bps, exceed 85000 bps

Class-map: Class-4 (match-any) (1191/8)
 50000 packets, 6000000 bytes
 30 second offered rate 1366000 bps, drop rate 85000 bps
Match: mpls experimental 4 (1192)
Match: precedence 4 (1193)
police:
 9008000 bps, 4504 limit, 4504 extended limit
 conformed 46952 packets, 5634240 bytes; actions:
  transmit
 exceeded 3048 packets, 365760 bytes; actions:
  drop
 conformed 1283000 bps, exceed 85000 bps

Class-map: Class-3 (match-any) (1291/1)
 0 packets, 0 bytes
 30 second offered rate 0 bps, drop rate 0 bps
Match: mpls experimental 3 (1292)
Match: precedence 3 (1293)
police:
 9008000 bps, 4504 limit, 4504 extended limit
 conformed 0 packets, 0 bytes; actions:
  transmit
 exceeded 0 packets, 0 bytes; actions:
  drop
 conformed 0 bps, exceed 0 bps

Class-map: class-default (match-any) (1195/0)
 50000 packets, 6000000 bytes
 30 second offered rate 1366000 bps, drop rate 0 bps
Match: any (1196)

```

### Rate-Limit Packet and Byte Count for the Interface

```
Router# show interfaces g2/0 rate-limit
GigabitEthernet2/0
  Input
    matches: all traffic
    params: 30000000 bps, 100000 limit, 200000 extended limit
    conformed 157346 packets, 18876032 bytes; action: transmit
    exceeded 33607 packets, 4032840 bytes; action: drop
    last packet: 24ms ago, current burst: 0 bytes
    last cleared 00:07:33 ago, conformed 332863 bps, exceeded 71115 bps
```



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**Note** Only packets that pass through the policy-map filters are counted in the rate-limit statistics.

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## Additional References

The following sections provide references related to QoS—Partial Support for Ingress Hierarchical Policing for the Cisco 12000 4-port Gigabit Ethernet ISE Line Card.

### Related Documents

Related Topic	Document Title
Descriptions of software functionality added in Cisco IOS Release 12.0S to support the 4-port Gigabit Ethernet ISE line card.	<a href="#">4-Port Gigabit Ethernet ISE Line Card for Cisco 12000 Series Internet Router</a>
Library of Cisco IOS 12.0S feature documents written for the Cisco 12000 series router.	<a href="#">Cisco IOS Release 12.0S Features for Cisco 12000 Series Internet Router</a>
Descriptions of QoS concepts and configurations.	<a href="#">Cisco IOS Quality of Service Solutions Configuration Guide, Release 12.2</a>
QoS command reference.	<a href="#">Cisco IOS Quality of Service Solutions Command Reference, Release 12.2</a>

### Standards

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

### MIBs

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

### RFCs

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

## 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.	<a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a>

## Command Reference

There are no new comands for this feature.

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