



Quality of Service Commands on Cisco IOS-XR Software

This chapter describes the commands used to display and configure quality of service (QoS) on Cisco IOS-XR software. QoS expedites the handling of mission-critical applications, while sharing network resources with noncritical applications. QoS also ensures available bandwidth and minimum delays required by time-sensitive multimedia and voice applications. It also gives network managers control over network applications, improves cost-efficiency of WAN connections, and enables advanced differentiated services.

bandwidth (QoS)

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

bandwidth { *bandwidth-kbps* | **percent** *value* }

no bandwidth { *bandwidth-kbps* | **percent** *value* }

Syntax Description

| | |
|-----------------------------|------------------------------------------------------------------------------------------------------------------|
| <i>bandwidth-kbps</i> | Amount of bandwidth, in number of kilobits (kbps), to be assigned to the class. The range is from 8 to 4000000. |
| percent <i>value</i> | Amount of guaranteed bandwidth, based on an absolute percent of available bandwidth. The range is from 1 to 100. |

Defaults

No bandwidth is specified.

Command Modes

Policy map class configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

The **bandwidth** command is used to configure bandwidth guarantees for a class. It specifies the minimum bandwidth guaranteed for the class.

Bandwidth Command Restrictions

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

- The amount of bandwidth configured should be large enough to also accommodate Layer 2 overhead.
- A policy map can have all the class bandwidths specified in kbps or all the class bandwidths specified in percentages but not a mix of both in the same class.
- The guaranteed bandwidth feature is supported only in egress policies, therefore, the **bandwidth** command can only be configured in egress policies.

Examples

The following example guarantees 50% of the interface bandwidth to class c1 and 10% of the interface bandwidth to class c2:

```
RP/0/RP1/CPU0:router (config) # policy-map p1
RP/0/RP1/CPU0:router (config-pmap) # class c1
```

```
RP/0/RP1/CPU0:router(config-pmap-c)# bandwidth percent 50
RP/0/RP1/CPU0:router(config-pmap)# class c2
RP/0/RP1/CPU0:router(config-pmap-c)# bandwidth percent 10
```

| Related Commands | Command | Description |
|------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| | class (policy-map) | Specifies the name of the class whose policy you want to create or change. |
| | class-map | Creates a class map to be used for matching packets to the class whose name you specify. |
| | policy-map | Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy. |
| | queue-limit | Specifies or modifies the maximum number of packets the queue can hold for a class policy configured in a policy map |
| | random-detect | Enables WRED or distributed WRED. |
| | random-detect exp | Configures the WRED and distributed WRED exponential weight factor for the average queue size calculation for the queue |
| | random-detect precedence | Configures WRED parameters for a particular IP Precedence for a class policy in a policy map |
| | show policy-map interface | Displays the configuration of all classes configured for all service policies on the specified interface. |

bandwidth remaining

To specify how to allocate left over bandwidth to various classes, use the **bandwidth remaining** command. To return to the system defaults, use the **no** form of this command.

bandwidth remaining {percent *value*}

no bandwidth remaining {percent *value*}

Syntax Description

| | |
|-----------------------------|------------------------------------------------------------------------------------------------------------------|
| percent <i>value</i> | Amount of guaranteed bandwidth, based on an absolute percent of available bandwidth. The range is from 1 to 100. |
|-----------------------------|------------------------------------------------------------------------------------------------------------------|

Defaults

No bandwidth is specified.

Command Modes

Policy map class configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

The **bandwidth remaining** command specifies a weight for the class and the Modified Deficit Round Robin (MDRR), a scheduling algorithm used in Cisco IOS-XR software. The MDRR algorithm derives the weight for each class from the bandwidth remaining value allocated to the class. If you do not configure the **bandwidth remaining** command for any class, the left over bandwidth is allocated equally to all the classes.

Examples

In the following example, class c1 is guaranteed 50% of the interface bandwidth and class c2 is guaranteed 10% of the interface bandwidth. The remaining bandwidth of 40% will be shared by class c1 and c2 in a 20:80 ratio; that is:

class c1 receives 20% of the 40%, and

class c2 receives 80% of the 40%

```
RP/0/RP0/CPU0:router(config)# policy-map p1
RP/0/RP0/CPU0:router(config-pmap)# class c1
RP/0/RP0/CPU0:router(config-pmap-c)# bandwidth percent 50
RP/0/RP0/CPU0:router(config-pmap-c) bandwidth remaining percent 20
RP/0/RP0/CPU0:router(config-pmap)# class c2
RP/0/RP0/CPU0:router(config-pmap-c)# bandwidth percent 10
RP/0/RP0/CPU0:router(config-pmap-c)# bandwidth remaining percent 80
```

class (policy-map)

To specify the name of the class whose policy you want to create or change, use the **class** command in policy-map configuration mode. To remove a class from the policy map, use the **no** form of this command.

class *class-name*

no class *class-name*

| Syntax Description | <i>class-name</i> | Name of the class for which you want to configure or modify policy. |
|--------------------|-------------------|---------------------------------------------------------------------|
|--------------------|-------------------|---------------------------------------------------------------------|

| Defaults | No class is specified. |
|----------|------------------------|
|----------|------------------------|

| Command Modes | Policy map configuration |
|---------------|--------------------------|
|---------------|--------------------------|

| Command History | Release | Modification |
|-----------------|-------------|------------------------------|
| | Release 2.0 | This command was introduced. |

| Usage Guidelines | To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the <i>Configuring AAA Services on Cisco IOS-XR Software</i> module of the <i>Cisco IOS-XR System Security Configuration Guide</i> . |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Use the **policy-map** command to identify the policy map and enter policy-map configuration mode before you use the **class** command. After you specify a policy map, you can configure policy for new classes or modify policy for any existing classes in that policy map.

The class name that you specify in the policy map ties the characteristics for that class—that is, its policy—to the class map and its match criteria configured using the **class-map** command.

| Examples | The following example configures three class policies for the policy1 policy map: class1 specifies policy for traffic that matches access control list 136, class2 specifies policy for traffic on Ethernet interface 101, and the default class is used for packets that do not satisfy configured match criteria for the other two classes: |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

```
! The following commands create class-maps class1 and class2
! and define their match criteria:
class-map class1
  match access-group 136
class-map class2
  match access-group 101
```

```
! The following commands create the policy map, which is defined to contain policy
! specification for class1, class2, and the default class:
policy-map policy1
```

```
class class1
```

class (policy-map)

```
set prec 2

class class2
set prec 3
```

Related Commands

| Command | Description |
|----------------------------|---------------------------------------------------------------------------|
| class-map | Creates a class map to be used for matching packets to a specified class. |
| policy-map | Specifies the name of the service policy to configure. |

class-map

To create a class map to be used for matching packets to the class whose name you specify, use the **class-map** command in global configuration mode. To remove an existing class map from the router, use the **no** form of this command.

```
class-map [match-any] class-map-name
```

```
no class-map class-map-name
```

Syntax Description

| | |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| match-any | (Optional) Allows the user to specify match criteria. |
| <i>class-map-name</i> | Name of the class for the class map. The class name is used for both the class map and to configure policy for the class in the policy map. |

Defaults

No default behavior or values

Command Modes

Global configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

Use this command to specify the name of the class for which you want to create or modify class map match criteria. Use of the **class-map** command enables class-map configuration mode in which you can enter one of the **match** commands to configure the match criteria for this class. Packets arriving at the output interface are checked against the match criteria configured for a class map to determine if the packet belongs to that class.

The following commands can be used in a class map:

- **match access-group**
- **match any**
- **match discard-class**
- **match dscp**
- **match precedence**
- **match mpls experimental topmost**
- **match protocol**
- **match qos-group**

If you specify more than one command in the class map, only the last command entered applies. The last command overrides the previously entered commands.

The maximum number of class-maps supported is 4K.

Examples

The following example specifies class101 as the name of a class, and it defines a class map for this class. The class101 class specifies policy for traffic that matches access control list 101.

```
RP/0/RP0/CPU0:router(config-cmap)# class-map class101
  match access-group 101
```

```
RP/0/RP0/CPU0:router(config-cmap)# class-map match-any class201
  match access-group 101
  match prec 3 4 5
```

Related Commands

| Command | Description |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| class (policy-map) | Specifies the name of the class whose policy you want to create or change, and the default class called class-default before you configure its policy. |
| match access-group | Configures the match criteria for a class map based on the specified ACL number. |
| match any | Configures the match criteria for a class map to be based on the remaining traffic after other match criteria have been specified. |
| match dscp | Configures a specific DSCP value as a match criterion. |
| match mpls experimental topmost | Configures an precedence value as a match criterion. |

clear qos counters

To clear QoS counters for a specified interface, use the **clear qos counters** command in EXEC mode.

```
clear qos counters type instance [input | output]
```

| Syntax Description | |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>type</i> | Interface type. For more information, use the question mark (?) online help function. |
| <i>instance</i> | <p>Either a physical interface instance or a virtual interface instance:</p> <ul style="list-style-type: none"> Physical interface instance. Naming notation is rack/slot/module/port, and a slash mark between values is required as part of the notation. <ul style="list-style-type: none"> rack: Chassis number of the rack. slot: Physical slot number of the line card. module: Module number. A Physical Layer Interface Module (PLIM) is always 0. port: Physical port number of the interface. Virtual interface instance. Number range will vary depending on interface type. <p>For more information about the syntax for the router, use the question mark (?) online help function.</p> |
| input | (Optional) Clears input QoS counters that are attached to the specified interface. |
| output | (Optional) Clears output QoS counters that are attached to the specified interface. |

| Command Modes | |
|---------------|------|
| | EXEC |

| Command History | Release | Modification |
|-----------------|-------------|------------------------------|
| | Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

The **clear qos counters** command clears all input and output QoS counters that are attached to a specified interface, unless the **input** or **output** keyword is specified. If the **input** or **output** keyword is specified, only counters attached to the interface in specified direction are cleared.

Examples

The following example clears QoS counters attached to the POS interface 0/7/0/3:

```
RP/0/RP0/CPU0:router# clear qos counters POS 0/7/0/3
```

The following example clears output QoS counters attached to the POS interface 0/7/0/3:

```
RP/0/RP0/CPU0:router# clear qos counters POS 0/7/0/3 output
```

match access-group

To configure the match criteria for a class map based on the specified access control list (ACL) number, use the **match access-group** command in class map configuration mode. To remove ACL match criteria from a class map, use the **no** form of this command.

```
match access-group {ipv4} access-group-name
```

```
no match access-group {ipv4} access-group-name
```

Syntax Description

| | |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| ipv4 | Specifies the name of the IPv4 access group to be matched. |
| <i>access-group-name</i> | ACL whose contents are used as the match criteria against which packets are checked to determine if they belong to this class. |

Defaults

No match criteria are configured.

Command Modes

Class map configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

For class-based features (such as marking, modified deficit round robin [MDRR], and policing), you define traffic classes based on match criteria including ACLs and input interfaces. Packets satisfying the match criteria for a class constitute the traffic for that class.

The **match access-group** command specifies an ACL whose contents are used as the match criteria against which packets are checked to determine if they belong to the class specified by the class map.

To use the **match access-group** command, you must first enter the **class-map** command to specify the name of the class whose match criteria you want to establish. After you identify the class, you can use one of the following commands to configure its match criteria:

- **match access-group**
- **match any**
- **match dscp**
- **match protocol**
- **match precedence**

If you specify more than one command in a class map, only the last command entered applies. The last command overrides the previously entered commands.

match access-group**Examples**

The following example specifies a class map called map1 and configures map1 to be used as the match criteria for this class:

```
RP/0/RP0/CPU0:router(config-cmap)# class-map map1  
  match access-group map1
```

Related Commands

| Command | Description |
|----------------------------|---------------------------------------------------------------------------|
| class-map | Creates a class map to be used for matching packets to a specified class. |
| policy-map | Specifies the name of the service policy to configure. |

match any

To configure the match criteria for a class map to be successful match criteria for all packets, use the **match any** command in class map configuration mode. To remove match criteria from a class map, use the **no** form of this command.

match any

no match any

Syntax Description

This command has no arguments or keywords.

Defaults

No match criteria are specified.

Command Modes

Class map configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

For class-based features (such as marking, modified deficit round robin [MDRR], and policing), you define traffic classes based on match criteria including access control lists and input interfaces. Packets satisfying the match criteria for a class constitute the traffic for that class. The maximum number of match criteria configurable in one class-map is 8.

The **match any** command specifies that the remaining traffic (after the other match criteria are met) is considered to belong to the class specified by the class map.

To use the **match any** command, you must first enter the **class-map** command to specify the name of the class whose match criteria you want to establish. After you identify the class, you can use one of the following commands to configure its match criteria:

- **match access-group**
- **match any**
- **match dscp**
- **match precedence**

The **match any** command is always considered after any other class maps in a policy, regardless of the order in which the commands were entered.

match any

Examples

The following example configures a policy map that matches all packets having the precedence routing, and marks them with the new precedence flash-override. It also marks all other packets with the precedence immediate:

```
RP/0/RP0/CPU0:router(config-cmap)# class-map c1
  match precedence routing
```

```
RP/0/RP0/CPU0:router(config-cmap)# class-map c2
  match any
```

```
RP/0/RP0/CPU0:router(config-cmap)# policy-map p1
  class c2
    set precedence immediate
```

```
  class c1
    set precedence flash-override
```

Related Commands

| Command | Description |
|---------------------------|---------------------------------------------------------------------------|
| class-map | Creates a class map to be used for matching packets to a specified class. |

match discard-class

To use specified discard class values in a class map to match packets, use the **match discard-class** command in class map configuration mode. To remove a specified card class value from the matching criteria for a class map, use the **no** form of this command.

match discard-class *discard-class-value* [*discard-class-value1* ... *discard-class-value7*]

no match discard-class *discard-class-value* [*discard-class-value1* ... *discard-class-value7*]

Syntax Description

| | |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <i>discard-class-value</i> | Discard class identifier, specified as an integer from 1 to 7. Up to seven discard class identifiers can be specified to match packets. |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|

Defaults

Packets will not be classified as expected.

Command Modes

Class map configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

The **match discard-class** command is used to set the match criteria for examining discard classes marked on the packet. Up to seven discard class values can be matched in one match statement. For example, **match discard-class 1 2 3 4 5 6 7** returns matches for discard class variables 1, 2, 3, 4, 5, 6, and 7. Only one of the discard class values must be a successful match criterion, not all of the specified discard class values.

The discard class value is used as a matching criterion only. The value has no mathematical significance. For instance, the discard class value 2 is not greater than 1. The value simply indicates that a packet marked with the discard class of 2 should be treated differently than a packet marked with a discard class value of 1.

Examples

The following example shows a service policy called policy1 attached to an interface. In this example, class map discardclass5 will evaluate all packets leaving POS interface 0/2/0/1 for a discard-class value of 5. Packets marked with the discard-class value of 5 will be queued to a class queue with the bandwidth setting 300 kbps.zx

```
RP/0/RP0/CPU0:router(config)# class-map discard-class5
  match discard-class 5
  exit
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config)# class discard-class5
```

■ match discard-class

```
    bandwidth 300
    exit
  exit
RP/0/RP0/CPU0:router(config)# interface POS 0/2/0/1
  service-policy output policy1
```

Related Commands

| Command | Description |
|--------------------------------|---------------------------------------------------------------------------|
| class-map | Specifies the user-defined name of the traffic class. |
| policy-map | Specifies the name of the service policy to configure. |
| service-policy | Specifies the name of the service policy to be attached to the interface. |
| set qos-group | Specifies the QoS group value for packets. |

match dscp

To identify a specific IP differentiated service code point (DSCP) value as a match criterion, use the **match dscp** command in class map configuration mode. To remove a DSCP value from a class map, use the **no** form of this command.

```
match dscp {ipv4} dscp-value [dscp-value1 ... dscp-value7]
```

```
no match dscp {ipv4} dscp-value [dscp-value1 ... dscp-value7]
```

Syntax Description

| | |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ipv4 | Specifies the IPv4 DSCP value. |
| <i>dscp-value</i> | Specifies the exact value from 1 to 7 used to identify an DSCP value. Up to eight IP DSCP values can be specified to match packets. Reserved keywords can be specified instead of numeric values. Table 8 describes the reserved keywords. |

Defaults

Matching on IP Version (IPv4) packets is the default.

Command Modes

Class map configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

The **match dscp** command examines the higher order 6 bits in the type of service (ToS) byte of the IP header. Up to eight IP DSCP values can be matched in one match statement. For example, if you wanted the IP DSCP values of 1, 2, 3, 4, 5, 6, and 7 (note that only one of the IP DSCP values must be a successful match criterion, not all of the specified IP DSCP values), enter the **match ip dscp 1 2 3 4 5 6 7** command.

The IP DSCP value is used as a matching criterion only. The value has no mathematical significance. For instance, the IP DSCP value 2 is not greater than 1. The value simply indicates that a packet marked with the discard class of 2 should be treated differently than a packet marked with a discard class value of 1. The treatment of these marked packets is defined by the user through the setting of quality of service (QoS) policies in policy map class configuration mode.

Reserved keywords such as those listed in [Table 8](#) can be specified instead of numeric values.

Table 8 IP DSCP Reserved Keywords

| DSCP Value | Reserved Keyword |
|------------|------------------|
| 0 | default |
| 10 | AF11 |
| 12 | AF12 |
| 14 | AF13 |
| 18 | AF21 |
| 20 | AF22 |
| 22 | AF23 |
| 26 | AF31 |
| 28 | AF32 |
| 30 | AF33 |
| 34 | AF41 |
| 36 | AF42 |
| 38 | AF43 |
| 46 | EF |
| 8 | CS1 |
| 16 | CS2 |
| 24 | CS3 |
| 32 | CS4 |
| 40 | CS5 |
| 48 | CS6 |
| 56 | CS7 |

Examples

The following example shows how to configure the service policy called policy1 and attach service policy policy1 to an interface. In this example, class map ipdscp15 will evaluate all packets entering POS interface 0/1/0/0 for an IP DSCP value of 15. If the incoming packet has been marked with the IP DSCP value of 15, the packet will be queued to the class queue with the bandwidth setting of 300 kbps.

```
RP/0/RP0/CPU0:router(config)# class-map ipdscp15
RP/0/RP0/CPU0:router(config-cmap)# match dscp ipv4 15
  exit
RP/0/RP0/CPU0:router(config-cmap)# policy-map policy1
  class ipdscp15
    set ip dscp AF23
  exit
  exit
RP/0/RP0/CPU0:router(config-cmap)# interface POS 0/1/0/0
  service-policy input priority55
```

| Related Commands | Command | Description |
|------------------|--------------------------------|---------------------------------------------------------------------------|
| | class-map | Specifies the user-defined name of the traffic class. |
| | service-policy | Specifies the name of the service policy to be attached to the interface. |
| | set dscp | Marks the IP DSCP value for packets within a traffic class. |

match mpls experimental topmost

To configure a class map so that the three-bit experimental field in the top-most Multiprotocol Label Switching (MPLS) labels are examined for experimental (EXP) field values, use the **match mpls experimental topmost** command in class map configuration mode. To remove EXP field values from the class map match criteria, use the **no** form of the command.

match mpls experimental topmost *exp-value* [*exp-value1* ... *exp-value7*]

no match mpls experimental topmost *exp-value* [*exp-value1* ... *exp-value7*]

Syntax Description

| | |
|------------------|----------------------------------------------------------------------------------------------------|
| <i>exp-value</i> | An EXP identifier from 0 to 7. Up to eight EXP identifiers can be specified to match MPLS headers. |
|------------------|----------------------------------------------------------------------------------------------------|

Defaults

Packets will not be classified as expected.

Command Modes

Class map configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

This command is used by the class map to identify MPLS EXP value matching on a packet.

The **match mpls experimental topmost** command examines the higher order 3 bits in the type of service (ToS) byte of the IP header. Up to four EXP values can be matched in one match statement. For example, if you wanted the EXP values of 0, 1, 2, and 3 (note that only one of the EXP values must be a successful match criterion, not all of the specified EXP values), enter the **match mpls experimental topmost 0 1 2 3** command.

The EXP value arguments are used as a matching criterion only. The value has no mathematical significance. For instance, the EXP value 2 is not greater than 1. The value indicates that a packet marked with the EXP value of 2 is different than a packet marked with the EXP value of 1. The treatment of these different packets is defined by the user through the setting of QoS policies in policy map class configuration mode.

Examples

The following example shows how to configure the service policy called policy1 and attach service policy policy1 to an interface. In this example, class map mplsmap1 will evaluate all packets entering POS interface 0/5/0/0 for an MPLS EXP value of 1. If the incoming packet has been marked with the MPLS EXP value of 1, the packet will be queued to the class queue with the bandwidth setting of 300 kbps.

```

RP/0/RP0/CPU0:router(config-cmap)# class-map mplsmap1
  match mpls experimental topmost1
  exit
RP/0/RP0/CPU0:router(config)# policy-map policy1
  class mplsmap1
    bandwidth 300
  exit
  exit
RP/0/RP0/CPU0:router(config)# interface POS 0/5/0/0
  service-policy input policy1

```

Related Commands

| Command | Description |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| class-map | The user-defined name of the traffic class. |
| match discard-class | Matches the discard class field from the packet. |
| match qos-group | Matches the QoS group field from the packet. |
| policy-map | Matches the name of the service policy to configure. |
| service-policy | Matches the name of the service policy to be attached to the interface. |
| show policy-map interface | Displays statistics and configurations of all input and output service policies that are attached to an interface. |
| set mpls experimental topmost | Sets specified EXP bits in the MPLS packet label. |

match precedence

To identify IP precedence values as match criteria, use the **match precedence** command in class map configuration mode. To remove precedence values from a class map, use the **no** form of this command.

match precedence {**ipv4**} *precedence-value* [*precedence-value1* ... *precedence-value7*]

no match precedence {**ipv4**} *precedence-value* [*precedence-value1* ... *precedence-value7*]

Syntax Description

| | |
|-------------------------|----------------------------------------------------------------------------|
| ipv4 | Specifies the IPv4 precedence value. |
| <i>precedence-value</i> | (Optional) An exact value from 1 to 7 used to identify a precedence value. |

Defaults

Matching on IP Version 4 (IPv4) packets is the default.

Command Modes

Class map configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

The **match precedence** command examines the higher order 3 bits in the type of service (ToS) byte of the IP header. Up to four precedence values can be matched in one match statement. For example, if you wanted the IP precedence values of 1, 2, and 3 (note that only one of the IP precedence values must be a successful match criterion, not all of the specified IP precedence values), enter the **match precedence 1 2 3** command.

The precedence value arguments are used as a matching criterion only. The value has no mathematical significance. For instance, the precedence value 2 is not greater than 1. The value simply indicates that a packet marked with the precedence-value of 2 is different than a packet marked with the precedence-value of 1. The treatment of these different packets is defined by the user through the setting of QoS policies in policy map class configuration mode.

[Table 9](#) lists the IP precedence value number and associated name in descending order of importance.

Table 9 IP Precedence Values and Names

| Number | Name |
|--------|----------------|
| 1 | priority |
| 2 | immediate |
| 3 | flash |
| 4 | flash-override |

Table 9 IP Precedence Values and Names (continued)

| Number | Name |
|--------|----------|
| 5 | critical |
| 6 | internet |
| 7 | network |

Examples

The following example shows how to configure the service policy called policy1 and attach service policy policy1 to an interface. In this example, class map ipprec5 will evaluate all packets entering POS interface 0/1/0/0 for an precedence value of 5. If the incoming packet has been marked with the precedence value of 5, the packet will be queued to the class queue with the bandwidth setting 300 kbps.

```
RP/0/RP0/CPU0:router(config)# class-map ipprec5
RP/0/RP0/CPU0:router(config-cmap)# match precedence ipv4 5
exit
RP/0/RP0/CPU0:router(config)# policy-map policy1
class ipprec5
  bandwidth 300
  exit
exit
RP/0/RP0/CPU0:router(config)# interface POS 0/1/0/0
service-policy input priority50
```

match protocol

To configure the match criteria for a class map on the basis of the specified protocol, use the **match protocol** command in class map configuration mode. To remove protocol-based match criteria from a class map, use the **no** form of this command.

match protocol *number name*

no match protocol *number name*

Syntax Description

| | |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>number</i> | (Optional) Protocol number. The range is from 1 to 255. |
| <i>name</i> | (Optional) Protocol name. <ul style="list-style-type: none"> • ahp—Authentication Header Protocol • eigrp—Cisco EIGRP Routing Protocol • esp—Encapsulation Security Payload • gre—Cisco GRE Tunneling • icmp—Internet Control Message Protocol • igmp—Internet Gateway Message Protocol • igrp—Cisco IGRP Routing Protocol • ipinip—IP in IP tunneling • ipv4—Any IPv4 Protocol • ipv6—Any IPv6 Protocol • mpls—Any MPLS Packet • nos—KA9Q NOS Compatible IP over IP Tunneling • ospf—OSPF Routing Protocol • pcp—Payload Compression Protocol • pim—Protocol Independent Multicast • rtp—Routing Table Protocol • sctp—Stream Control Transmission Protocol • tcp—Transport Control Protocol • udp—User Datagram Protocol |

Defaults

This command has no default behavior or values.

Command Modes

Class map configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

Definitions of traffic classes are based on match criteria including protocols, access control lists (ACLs), input interfaces, QoS labels, and EXP field values. Packets satisfying the match criteria for a class constitute the traffic for that class.

The match protocol command specifies the name of a protocol to be used as the match criteria against which packets are checked to determine if they belong to the class specified by the class map.

To use the match protocol command, you must first enter the class-map command to specify the name of the class whose match criteria you want to establish. After you identify the class, you can use one of the following commands to configure its match criteria:

- [match access-group](#)
- [match mpls experimental topmost](#)

If you specify more than one command in a class-map, only the last command entered applies. The last command overrides the previously entered commands.

Examples

In the following example, all TCP packets belong to class c11:

```
RP/0/RP0/CPU0:router(config)# class c11
RP/0/RP0/CPU0:router(config-cmap)# match protocol tcp
```

Related Commands

| Command | Description |
|------------------------------------|---------------------------------------------------------------------------------|
| class-map | Specifies the user-defined name of the traffic class. |
| match access-group | Configure the match criteria for a class map based on the specified ACL number. |
| match qos-group | Specifies QoS group values in a class map to match packets. |

match qos-group

To use specified quality of service (QoS) group values in a class map to match packets, use the **match qos-group** command in class map configuration mode. To remove a specific QoS group value from the matching criteria for a class map, use the **no** form of this command.

```
match qos-group [qos-group-value1 ... qos-group-value7]
```

```
no match qos-group [qos-group-value1 ... qos-group-value7]
```

Syntax Description

| | |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <i>qos-group-value</i> | QoS group identifier, specified as an integer from 1 to 31. Eight QoS group identifiers must be specified to match packets. |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------|

Defaults

No match criteria are specified.

Command Modes

Class map configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

The **match qos-group** command is used to set the match criteria for examining QoS groups marked on the packet. Up to eight QoS group values can be matched in one match statement. For example, **match qos-group 1 2 3 4 5 6 7** returns matches for QoS group variables 1, 2, 3, 4, 5, 6, and 7. Only one of the QoS group values must be a successful match criterion, not all of the specified QoS group values.

The QoS group value is used as a matching criterion only. The value has no mathematical significance. For instance, the QoS group value 2 is not greater than 1. The value simply indicates that a packet marked with the QoS group of 2 should be treated differently than a packet marked with a QoS group value of 1. The treatment of these different packets is defined using the **service-policy** command in policy map class configuration mode.

Examples

The following example shows a service policy called policy1 attached to an interface. In this example, class-map qosgroup5 will evaluate all packets leaving Fast Ethernet interface 1/0/0/1 for a QoS group value of 5. If the packet has been marked with the QoS group value of 5, the packet will be queued to the class queue with the bandwidth setting 300 kbps.

```
RP/0/RP0/CPU0:router (config-cmap) # class-map qosgroup5
  match qos-group 5
  exit
RP/0/RP0/CPU0:router (config) # policy-map policy1
  class qosgroup5
    bandwidth 300
```

```
    exit
  exit
RP/0/RP0/CPU0:router(config)# interface 0/1/0/0
  service-policy output policy1
```

Related Commands

| Command | Description |
|--------------------------------|---------------------------------------------------------------------------|
| class-map | Specifies the user-defined name of the traffic class. |
| policy-map | Specifies the name of the service policy to configure. |
| service-policy | Specifies the name of the service policy to be attached to the interface. |
| set qos-group | Specifies the QoS group value for packets. |

police

To configure traffic policing, use the **police** command in policy map class configuration mode. To remove traffic policing from the configuration, use the **no** form of this command.

police cir [*bc* | *be*] [**conform-action** | **exceed-action** | **violate-action**] *action* **pir**

no police cir [*bc* | *be*] [**conform-action** | **exceed-action** | **violate-action**] *action* **pir**

Syntax Description

| | |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| cir | Committed Information Rate. Average interface traffic rate in kilobits per second (kbps). Range is from 250 to 16384000. The minimum policing rate is 250 kbps; the maximum is 16.384 gigabits per second (Gbps). |
| <i>bc</i> | (Optional) Normal burst size (in kilobits). The range is from 0 to 4294967295. |
| <i>be</i> | (Optional) Excess burst size (in kilobits). The range is from 0 to 4294967295. |
| conform-action | (Optional) Action to take on packets that conform to the rate limit. Action limit: 1 |
| exceed-action | (Optional) Action to take on packets that exceed the rate limit. Action limit: 1. |
| violate-action | (Optional) Action to take on packets that violate the normal and maximum burst sizes. If the violate-action option is specified, the token bucket algorithm works with two token buckets. To configure a violate action, both the <i>be</i> argument and the exceed-action keyword must be configured. Action limit: 1. |
| <i>action</i> | (Optional) Action to take on packets. Specify one of the following keywords: <ul style="list-style-type: none"> • drop—Drops the packet. • set dscp dscp-value—Sets the differentiated services code point (DSCP) value and sends the packet. • set prec new-precedence—Sets the IP precedence and sends the packet. • set mpls experimental topmost • set discard class |
| pir | (Optional) Peak information rate. |

Defaults

No restrictions on the flow of data are applied to any interface.

Command Modes

Policy map class configuration

Command History

| Release | Modification |
|-------------|-----------------------------|
| Release 2.0 | The command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

The traffic policing feature works with a token bucket algorithm. The two types of token bucket algorithms are 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.

The **police** command can set differentiated service code point (DSCP) or precedence or discard class for IP packets, and experimental and discard-class values for Multiprotocol Label Switching (MPLS) packets.

Police action cannot set QoS group value on any type of packet. Policing can only be performed in multiples of 250 kbps.

Examples

In the following example for the MPLS case, traffic policing is configured with the average rate at 250 bps, the normal burst size at 250 kbps, and the excess burst size at 50 bps for all packets leaving POS interface 0/5/0/0:

```
RP/0/RP0/CPU0:router(config-cmap)# class-map class1
  match mpls experimental 0
  exit
```

```
RP/0/RP0/CPU0:router(config)# policy-map policy1
  class class1
    police 500 250 250 conform-action set mpls experimental3 exceed-action set mpls
    experimental4
  exit
  exit
```

```
RP/0/RP0/CPU0:router(config)# interface POS 0/5/0/0
  service-policy input policy1
```

Related Commands

| Command | Description |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| policy-map | Specifies the name of the service policy to configure. |
| service-policy | Specifies the name of the service policy to be attached to the interface. |
| show policy-map interface | Displays statistics and configurations of all input and output service policies that are attached to an interface. |

policy-map

To create or modify a policy map that can be attached to one or more interfaces to specify a service policy, use the **policy-map** command in global configuration mode. To delete a policy map, use the **no** form of this command.

policy-map *name*

no policy-map *name*

Syntax Description

| | |
|-------------|-------------------------|
| <i>name</i> | Name of the policy map. |
|-------------|-------------------------|

Defaults

A policy map does not exist until one is configured. Because a policy map is applied to an interface, no restrictions on the flow of data are applied to any interface until a policy map is created.

Command Modes

Global configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

Use the **policy-map** command to specify the name of the policy map to be created, added to, or modified before you can configure policies for classes whose match criteria are defined in a class map. Entering the **policy-map** command enables policy map configuration mode in which you can configure or modify the class policies for that policy map.

You can configure class policies in a policy map only if the classes have match criteria defined for them. You use the **class-map** and **match** commands to configure the match criteria for a class. Because you can configure a maximum of 16 classes in one policy map, no policy map can contain more than 16 class policies.

A single policy map can be attached to multiple interfaces concurrently. When you attempt to attach a policy map to an interface, the attempt is denied if the available bandwidth on the interface cannot accommodate the total bandwidth requested by class policies comprising the policy map. In this case, any policy map already attached to other interfaces is removed.

The maximum number of policy-maps supported is 1K.

Examples

The following example creates a policy map called policy1 and configures two class policies included in that policy map. Class1 specifies policy for traffic that matches access control list 136. The second class is the default class (called class default) to which packets that do not satisfy configured match criteria are directed.

```
! The following commands create class-map class1 and defines its match criteria:
RP/0/RP0/CPU0:router(config)# class-map class1
  match access-group 136
```

```
! The following commands create the policy map, which is defined to contain policy
! specification for class1 and the default class:
RP/0/RP0/CPU0:router(config)# policy-map policy1
```

```
RP/0/RP0/CPU0:router(config-cmap)# class class1
  police 100
  set ip prec 3
```

Related Commands

| Command | Description |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| class (policy-map) | Specifies the name of the class whose policy you want to create or change, and the default class called class-default before you configure its policy. |
| class-map | Creates a class map to be used for matching packets to a specified class. |
| match access-group | Configure a class map to use the specified ACL as a match criterion. |
| match any | Configures the match criteria for a class map to be based on the remaining traffic after other match criteria have been specified. |
| match dscp | Configures a specific DSCP value as a match criterion. |
| match mpls experimental topmost | Configures a precedence value as a match criterion. |
| service-policy | Attaches a policy map to an input interface, or an output interface, to be used as the service policy for that interface. |

priority (QoS)

To give priority to a class of traffic belonging to a policy map, use the **priority** command in policy map class configuration mode. To remove a previously specified priority for a class, use the **no** form of this command.

priority

no priority

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values

Command Modes Policy map class configuration

| Command History | Release | Modification |
|-----------------|-------------|------------------------------|
| | Release 2.0 | This command was introduced. |

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

The **priority** command configures low latency queueing (LLQ), providing strict priority queueing (PQ). Strict PQ allows delay-sensitive data such as voice to be dequeued and sent before packets in other queues are dequeued. When a class is marked as high priority using the **priority** command, it is recommended that you configure a policer to limit the priority traffic. This will ensure that the priority traffic does not starve all of the other traffic on the line card, which protects low priority traffic from starvation. Use the **police** command to explicitly configure the policer.

The **priority** command allows you to set up classes based on a variety of criteria (not just User Datagram Ports (UDP) ports) and assign priority to them.

The **bandwidth** and **priority** commands cannot be used in the same class, within the same policy map. These commands can be used together in the same policy map, however.

Within a policy map, you can give one or more classes priority status. When multiple classes within a single policy map are configured as priority classes, all traffic from these classes is queued to the same, single, priority queue.

Examples The following example configures priority queuing for the policy map named policy1:

```
RP/0/RP0/CPU0:router(config-pmap-c)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap-c)# class voice
RP/0/RP0/CPU0:router(config-pmap-c)# priority
```

| Related Commands | Command | Description |
|------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------|
| | bandwidth (QoS) | Specifies or modifies the bandwidth allocated for a class belonging to a policy map. |
| | police | |
| | show policy-map interface | Displays the configuration of all classes configured for all service policies on the specified interface |

queue-limit

To specify or modify the maximum number of packets the queue can hold for a class policy configured in a policy map, use the **queue-limit** command in policy map class configuration mode. To remove the queue packet limit from a class, use the **no** form of this command.

queue-limit bytes *value*

no queue-limit bytes *value*

Syntax Description

| | |
|---------------------------|--------------------------------------------------------------------------|
| bytes <i>value</i> | Maximum threshold for tail drop in bytes. Range is from 1 to 1000000000. |
|---------------------------|--------------------------------------------------------------------------|

Defaults

200 ms: maximum threshold for tail drop

10 ms: maximum threshold for high priority queues



Note

The default queue-limit is set to bytes worth 200 ms of queue bandwidth. The following formula is used to calculate the default queue limit in bytes: $\text{bytes} = (200 \text{ ms} * \text{queue_bandwidth kbps}) / 8$.

Command Modes

Policy map class configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

You can attach a single policy map to one or more interfaces to specify the service policy for those interfaces. The class policies comprising the policy map are then applied to packets that satisfy the class map match criteria for the class.

Examples

The following example sets queue-limit bytes to 1000000:

```
RP/0/RP0/CPU0:router(config)# policy policy1
RP/0/RP1/CPU0:routers(config-pmap)# class class1
RP/0/RP1/CPU0:router(config-pmap-c)# queue-limit bytes 1000000
```

| Related Commands | Command | Description |
|------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------|
| | class (policy-map) | Specifies the name of the class whose policy you want to create or change. |
| | policy-map | Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy. |

random-detect

To enable Weighted Random Early Detection (WRED) or distributed WRED (DWRED), use the **random-detect** command in policy map class configuration mode. To return the values to the default, use the **no** form of this command.

random-detect [default]

no random-detect [default]

| | |
|---------------------------|------------------------------------------------------------------------------------|
| Syntax Description | default (Optional) Enables RED with default minimum and maximum thresholds. |
|---------------------------|------------------------------------------------------------------------------------|

| | |
|-----------------|-------------------------------|
| Defaults | No default behavior or values |
|-----------------|-------------------------------|

| | |
|----------------------|--------------------------------|
| Command Modes | Policy map class configuration |
|----------------------|--------------------------------|

| | | |
|------------------------|----------------|------------------------------|
| Command History | Release | Modification |
| | Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

The default values for RED are calculated as follows:

default min_threshold = 0.03 * B

default max_threshold = 0.1 B

where B is the bandwidth for the queue.

Examples

The following example enables RED using a minimum threshold value of 1000000 and a maximum threshold value of 2000000:

```
RP/0/RP0/CPU0:router(config)# policy-map p1
RP/0/RP0/CPU0:router(config-pmap)# class c1
RP/0/RP0/CPU0:router(config-pmap-c)# random-detect 1000000 2000000
```

| | | |
|-------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Related Commands | Command | Description |
| | show policy-map interface | Displays the configuration of all classes configured for all service policies on the specified interface. |
| | random-detect precedence | Configures WRED parameters for a particular IP Precedence for a class policy in a policy map. |

random-detect discard-class

To configure the Weighted Random Early Detection (WRED) parameters for a discard-class value for a class policy in a policy map, use the **random-detect discard-class** command in policy map class configuration mode. To return the values to the default for the discard class, use the **no** form of this command.

random-detect discard-class *value*

no random-detect discard-class *value*

| | | |
|---------------------------|--------------|----------------------------------------------------|
| Syntax Description | <i>value</i> | Discard class value. Valid values are from 0 to 7. |
|---------------------------|--------------|----------------------------------------------------|

| | |
|-----------------|-------------------------------|
| Defaults | No default behavior or values |
|-----------------|-------------------------------|

| | |
|----------------------|--------------------------------|
| Command Modes | Policy map class configuration |
|----------------------|--------------------------------|

| | | |
|------------------------|----------------|------------------------------|
| Command History | Release | Modification |
| | Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

When you configure the **random-detect discard-class** command on an interface, packets are given preferential treatment based on the discard class of the packet. Use the **random-detect discard-class** command to adjust the discard class for different discard class values.

Examples

The following example set the discard class values for discard-class 3 to 1000000.

```
RP/0/RP0/CPU0:router(config)# policy-map p1
RP/0/RP0/CPU0:router(config-pmap)# class c1
RP/0/RP0/CPU0:router(config-pmap-c)# random-detect discard-class 3 1000000 2000000
```

| | | |
|-------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Related Commands | Command | Description |
| | show policy-map interface | Displays the configuration of all classes configured for all service policies on the specified interface. |
| | random-detect precedence | Configures WRED parameters for a particular IP Precedence for a class policy in a policy map. |

random-detect dscp

To change the minimum and maximum packet thresholds for the differentiated services code point (DSCP) value, use the **random-detect dscp** command in policy map class configuration mode. To return the minimum and maximum packet thresholds to the default for the DSCP value, use the no form of this command.

random-detect dscp *dscp-value*

no random-detect dscp *dscp-value*

Syntax Description

dscp-value Number from 0 to 63 that sets the DSCP value. Reserved keywords can be specified instead of numeric values. [Table 10](#) describes the reserved keywords.

Defaults

No default behavior or values

Command Modes

Policy map class configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

Reserved keywords such as those listed in [Table 10](#) can be specified instead of numeric values.

Table 10 DSCP Reserved Keywords

| DSCP Value | Reserved Keyword |
|------------|------------------|
| 0 | default |
| 10 | AF11 |
| 12 | AF12 |
| 14 | AF13 |
| 18 | AF21 |
| 20 | AF22 |
| 22 | AF23 |
| 26 | AF31 |
| 28 | AF32 |
| 30 | AF33 |

Table 10 DSCP Reserved Keywords (continued)

| DSCP Value | Reserved Keyword |
|------------|------------------|
| 34 | AF41 |
| 36 | AF42 |
| 38 | AF43 |
| 46 | EF |
| 8 | CS1 |
| 16 | CS2 |
| 24 | CS3 |
| 32 | CS4 |
| 40 | CS5 |
| 48 | CS6 |
| 56 | CS7 |

Examples

The following example shows that for packets with dscp af11, the WRED minimum threshold is 1000000 bytes, and maximum threshold is 2000000 bytes:

```
RP/0/RP0/CPU0:router(config)# policy-map p1
RP/0/RP0/CPU0:router(config-pmap)# class c1
RP/0/RP0/CPU0:router(config-pmap-c)# random-detect dscp af11 1000000 2000000
```

Related Commands

| Command | Description |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| show policy-map interface | Displays the configuration of all classes configured for all service policies on the specified interface. |
| random-detect | Enables WRED or DWRED. |
| random-detect precedence | Configures WRED parameters for a particular IP Precedence for a class policy in a policy map. |

random-detect exp

To configure the Weighted Random Early Detection (WRED) and distributed WRED (DWRED) exponential weight factor for the average queue size calculation for the queue, use the **random-detect exp** command in policy map class configuration mode. To return the value to the default, use the **no** form of this command.

random-detect exp *value*

no random-detect exp *value*

Syntax Description

value Exponential value. Valid values are from 0 to 7.

Defaults

No default behavior or values

Command Modes

Policy map class configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

Examples

The following example shows that for Multiprotocol Label Switching (MPLS) packets with exp4, the WRED minimum threshold is 1000000 bytes and maximum threshold is 2000000 bytes:

```
RP/0/RP0/CPU0:router(config)# policy-map p1
RP/0/RP0/CPU0:router(config-pmap)# class c1
RP/0/RP0/CPU0:router(config-pmap-c)# random-detect exp 4 1000000 20000
```

Related Commands

| Command | Description |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------|
| random-detect dscp | Changes the minimum and maximum packet thresholds for the DSCP value. |
| random-detect precedence | Configures WRED parameters for a particular IP Precedence for a class policy in a policy map. |
| show policy-map interface | Displays the configuration of all classes configured for all service policies on the specified interface |

random-detect precedence

To configure Weighted Random Early Detection (WRED) parameters for a particular IP Precedence for a class policy in a policy map, use the **random-detect precedence** command in policy map class configuration mode. To return the values to the default for the precedence, use the **no** form of this command.

random-detect precedence *value*

no random-detect precedence *value*

| | | |
|---------------------------|--------------|-----------------------------------------|
| Syntax Description | <i>value</i> | Discard class. Valid values are 0 to 7. |
|---------------------------|--------------|-----------------------------------------|

| | |
|-----------------|-------------------------------|
| Defaults | No default behavior or values |
|-----------------|-------------------------------|

| | |
|----------------------|--------------------------------|
| Command Modes | Policy map class configuration |
|----------------------|--------------------------------|

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 2.0 | This command was introduced. |

| | |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Usage Guidelines | To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the <i>Configuring AAA Services on Cisco IOS-XR Software</i> module of the <i>Cisco IOS-XR System Security Configuration Guide</i> . |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Examples | The following example shows that for packets with precedence 3, the WRED minimum threshold is 1000000 bytes and maximum threshold is 2000000 bytes: |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|

```
RP/0/RP0/CPU0:router(config)# policy-map p1
RP/0/RP0/CPU0:router(config-pmap)# class c1
RP/0/RP0/CPU0:router(config-pmap-c)# random-detect precedence 3 1000000 2000000
```

| Related Commands | Command | Description |
|-------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| | | bandwidth (QoS) |
| | random-detect dscp | Changes the minimum and maximum packet thresholds for the DSCP value. |
| | random-detect exp | Configures the WRED and distributed WRED exponential weight factor for the average queue size calculation for the queue. |
| | show policy-map interface | Displays the configuration of all classes configured for all service policies on the specified interface |

service-policy

To attach a policy map to an input interface or an output interface to be used as the service policy for that interface, use the **service-policy** command in global configuration mode. To remove a service policy from an input or output interface, use the **no** form of this command.

```
service-policy {input | output} policy-map
```

```
no service-policy {input | output} policy-map
```

Syntax Description

| | |
|-------------------|--------------------------------------------------------------------------------------------|
| input | Attaches the specified policy map to the input interface. |
| output | Attaches the specified policy map to the output interface. |
| <i>policy-map</i> | Name of a service policy map (created using the policy-map command) to be attached. |

Defaults

No service policy is specified.

Command Modes

Policy map class configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

You can attach a single policy map to one or more interfaces to specify the service policy for those interfaces. The class policies comprising the policy map are then applied to packets that satisfy the class map match criteria for the class.

Examples

The following example shows policy-map p1 being applied on interface POS 0/2/0/0:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# class c1
RP/0/RP0/CPU0:router(config-cmap)# match prec ipv4 1
RP/0/RP0/CPU0:router(config-cmap)# policy p1
RP/0/RP0/CPU0:router(config-pmap)# class c1
RP/0/RP0/CPU0:router(config-pmap-c)# set prec 2

RP/0/RP1/CPU0:altadena(config)# interface POS 0/2/0/0
RP/0/RP1/CPU0:altadena(config-if)# service-policy output p1
```

| Related Commands | Command | Description |
|------------------|----------------------------|--------------------------------------------------------------------------------------------------------------|
| | class-map | Specifies the user-defined name of the traffic class. |
| | policy-map | Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy. |

set discard-class

To set the discard class and QoS group identifiers on IP Version 4 (IPv4) or Multiprotocol Label Switching (MPLS) packets, use the **set discard-class** command in policy map class configuration mode. To leave the discard-class values unchanged, use the **no** form of this command.

set discard-class *discard-class-value*

no set discard-class *discard-class-value*

Syntax Description

discard-class-value Discard class ID. An integer from 1 to 7, to be marked on the packet.

Defaults

No group ID is specified.

Command Modes

Policy map class configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

This command associates a discard-class ID with a packet. Once the discard class and QoS group IDs are set, other QoS services such as Modified Deficit Round Robin (MDRR) and Weighted Random Early Detection (WRED) can operate on the bit settings.

Note that marking of the discard class and the QoS group has only local significance on a node.

Examples

The following example sets the discard class to 5 for packets that match the MPLS experimental bits 1:

```
RP/0/RP0/CPU0:router(config-pmap-c) # class-map cust1
RP/0/RP0/CPU0:router(config-pmap-c) # match mpls experimental topmost1
RP/0/RP0/CPU0:router(config-pmap-c) # exit

RP/0/RP0/CPU0:router(config-pmap) # policy-map custpol
RP/0/RP0/CPU0:router(config-pmap) # class cust1
RP/0/RP0/CPU0:router(config-pmap) # set discard-class 5
RP/0/RP0/CPU0:router(config-pmap) # exit

RP/0/RP0/CPU0:router(config) # interface POS 0/7/0/0
RP/0/RP0/CPU0:router(config) # service-policy output custpol
```

| Related Commands | Command | Description |
|------------------|--------------------------------|--------------------------------------------------------|
| | class-map | Specifies the user-defined name of the traffic class. |
| | policy-map | Specifies the name of the service policy to configure. |
| | service-policy | Attaches the service policy to an interface. |

set dscp

To mark a packet by setting the IP differentiated services code point (DSCP) in the type of service (ToS) byte, use the **set dscp** command in policy-map configuration mode. To remove a previously set differentiated service code point (DSCP) value, use the **no** form of this command.

set dscp *dscp-value*

no set dscp *dscp-value*

Syntax Description

| | |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>dscp-value</i> | Number from 0 to 63 that sets the DSCP value. Reserved keywords can be specified instead of numeric values. Table 11 describes the reserved keywords. |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Defaults

Marking is not configured.

Command Modes

Policy map class configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

Once the DSCP bit is set, other quality of service (QoS) services can then operate on the bit settings.

The network gives priority (or some type of expedited handling) to marked traffic. Typically, you set precedence at the edge of the network (or administrative domain); data then is queued based on the precedence. Modified deficit round robin (MDRR) can speed up handling for high-precedence traffic at congestion points. Weighted Random Early Detection (WRED) ensures that high-precedence traffic has lower loss rates than other traffic during times of congestion.

Reserved keywords such as those listed in [Table 11](#) can be specified instead of numeric values.

Table 11 DSCP Reserved Keywords

| DSCP Value | Reserved Keyword |
|------------|------------------|
| 0 | default |
| 10 | AF11 |
| 12 | AF12 |
| 14 | AF13 |
| 18 | AF21 |
| 20 | AF22 |

Table 11 DSCP Reserved Keywords (continued)

| DSCP Value | Reserved Keyword |
|------------|------------------|
| 22 | AF23 |
| 26 | AF31 |
| 28 | AF32 |
| 30 | AF33 |
| 34 | AF41 |
| 36 | AF42 |
| 38 | AF43 |
| 46 | EF |
| 8 | CS1 |
| 16 | CS2 |
| 24 | CS3 |
| 32 | CS4 |
| 40 | CS5 |
| 48 | CS6 |
| 56 | CS7 |

Examples

In the following example, the DSCP ToS byte is set to 8 in the policy map called policy1:

```
RP/0/RP0/CPU0:router(config-pmap-c)# policy-map policy1
  class class1
    set ip dscp 8
```

All packets that satisfy the match criteria of class1 are marked with the DSCP value of 8. How packets marked with the DSCP value of 8 are treated is determined by the network configuration.

Related Commands

| Command | Description |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| service-policy | Displays the configuration of classes configured for service policies on the specified interface or PVC. |
| set precedence | Sets the precedence value in the IP header. |
| show policy-map interface | Displays statistics and configurations of all input and output service policies that are attached to an interface. |

set mpls experimental topmost

To set the experimental (EXP) value on the Multiprotocol Label Switching (MPLS) packet top-most label, use the **set mpls experimental topmost** command in policy-map configuration mode. To leave the EXP value unchanged, use the **no** form of this command.

set mpls experimental topmost *exp-value*

no set mpls experimental topmost *exp-value*

Syntax Description

| | |
|------------------|----------------------------------------------|
| <i>exp-value</i> | The value on the MPLS top-most packet label. |
|------------------|----------------------------------------------|

Command Modes

Policy map class configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

Once the MPLS experimental bits are set, other QoS services such as modified deficit round robin (MDRR) and Weighted Random Early Detection (WRED) then operate on the bit settings.

The network gives priority (or some type of expedited handling) to the marked traffic through the application of MDRR or WRED at points downstream in the network. Typically, the MPLS experimental value is set at the edge of the network (or administrative domain) and queueing is acted on it thereafter. MDRR can speed up handling for high priority traffic at congestion points. WRED ensures that high priority traffic has lower loss rates than other traffic during times of congestion.

Examples

The following policy map sets the MPLS experimental to 5 for packets that match QoS group 3:

```
RP/0/RP0/CPU0:router(config)# class-map cust1
  match qos-group 3
  exit

RP/0/RP0/CPU0:router(config)# policy-map custpol
  class cust1
    set mpls experimental topmost5
  exit
exit

RP/0/RP0/CPU0:router(config)# interface POS 0/7/0/0
  service-policy output custpol
```

Related Commands

| Command | Description |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| class-map | Specifies the user-defined name of the traffic class. |
| policy-map | Specifies the name of the service policy to configure. |
| service-policy | Attaches a policy map to an input interface or an output interface to be used as the service policy for that interface. |

set precedence

To set the precedence value in the IP header, use the **set precedence** command in route-map configuration mode. To leave the precedence value unchanged, use the **no** form of this command.

set precedence [*number*]

no set precedence [*number*]

Syntax Description

| | |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>number</i> | (Optional). Number or name that sets the precedence bits in the IP header. The values for <i>name</i> are as follows, listed from least to most important: 0 , routine; 1 , priority; 2 , immediate; 3 , flash; 4 , flash-override; 5 , critical; 6 , internet; 7 , network). |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Defaults

Marking is not configured.

Command Modes

Policy map class configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

Precedence can be set using number or corresponding name. After IP Precedence bits are set, other QoS services such as modified deficit round robin (MDRR) and Weighted Random Early Detection (WRED) then operate on the bit settings.

The network gives priority (or some type of expedited handling) to the marked traffic through the application of MDRR or WRED at points downstream in the network. IP precedence can be set at the edge of the network (or administrative domain) and have queueing act on it thereafter. MDRR can speed up handling for high precedence traffic at congestion points. WRED ensures that high precedence traffic has lower loss rates than other traffic during times of congestion.

The mapping from keywords such as **0** (routine) and **1** (priority) to a precedence value is useful only in some instances. That is, the use of the precedence bit is evolving. You can define the meaning of a precedence value by enabling other features that use the value. In the case of high-end Internet QoS, IP precedences can be used to establish classes of service that do not necessarily correspond numerically to better or worse handling in the network.

Examples

The following policy map sets the IP precedence to 5 (critical) for packets that match the access control list named customer1:

```
RP/0/RP0/CPU0:router(config)# class-map cust1  
  match access-group customer1  
  exit
```

```
RP/0/RP0/CPU0:router(config)# policy-map custpol  
  class cust1  
    set precedence 5  
  exit  
exit
```

```
RP/0/RP0/CPU0:router(config)# interface POS 0/7/0/0  
  service-policy output custpol
```

set qos-group

To set the quality of service (QoS) group identifiers on IP Version 4 (IPv4) or Multiprotocol Label Switching (MPLS) packets, use the **set qos-group** command in policy map class configuration mode. To leave the QoS group values unchanged, use the **no** form of this command.

set qos-group *qos-group-value* [**discard-class** *discard-class-value*]

no set qos-group *qos-group-value* [**discard-class** *discard-class-value*]

Syntax Description

| | |
|----------------------------|----------------------------------------------------------------------------------|
| <i>qos-group-value</i> | QoS group ID. An integer from 1 to 31, to be marked on the packet. |
| discard-class | (Optional) Discard behavior identifier. |
| <i>discard-class-value</i> | (Optional) Discard-class ID. An integer from 1 to 7, to be marked on the packet. |

Defaults

No group ID is specified.

Command Modes

Policy map class configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

This command associates a QoS group ID with a packet. Once the MPLS experimental bits are set, other QoS services such as modified deficit round robin (MDRR) and Weighted Random Early Detection (WRED) can operate on the bit settings.

The network gives priority (or some type of expedited handling) to the marked traffic through the application of MDRR or WRED at points downstream in the network. Typically, the MPLS experimental value is set at the edge of the network (or administrative domain) and queuing is acted on it thereafter. MDRR can speed up handling for high priority traffic at congestion points. WRED ensures that high priority traffic has lower loss rates than other traffic during times of congestion.

Examples

The following example sets the QoS group to 5 for packets that match the MPLS experimental bits 1:

```
RP/0/RP0/CPU0:router(config)# class-map cust1
  match mpls experimental topmost1
  exit

RP/0/RP0/CPU0:router(config)# policy-map custpol
  class cust1
    set qos-group 5
  exit
```

```
exit
```

```
RP/0/RP0/CPU0:router(config)# interface POS 0/7/0/0  
service-policy out/put custpol
```

Related Commands

| Command | Description |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| class-map | Specifies the user-defined name of the traffic class. |
| match discard-class | Matches the QoS group value marked on the packet. |
| policy-map | Specifies the name of the service policy to configure. |
| service-policy | Attaches a policy map to an input interface or an output interface to be used as the service policy for that interface. |

shape

To shape traffic to the indicated bit rate according to the algorithm specified, use the **shape** command in policy map class configuration mode. To remove traffic shaping, use the **no** form of this command.

shape { **average** | **percent** }

no shape { **average** | **percent** }

Syntax Description

| | |
|----------------|----------------------------------------------------------------------------------|
| average | Specifies average rate shaping in kilobits. The range is from 128 to 4294967295. |
| percent | Specifies the interface bandwidth in milliseconds. The range is from 1 to 100. |

Defaults

Average or percent traffic shaping is not specified.

Command Modes

Policy map class configuration

Command History

| Release | Modification |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

Shaping is performed in multiples of 128 kbps, the minimum shaping rate.

When using the **shape** command, egress shaping is done at the L2 level and includes the L2 header in the rate calculation. Ingress shaping is done at the L3 level and does not include the L2 header in the rate calculation.

Examples

The following example sets traffic shaping to 50 milliseconds:

```
RP/0/RP0/CPU0:router(config)# policy-map p1
RP/0/RP0/CPU0:router(config-pmap)# class c1
RP/0/RP0/CPU0:router(config-pmap-c)# shape average percent 50
```

The following example sets traffic shaping to 5000000 kbps:

```
RP/0/RP0/CPU0:router(config)# policy-map p1
RP/0/RP0/CPU0:router(config-pmap)# class c1
RP/0/RP0/CPU0:router(config-pmap-c)# shape average 5000000
```

| Related Commands | Command | Description |
|------------------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| | bandwidth (QoS) | Specifies or modifies the bandwidth allocated for a class belonging to a policy map. |
| | class (policy-map) | Specifies the name of the class whose policy you want to create or change. |
| | policy-map | Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy. |
| | service-policy | Attaches a policy map to an input interface or an output interface to be used as the service policy for that interface. |

show policy-map interface

To display the configuration of all classes configured for all service policies on the specified interface, use the **show policy-map interface** command in EXEC mode.

show policy-map interface *type instance* [**input** | **output**]

| Syntax Description | |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>type</i> | Interface type. For more information, use the question mark (?) online help function. |
| <i>instance</i> | <p>Either a physical interface instance or a virtual interface instance:</p> <ul style="list-style-type: none"> Physical interface instance. Naming notation is rack/slot/module/port and a slash mark between values is required as part of the notation. <ul style="list-style-type: none"> rack: Chassis number of the rack. slot: Physical slot number of the line card. module: Module number. A Physical Layer Interface Module (PLIM) is always 0. port: Physical port number of the interface. <p>Note In references to a Management Ethernet interface located on a Route Processor card, the physical slot number is alphanumeric (RP0 or RP1) and the module is CPU0. Example: interface MgmtEth0/RP1/CPU0/0.</p> <ul style="list-style-type: none"> Virtual interface instance. Number range will vary depending on interface type. <p>For more information about the syntax for the router, use the question mark (?) online help function.</p> |
| input | (Optional) Displays only the policy configuration that is applied to data arriving on the specified interface. |
| output | (Optional) Displays only the policy configuration that is applied to data going out the specified interface. |

Command Modes EXEC

| Command History | Release | Modification |
|-----------------|-------------|------------------------------|
| | Release 2.0 | This command was introduced. |

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

Examples

The following example displays configurations for classes on output POS interface 0/7/0/3:

```
RP/0/RP0/CPU0:router# show policy-map interface POS 0/7/0/3

POS 0/7/0/3 output: p1
  Class c1
    Matched      (packets/bytes) : 0/0
    Marked (packets/bytes) : 0/0
  Class c2
    Matched      (packets/bytes) : 10/1320
POS 0/7/0/3 input: p4
  Class c3
    Matched      (packets/bytes) : 9/499
    Marked      (packets/bytes) : 0/0
```

The following example displays configuration information for classes comprising the service policy attached to POS interface 0/7/0/3 in the output direction:

```
RP/0/RP0/CPU0:router# show policy-map interface POS 0/7/0/3 output

POS 0/7/0/3 output: p1
  Class c1
    Matched      (packets/bytes) : 0/0
    Dropped     (packets/bytes) : 0/0
  Class c2
    Matched      (packets/bytes) : 10/1320
    Dropped     (packets/bytes) : 0/0
```

show qos interface

To display QoS information for a specific interface, use the **show qos interface** command in EXEC mode.

```
show qos interface type instance {input | output} location node-id
```

| Syntax Description | |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>type</i> | Interface type. For more information, use the question mark (?) online help function. |
| <i>instance</i> | <p>Either a physical interface instance or a virtual interface instance:</p> <ul style="list-style-type: none"> Physical interface instance. Naming notation is rack/slot/module/port and a slash mark between values is required as part of the notation. <ul style="list-style-type: none"> rack: Chassis number of the rack. slot: Physical slot number of the line card. module: Module number. A Physical Layer Interface Module (PLIM) is always 0. port: Physical port number of the interface. <p>Note In references to a Management Ethernet interface located on a Route Processor card, the physical slot number is alphanumeric (RP0 or RP1) and the module is CPU0. Example: interface MgmtEth0/RP1/CPU0/0.</p> <ul style="list-style-type: none"> Virtual interface instance. Number range will vary depending on interface type. <p>For more information about the syntax for the router, use the question mark (?) online help function.</p> |
| input | Displays statistics for the attached input policy. |
| output | Displays statistics for the attached output policy. |
| location <i>node-id</i> | Displays detailed QoS information for the designated node. The <i>node-id</i> argument is entered in the rack/slot/module notation. |

Defaults No default behavior or values

Command Modes EXEC

| Command History | Release | Modification |
|-----------------|-------------|------------------------------|
| | Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

Examples

The following example displays QoS information on POS interface address 0/3/1/7:

```
RP/0/RP0/CPU0:router# show qos interface POS 0/3/1/7 output
```

```
Interface TenGigE0_3_1_7 -- output policy
Total number of classes: 3
```

```
-----
LEVEL1 class: classid   = 0x1
class name              = c1
new prec                = 5
No explicit weight assigned for this class
Sharq Queue ID         = 17
This Q belongs to Group = 16
Queue Max. BW.         = 4999936
WRED not configured for this class
Policer not configured for this class
```

```
LEVEL1 class: classid   = 0x2
class name              = c2
No explicit weight assigned for this class
Sharq Queue ID         = 16
This Q belongs to Group = 16
This Q is not being shaped.
WRED not configured for this class
Policer slot #         = 224
Policer avg. kbps       = 5000000
Policer peak kbps      = 0
Policer conform action = Just TX
Policer conform action value = 0
Policer exceed action  = DROP PKT
Policer exceed action value = 0
Policer violate action  = DROP PKT
Policer violate action value = 0
```

```
LEVEL1 class: classid   = 0x0
class name              = default
No explicit weight assigned for this class
Sharq Queue ID         = 16
This Q belongs to Group = 16
Queue Max. BW.         = 10000000
WRED not configured for this class
Policer not configured for this class
```

■ show qos interface