



Low Latency Queueing with Priority Percentage Support

This feature allows you to configure bandwidth as a percentage within low latency queueing (LLQ). Specifically, you can designate a percentage of the bandwidth to be allocated to an entity (such as a physical interface, a shaped ATM permanent virtual circuit (PVC), or a shaped Frame Relay PVC to which a policy map is attached. Traffic associated with the policy map will then be given priority treatment.

This feature also allows you to specify the percentage of bandwidth to be allocated to non-priority traffic classes. It modifies two existing commands—**bandwidth** and **priority**—and provides additional functionality to the way that bandwidth can be allocated using these two commands.

Feature History for Low Latency Queueing with Priority Percentage Support

Release	Modification
12.2(2)T	This feature was introduced.
12.0(28)S	This feature was integrated into Cisco IOS Release 12.0(28)S and two existing commands— bandwidth and priority —were modified.
12.2(27)SBA	This feature was integrated into Cisco IOS Release 12.2(27)SBA.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

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Information About LLQ with Priority Percentage Support

To configure the Low Latency Queueing with Priority Percentage Support feature, you should understand the following concepts:

- [Benefits of LLQ with Priority Percentage Support, page 2](#)
- [Changes to the bandwidth Command for LLQ with Priority Percentage Support, page 2](#)
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Benefits of LLQ with Priority Percentage Support

This feature allows the Cisco IOS software to accommodate networks with a large number of interfaces, all with differing bandwidths. This feature is useful when all of those interfaces with differing bandwidths need to be associated with a policy map that allocates proportional bandwidths to multiple classes.

Additionally, configuring bandwidth in percentages is most useful when the underlying link bandwidth is unknown or the relative class bandwidth distributions are known. For interfaces that have adaptive shaping rates (such as available bit rate (ABR) virtual circuits), CBWFQ can be configured by configuring class bandwidths in percentages.

Changes to the bandwidth Command for LLQ with Priority Percentage Support

This feature adds a new keyword to the **bandwidth** command—**remaining percent**. The feature also changes the functionality of the existing **percent** keyword. These changes result in the following commands for bandwidth: **bandwidth percent** and **bandwidth remaining percent**.

The **bandwidth percent** command configures bandwidth as an absolute percentage of the total bandwidth on the interface.

The **bandwidth remaining percent** command allows you to allocate bandwidth as a relative percentage of the total bandwidth available on the interface. This command allows you to specify the relative percentage of the bandwidth to be allocated to the classes of traffic. For instance, you can specify that 30 percent of the available bandwidth be allocated to class1, and 60 percent of the bandwidth be allocated to class2. Essentially, you are specifying the ratio of the bandwidth to be allocated to the traffic class. In this case, the ratio is 1 to 2 (30 percent allocated to class1 and 60 percent allocated to class2). The sum of the numbers used to indicate this ratio cannot exceed 100 percent. This way, you need not know the total amount of bandwidth available, just the relative percentage you want to allocate for each traffic class.

Each traffic class gets a minimum bandwidth as a relative percentage of the remaining bandwidth. The remaining bandwidth is the bandwidth available after the priority queue, if present, is given its required bandwidth, and after any Resource Reservation Protocol (RSVP) flows are given their requested bandwidth.

Because this is a relative bandwidth allocation, the packets for the traffic classes are given a proportionate weight only, and no admission control is performed to determine whether any bandwidth (in kbps) is actually available. The only error checking that is performed is to ensure that the total bandwidth percentages for the classes do not exceed 100 percent.

For more information about how this feature defines and calculates bandwidth, see the “[Bandwidth Calculations in LLQ with Priority Percentage Support](#)” section of this document. For the **bandwidth** command syntax description and usage guidelines, see the “[Command Reference](#)” section of this document.

Changes to the **priority** Command for LLQ with Priority Percentage Support

This feature also adds the **percent** keyword to the **priority** command. The **priority percent** command indicates that the bandwidth will be allocated as a percentage of the total bandwidth of the interface. You can then specify the percentage (that is, a number from 1 to 100) to be allocated by using the *percentage* argument with the **priority percent** command.

Unlike the **bandwidth** command, the **priority** command provides a strict priority to the traffic class, which ensures low latency to high priority traffic classes.

For more information about how this feature defines and calculates bandwidth, see the “[Bandwidth Calculations in LLQ with Priority Percentage Support](#)” section of this document. For the **priority** command syntax description and usage guidelines, see the “[Command Reference](#)” section of this document.

Bandwidth Calculations in LLQ with Priority Percentage Support

When the **bandwidth** and **priority** commands calculate the total amount of bandwidth available on an entity, the following guidelines are invoked:

- If the entity is a physical interface, the total bandwidth is the bandwidth on the physical interface.
- If the entity is a shaped ATM PVC, the total bandwidth is calculated as follows:
 - For a variable bit rate (VBR) VC, the average shaping rate is used in the calculation.
 - For an available bit rate (ABR) VC, the minimum shaping rate is used in the calculation.
- If the entity is a shaped Frame Relay PVC, the total bandwidth is calculated as follows:
 - If a minimum acceptable committed information rate (minCIR) is not configured, the CIR divided by two is used in the calculation.
 - If a minimum acceptable CIR is configured, the minCIR setting is used in the calculation.

For more information on bandwidth allocation, refer to the [Cisco IOS Quality of Service Solutions Configuration Guide](#).

LLQ with Priority Percent Support Restrictions

Dropping Excess Traffic

If the incoming high priority traffic exceeds the bandwidth percentage calculated by the **priority percent** command, and there is congestion in the network, the excess traffic is dropped. This is identical to the behavior demonstrated when the **priority** command uses bandwidth in kbps. In both cases, if the high priority traffic exceeds the bandwidth, and there is congestion in the network, excess traffic is dropped.

Exceeding the Configured Bandwidth Percentage Calculated by the `bandwidth percent` and `priority percent` Commands

By default, when the `bandwidth percent` and `priority percent` commands are used to allocate bandwidth, the sum of the bandwidth percentage allocated to the high priority traffic and the bandwidth percentage allocated to the nonpriority traffic cannot exceed 75 percent of the total bandwidth available on the interface.

The remaining 25 percent of the total bandwidth available on the interface is kept in reserve for the unclassified traffic and routing traffic, if any, and proportionally divided among the defined traffic classes. To override the 75 percent limitation, use the `max-reserved bandwidth` command in interface configuration mode.



Note

The `max-reserved bandwidth` command is intended for use on main interfaces only; it has no effect on virtual circuits (VCs) or ATM PVCs.

How to Configure Low Latency Queueing with Priority Percentage Support

This section contains the following procedures.

- [Specifying the Bandwidth Percentage](#) (required)
- [Verifying the Bandwidth Percentage](#) (optional)

Specifying the Bandwidth Percentage

To specify the bandwidth percentage, perform the following steps.

SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `policy-map policy-map`
4. `class {class-name | class-default}`
5. `priority {bandwidth-kbps | percent percentage} [burst]`
6. `bandwidth {bandwidth-kbps | percent percentage | remaining percent percentage}`
7. `exit`

DETAILED STEPS

	Command	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	policy-map <i>policy-map</i> Example: Router(config)# policy-map policy1	Specifies the name of the policy map to be created or modified. Enters policy-map configuration mode. <ul style="list-style-type: none"> Enter the policy map name.
Step 4	class { <i>class-name</i> class-default } Example: Router(config-pmap)# class class1	Specifies the class so that you can configure or modify its policy. Enters policy-map class configuration mode. <ul style="list-style-type: none"> Enter the class name.
Step 5	priority { <i>bandwidth-kbps</i> percent <i>percentage</i> } [<i>burst</i>] Example: Router(config-pmap-c)# priority percent 10	Gives priority to a class of traffic belonging to the policy map. <ul style="list-style-type: none"> Enter the priority percentage.
Step 6	bandwidth { <i>bandwidth-kbps</i> percent <i>percentage</i> remaining percent <i>percentage</i> } Example: Router(config-pmap-c)# bandwidth percent 30	Specifies the bandwidth for a class of traffic belonging to the policy map. <ul style="list-style-type: none"> Enter the bandwidth percentage.
Step 7	exit Router(config-pmap-c)# exit	(Optional) Exits policy-map class configuration mode.

Verifying the Bandwidth Percentage

To verify the bandwidth percentage, perform one or more of the following steps.

SUMMARY STEPS

- enable**
- show policy-map** *policy-map*
and/or
show policy-map *policy-map* **class** *class-name*
and/or
show policy-map interface *interface-name*
- exit**

DETAILED STEPS

	Command	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	show policy-map <i>policy-map</i> Example: Router# show policy-map policy1 and/or show policy-map <i>policy-map</i> class <i>class-name</i> Example: Router# show policy-map policy1 class class1 and/or show policy-map interface <i>interface-name</i> Example: Router# show policy-map interface s1/0	Displays the configuration of all classes comprising the specified policy map. <ul style="list-style-type: none"> Enter policy map name. Displays the configuration of the specified class of the specified policy map. <ul style="list-style-type: none"> Enter the class name of the specified policy map. Displays the configuration of all classes configured for all policy maps on the specified interface. <ul style="list-style-type: none"> Enter the interface type.
Step 3	exit Example: Router# exit	(Optional) Exits EXEC mode.

**Note**

The counters displayed for classes configured with **bandwidth** or **priority** after using the **show policy-map interface** command are updated only if congestion is present on the interface.

Configuration Examples for LLQ with Priority Percentage Support

This section provides the following configuration examples:

- [Specifying the Bandwidth Percentage: Example, page 7](#)
- [Mixing the Units of Bandwidth for Nonpriority Traffic: Example, page 7](#)
- [Verifying the Bandwidth Percentage: Example, page 8](#)

Specifying the Bandwidth Percentage: Example

The following example uses the **priority percent** command to specify a bandwidth percentage of 10 percent for the class called voice-percent. Then the **bandwidth remaining percent** command is used to specify a bandwidth percentage of 30 percent for the class called data1, and a bandwidth percentage of 20 percent for the class called data2.

```
Router> enable
Router# configure terminal
Router(config)# policy-map policy1
Router(config-pmap)# class voice-percent
Router(config-pmap-c)# priority percent 10
Router(config-pmap-c)# class data1
Router(config-pmap-c)# bandwidth remaining percent 30
Router(config-pmap-c)# class data2
Router(config-pmap-c)# bandwidth remaining percent 20
Router(config-pmap-c)# exit
Router(config-pmap)# exit
Router(config)# exit
Router# exit
```

As a result of this configuration, 10 percent of the interface bandwidth is guaranteed for the class called voice-percent. The classes called data1 and data2 get 30 percent and 20 percent of the remaining bandwidth, respectively.

Mixing the Units of Bandwidth for Nonpriority Traffic: Example

If a particular unit (that is, kbps or percentages) is used when specifying the bandwidth for a specific class of nonpriority traffic, the same bandwidth unit must be used when specifying the bandwidth for the other nonpriority classes in that policy map. The bandwidth units within the same policy map must be identical. However, the unit for the **priority** command in the priority class can be different from the bandwidth unit of the nonpriority class. The same configuration can contain multiple policy maps, however, which in turn can use different bandwidth units.

The following sample configuration contains three policy maps—policy1, policy2, and policy3. In the policy map called policy1 and the policy map called policy2, the bandwidth is specified by percentage. However, in the policy map called policy3, bandwidth is specified in kbps.

```
Router> enable
Router# configure terminal
Router(config)# policy-map policy1
Router(config-pmap)# class voice-percent
Router(config-pmap-c)# priority percent 10
Router(config-pmap-c)# class data1
Router(config-pmap-c)# bandwidth percent 30
Router(config-pmap-c)# class data2
Router(config-pmap-c)# bandwidth percent 20
Router(config-pmap-c)# exit
Router(config-pmap)# exit
Router(config)# policy-map policy2
Router(config-pmap)# class voice-percent
Router(config-pmap-c)# priority percent 10
Router(config-pmap-c)# class data1
Router(config-pmap-c)# bandwidth remaining percent 30
Router(config-pmap-c)# class data2
Router(config-pmap-c)# bandwidth remaining percent 20
Router(config-pmap-c)# exit
```

```

Router(config-pmap)# exit
Router(config)# policy-map policy3
Router(config-pmap)# class voice-percent
Router(config-pmap-c)# priority percent 500
Router(config-pmap-c)# class data1
Router(config-pmap-c)# bandwidth 30
Router(config-pmap-c)# class data2
Router(config-pmap-c)# bandwidth 20
Router(config-pmap-c)# exit
Router(config-pmap)# exit
Router(config)# exit

```

Verifying the Bandwidth Percentage: Example

The following sample output from the **show policy-map interface** command shows that 50 percent of the interface bandwidth is guaranteed for the class called class1, and 25 percent is guaranteed for the class called class2. The output displays the amount of bandwidth as both a percentage and a number of kbps.

```

Router# show policy-map interface s3/2

Serial3/2

Service-policy output:policy1

Class-map:class1 (match-all)
  0 packets, 0 bytes
  5 minute offered rate 0 bps, drop rate 0 bps
  Match:none
  Weighted Fair Queueing
    Output Queue:Conversation 265
    Bandwidth 50 (%)
    Bandwidth 772 (kbps) Max Threshold 64 (packets)
    (pkts matched/bytes matched) 0/0
    (depth/total drops/no-buffer drops) 0/0/0

Class-map:class2 (match-all)
  0 packets, 0 bytes
  5 minute offered rate 0 bps, drop rate 0 bps
  Match:none
  Weighted Fair Queueing
    Output Queue:Conversation 266
    Bandwidth 25 (%)
    Bandwidth 386 (kbps) Max Threshold 64 (packets)
    (pkts matched/bytes matched) 0/0
    (depth/total drops/no-buffer drops) 0/0/0

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

```

In this example, interface s3/2 has a total bandwidth of 1544 kbps. During periods of congestion, 50 percent (or 772 kbps) of the bandwidth is guaranteed to the class called class1, and 25 percent (or 386 kbps) of the link bandwidth is guaranteed to the class called class2.

Additional References

The following sections provide references related to the Low Latency Queueing with Priority Percentage Support feature.

Related Documents

Related Topic	Document Title
QoS commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	Cisco IOS Quality of Service Solutions Command Reference , Release 12.3 T
LLQ	Cisco IOS Quality of Service Solutions Configuration Guide
Bandwidth allocation	Cisco IOS Quality of Service Solutions Configuration Guide

Standards

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

MIBs

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

RFCs

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

Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/public/support/tac/home.shtml

Command Reference

This section documents modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.3 command reference publications.

- [bandwidth \(policy-map class\)](#)
- [priority](#)

bandwidth (policy-map class)

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* | **remaining percent** *percentage* | **percent** *percentage* }

no bandwidth { *bandwidth-kbps* | **remaining percent** *percentage* | **percent** *percentage* }

Syntax Description

<i>bandwidth-kbps</i>	Amount of bandwidth, in number of kbps, to be assigned to the class. The amount of bandwidth varies according to the interface and platform in use.
remaining percent	Amount of guaranteed bandwidth, based on a relative percent of available bandwidth.
<i>percentage</i>	Used in conjunction with the remaining percent keyword, a percentage. The percentage can be a number from 1 to 100.
percent	Amount of guaranteed bandwidth, based on an absolute percent of available bandwidth.
<i>percentage</i>	Used in conjunction with the percent keyword, the percentage of the total available bandwidth to be set aside for the priority class. The percentage can be a number from 1 to 100.

Defaults

No bandwidth is specified

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.0(5)T	This command was introduced.
12.0(5)XE	This command was incorporated into Cisco IOS Release 12.0(5)XE and implemented on Versatile Interface Processor (VIP)-enabled Cisco 7500 series routers.
12.0(7)T	The percent keyword was added.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T and implemented on VIP-enabled Cisco 7500 series routers.
12.2(2)T	The remaining percent keyword was added.
12.2(27)SBA	This command was integrated into Cisco IOS Release 12.2(27)SBA.

Usage Guidelines

You should use the **bandwidth** command when you configure a policy map for a class defined by the **class-map** command. The **bandwidth** command specifies the bandwidth for traffic in that class. Class-based weighted fair queuing (CBWFQ) derives the weight for packets belonging to the class from the bandwidth allocated to the class. CBWFQ then uses the weight to ensure that the queue for the class is serviced fairly.

Specifying Bandwidth as a Percentage

Besides specifying the amount of bandwidth in kbps, you can specify bandwidth as a percentage of either the available bandwidth or the total bandwidth. During periods of congestion, the classes are serviced in proportion to their configured bandwidth percentages. Available bandwidth is equal to the interface bandwidth minus the sum of all bandwidths reserved by the Resource Reservation Protocol (RSVP) feature, the IP RTP Priority feature, and the Low Latency Queueing (LLQ) feature.



Note

It is important to remember that when the **bandwidth remaining percent** command is configured, hard bandwidth guarantees may not be provided and only relative bandwidths are assured. That is, class bandwidths are always proportional to the specified percentages of the interface bandwidth. When the link bandwidth is fixed, class bandwidth guarantees are in proportion to the configured percentages. If the link bandwidth is unknown or variable, class bandwidth guarantees in kbps cannot be computed.

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. However, the unit for the **priority** command in the priority class can be different from the bandwidth unit of the nonpriority class.
- When the **bandwidth percent** command is configured, and a policy map containing class policy configurations is attached to the interface to stipulate the service policy for that interface, available bandwidth is assessed. If a policy map cannot be attached to a particular interface because of insufficient interface bandwidth, the policy is removed from all interfaces to which it was successfully attached. This restriction does not apply to the **bandwidth remaining percent** command.

For more information on bandwidth allocation, refer to the chapter “Congestion Management Overview” in the *Cisco IOS Quality of Service Solutions Configuration Guide*.

Note that when the policy map containing class policy configurations is attached to the interface to stipulate the service policy for that interface, available bandwidth is assessed. If a policy map cannot be attached to a particular interface because of insufficient interface bandwidth, then the policy is removed from all interfaces to which it was successfully attached.

Queue Limits

The **bandwidth** command can be used with the Modular Command-Line Interface (MQC) to specify the bandwidth for a particular class. When used with the MQC, the **bandwidth** command uses a default queue limit for the class. This queue limit can be modified using the **queue-limit** command, thereby overriding the default set by the **bandwidth** command.



Note

Using the **queue-limit** command to modify the default queue-limit is especially important for higher-speed interfaces, in order to meet the minimum bandwidth guarantees required by the interface.

Examples

CBWFQ Bandwidth Guarantee Example

The following example shows how bandwidth is guaranteed when only CBWFQ is configured:

! The following commands create a policy map with two classes:

```

policy-map policy1
  class class1
    bandwidth percent 50
  exit

  class class2
    bandwidth percent 25
  exit
end

!The following commands attach the policy to interface serial3/2:
interface serial3/2
  service output policy1
end

```

The following output from the **show policy-map** command shows the configuration for the policy map called policy1:

```

Router# show policy-map policy1

Policy Map policy1
  Class class1
    Weighted Fair Queueing
      Bandwidth 50 (%) Max Threshold 64 (packets)
  Class class2
    Weighted Fair Queueing
      Bandwidth 25 (%) Max Threshold 64 (packets)

```

The output from the **show policy-map interface** command shows that 50 percent of the interface bandwidth is guaranteed for the class called class1, and 25 percent is guaranteed for the class called class2. The output displays the amount of bandwidth as both a percentage and a number of kbps.

```

Router# show policy-map interface serial3/2

Serial3/2

Service-policy output:policy1

Class-map:class1 (match-all)
  0 packets, 0 bytes
  5 minute offered rate 0 bps, drop rate 0 bps
  Match:none
  Weighted Fair Queueing
    Output Queue:Conversation 265
    Bandwidth 50 (%)
    Bandwidth 772 (kbps) Max Threshold 64 (packets)
    (pkts matched/bytes matched) 0/0
    (depth/total drops/no-buffer drops) 0/0/0

Class-map:class2 (match-all)
  0 packets, 0 bytes
  5 minute offered rate 0 bps, drop rate 0 bps
  Match:none
  Weighted Fair Queueing
    Output Queue:Conversation 266
    Bandwidth 25 (%)
    Bandwidth 386 (kbps) Max Threshold 64 (packets)
    (pkts matched/bytes matched) 0/0
    (depth/total drops/no-buffer drops) 0/0/0

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

```

In this example, interface serial3/2 has a total bandwidth of 1544 kbps. During periods of congestion, 50 percent (or 772 kbps) of the bandwidth is guaranteed to the class called class1, and 25 percent (or 386 kbps) of the link bandwidth is guaranteed to the class called class2.

CBWFQ and LLQ Bandwidth Allocation Example

The following output from the **show policy-map** command shows the configuration for a policy map called p1:

```
Router# show policy-map p1

Policy Map p1
  Class voice
    Weighted Fair Queueing
      Strict Priority
      Bandwidth 500 (kbps) Burst 12500 (Bytes)
  Class class1
    Weighted Fair Queueing
      Bandwidth remaining 50 (%) Max Threshold 64 (packets)
  Class class2
    Weighted Fair Queueing
      Bandwidth remaining 25 (%) Max Threshold 64 (packets)
```

The following output from the **show policy-map interface** command on serial interface 3/2 shows that 500 kbps of bandwidth is guaranteed for the class called voice1. The classes called class1 and class2 receive 50 percent and 25 percent of the remaining bandwidth, respectively. Any unallocated bandwidth is divided proportionally among class1, class2, and any best-effort traffic classes.



Note

Note that in this sample output (unlike many of the others earlier in this section) the bandwidth is displayed only as a percentage. Bandwidth expressed as a number of kbps is not displayed because the **bandwidth remaining percent** keyword was used with the **bandwidth** command. The **bandwidth remaining percent** keyword allows you to allocate bandwidth as a relative percentage of the total bandwidth available on the interface.

```
Router# show policy-map interface serial3/2

Serial3/2

Service-policy output:p1

Class-map:voice (match-all)
  0 packets, 0 bytes
  5 minute offered rate 0 bps, drop rate 0 bps
  Match:ip precedence 5
  Weighted Fair Queueing
    Strict Priority
    Output Queue:Conversation 264
    Bandwidth 500 (kbps) Burst 12500 (Bytes)
    (pkts matched/bytes matched) 0/0
    (total drops/bytes drops) 0/0

Class-map:class1 (match-all)
  0 packets, 0 bytes
  5 minute offered rate 0 bps, drop rate 0 bps
  Match:none
  Weighted Fair Queueing
    Output Queue:Conversation 265
    Bandwidth remaining 50 (%) Max Threshold 64 (packets)
    (pkts matched/bytes matched) 0/0
```

bandwidth (policy-map class)

```

(depth/total drops/no-buffer drops) 0/0/0

Class-map:class2 (match-all)
  0 packets, 0 bytes
  5 minute offered rate 0 bps, drop rate 0 bps
Match:none
Weighted Fair Queueing
  Output Queue:Conversation 266
  Bandwidth remaining 25 (%) Max Threshold 64 (packets)
  (pkts matched/bytes matched) 0/0
  (depth/total drops/no-buffer drops) 0/0/0

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

```

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 (commonly known as the class-default class) before you configure its policy.
class-map	Creates a class map to be used for matching packets to a specified class.
max-reserved-bandwidth	Changes the percent of interface bandwidth allocated for CBWFQ, LLQ, and IP RTP Priority.
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 (interface)	Enables WRED or DWRED.
random-detect exponential-weighting-constant	Configures the WRED and DWRED exponential weight factor for the average queue size calculation.
random-detect precedence	Configures WRED and DWRED parameters for a particular IP precedence.
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.
show policy-map interface	Displays the packet statistics of all classes that are configured for all service policies either on the specified interface or subinterface or on a specific PVC on the interface.

priority

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 {*bandwidth-kbps* | **percent** *percentage*} [*burst*]

no priority {*bandwidth-kbps* | **percent** *percentage*} [*burst*]

Syntax Description

<i>bandwidth-kbps</i>	Guaranteed allowed bandwidth, in kbps, for the priority traffic. The amount of guaranteed bandwidth varies according to the interface and platform in use. Beyond the guaranteed bandwidth, the priority traffic will be dropped in the event of congestion to ensure that the nonpriority traffic is not starved.
percent	Specifies that the amount of guaranteed bandwidth will be specified by the percent of available bandwidth.
<i>percentage</i>	Used in conjunction with the percent keyword, specifies the percentage of the total available bandwidth to be set aside for the priority class. The percentage can be a number from 1 to 100.
<i>burst</i>	(Optional) Specifies the burst size in bytes. The burst size configures the network to accommodate temporary bursts of traffic. The default burst value, which is computed as 200 milliseconds of traffic at the configured bandwidth rate, is used when the burst argument is not specified. The range of the burst is from 32 to 2000000 bytes.

Defaults

No default behavior or values

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.0(7)T	This command was introduced.
12.0(5)XE5	This command was introduced for the Versatile Interface Processor (VIP) as part of the Distributed Low Latency Queuing (Low Latency Queuing for the VIP) feature.
12.0(9)S	This command was introduced for the VIP as part of the Distributed Low Latency Queueing (Low Latency Queueing for the VIP) feature.
12.1(2)E	The <i>burst</i> argument was added.
12.1(3)T	The <i>burst</i> argument was integrated in Release 12.1(3)T.
12.1(5)T	This command was introduced for the VIP as part of the Distributed Low Latency Queueing (Low Latency Queueing for the VIP) feature.

Release	Modification
12.2(2)T	The percent keyword and the <i>percentage</i> argument were added.
12.2(27)SBA	This command was integrated into Cisco IOS Release 12.2(27)SBA.

Usage Guidelines

This command configures low latency queueing (LLQ), providing strict priority queueing (PQ) for class-based weighted fair queueing (CBWFQ). Strict PQ allows delay-sensitive data such as voice to be dequeued and sent before packets in other queues are dequeued.

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, and is available for use on serial interfaces and ATM permanent virtual circuits (PVCs). A similar command, the **ip rtp priority** command, allows you to stipulate priority flows based only on UDP port numbers and is not available for ATM PVCs.

When the device is not congested, the priority class traffic is allowed to exceed its allocated bandwidth. When the device is congested, the priority class traffic above the allocated bandwidth is discarded.

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.

When the policy map containing class policy configurations is attached to the interface to stipulate the service policy for that interface, available bandwidth is assessed. If a policy map cannot be attached to a particular interface because of insufficient interface bandwidth, the policy is removed from all interfaces to which it was successfully attached.

For more information on bandwidth allocation, refer to the chapter “Congestion Management Overview” in the *Cisco IOS Quality of Service Solutions Configuration Guide*.

Examples

The following example configures PQ with a guaranteed bandwidth of 50 kbps and a one-time allowable burst size of 60 bytes for the policy map called policy1:

```
Router(config)# policy-map policy1
Router(config-pmap)# class voice
Router(config-pmap-c)# priority 50 60
```

In the following example, 10 percent of the available bandwidth is reserved for the class called voice on interfaces to which the policy map called policy1 has been attached:

```
Router(config)# policy-map policy1
Router(config-pmap)# class voice
Router(config-pmap-c)# priority percent 10
```

Related Commands	Command	Description
	bandwidth	Specifies or modifies the bandwidth allocated for a class belonging to a policy map.
	ip rtp priority	Reserves a strict priority queue for a set of RTP packet flows belonging to a range of UDP destination ports.
	ip rtp reserve	Reserves a special queue for a set of RTP packet flows belonging to a range of UDP destination ports.
	max-reserved-bandwidth	Changes the percent of interface bandwidth allocated for CBWFQ, LLQ, and IP RTP Priority.
	show interfaces fair-queue	Displays information and statistics about WFQ for a VIP-based interface.
	show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.
	show policy-map interface	Displays the packet statistics of all classes that are configured for all service policies either on the specified interface or subinterface or on a specific PVC on the interface.
	show queue	Displays the contents of packets inside a queue for a particular interface or VC.

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