Distribution of Remaining Bandwidth Using Ratio

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The Distribution of Remaining Bandwidth Using Ratio feature allows service providers to configure a bandwidth-remaining ratio on subinterfaces and class queues. This ratio specifies the relative weight of a subinterface or queue with respect to other subinterfaces or queues. During congestion, the router uses this bandwidth-remaining ratio to determine the amount of excess bandwidth (unused by priority traffic) to allocate to a class of nonpriority traffic. The router allocates excess bandwidth relative to the other subinterface-level queues and class queues configured on the physical interface. By administration of a bandwidth-remaining ratio, traffic priority is not based solely on speed. Instead, the service provider can base priority on alternative factors such as service product and subscription rate.

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the “Feature Information for Distribution of Remaining Bandwidth Using Ratio” section on page 19.

Finding Support Information for Platforms and Cisco IOS and Catalyst OS Software Images

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

Before enabling the Distribution of Remaining Bandwidth Using Ratio feature, create as many traffic classes as you need by using the `class-map` command.

Restrictions for Distribution of Remaining Bandwidth Using Ratio

- Bandwidth-remaining ratios can be used on outbound interfaces only.
- The `bandwidth remaining ratio` command cannot coexist with another `bandwidth` command in different traffic classes of the same policy map. For example, the following configuration is not valid and causes an error message to display:

  ```
  policy-map Prec1
  class precedence_0
  bandwidth remaining ratio 10
  class precedence_2
  bandwidth 1000
  ```

- The `bandwidth remaining ratio` command cannot coexist with another `bandwidth` command in the same class. For example, the following configuration is not valid and causes an error message to display:

  ```
  policy-map Prec1
  class precedence_0
  bandwidth 1000
  bandwidth remaining ratio 10
  ```

- The `bandwidth remaining ratio` command cannot coexist with the `priority` command in the same class. For example, the following configuration is not valid and causes an error message to display:

  ```
  policy-map Prec1
  class precedence_1
  priority percent 10
  bandwidth remaining ratio 10
  ```
Information About Distribution of Remaining Bandwidth Using Ratio

To configure the Distribution of Remaining Bandwidth Using Ratio feature, you should understand the following concepts:

- Benefits of the Distribution of Remaining Bandwidth Using Ratio Feature, page 3
- Bandwidth-Remaining Ratio Functionality, page 3

Benefits of the Distribution of Remaining Bandwidth Using Ratio Feature

The Distribution of Remaining Bandwidth Using Ratio feature allows service providers to prioritize subscriber traffic during periods of congestion. A bandwidth-remaining ratio is used to influence how the router allocates excess bandwidth (unused by priority traffic) to a class of nonpriority traffic. Instead of using only bandwidth rate, the router considers configured minimum bandwidth rates, maximum bandwidth rates, and bandwidth-remaining ratios when determining excess bandwidth allocation. A bandwidth-remaining ratio adds more flexibility in prioritizing traffic and enables you to influence excess bandwidth allocation by basing the bandwidth-remaining ratio on factors other than speed.

With bandwidth-remaining ratios, service providers have more flexibility in assigning priority to subinterfaces and queues during congestion. In addition to speed, you can base the bandwidth-remaining ratio on alternative factors, such as a service product or subscription rate. In this way, for example, you can give higher weight to subinterfaces that carry business services and lower weight to subinterfaces that carry residential services.

Bandwidth-Remaining Ratio Functionality

A bandwidth-remaining ratio, specified by the `bandwidth remaining ratio` command, is a value from 1 to 1000 that is used to determine the amount of unused (excess) bandwidth to allocate to a class-level queue or subinterface-level queue during congestion. The router allocates the excess bandwidth relative to the other class-level queues and subinterface-level queues configured on the physical interface. The bandwidth-remaining ratio value does not indicate a percentage. As the name implies, a ratio is used. For example, a subinterface with a bandwidth-remaining ratio of 100 receives 10 times the unused (excess) bandwidth during congestion than a subinterface with a bandwidth-remaining ratio of 10.

Without bandwidth-remaining ratios, the queueing mechanism or scheduler on the router allocates unused (excess) bandwidth equally among the classes or subinterfaces.

With bandwidth-remaining ratios, unused (excess) bandwidth allocation can be based on factors other than the bandwidth rate (for example, the service product or the subscription rate).

Using the `bandwidth remaining ratio` command, the bandwidth-remaining ratio can be configured differently on each subinterface or class. The bandwidth-remaining ratio can range from 1 to 1000. For example, if there are three subscribers, and the bandwidth-remaining ratios are configured as 9, 7, and 1, and if after priority traffic is served, there are 1700 kbps of excess bandwidth, the subscribers get 900 kbps, 700 kbps, and 100 kbps, respectively.
How to Configure the Distribution of Remaining Bandwidth Using Ratio Feature

You can apply bandwidth-remaining ratios to subinterfaces and/or classes queues.

- Configuring and Applying Bandwidth-Remaining Ratios to Subinterfaces, page 4
- Configuring and Applying Bandwidth-Remaining Ratios to Class Queues, page 7

Configuring and Applying Bandwidth-Remaining Ratios to Subinterfaces

To configure and apply bandwidth-remaining ratios to subinterfaces, complete the following steps.

Restrictions

You can apply bandwidth-remaining ratios to outbound subinterfaces only.

SUMMARY STEPS

1. enable
2. configure terminal
3. policy-map child-policy-name
4. class class-map-name
5. bandwidth bandwidth-kbps
6. Repeat Steps 4 and 5 to configure additional traffic classes, if needed.
7. exit
8. exit
9. policy-map parent-policy-name
10. class class-default
11. bandwidth remaining ratio ratio
12. shape \{ average | peak \} cir \{ bc \} \{ be \}
13. service-policy child-policy-name
14. exit
15. exit
16. interface type slot/module/port.subinterface \{ point-to-point | multipoint \}
17. service-policy output parent-policy-name
18. end
## DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
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</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td>enable</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Router&gt; enable</td>
</tr>
<tr>
<td></td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td></td>
<td>• Enter your password if prompted.</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td>configure terminal</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Router# configure terminal</td>
</tr>
<tr>
<td></td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
<td>policy-map child-policy-name</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Router(config)# policy-map Child</td>
</tr>
<tr>
<td></td>
<td>Creates or modifies a child policy map and enters policy-map configuration mode.</td>
</tr>
<tr>
<td></td>
<td>• Enter the name of the child policy map.</td>
</tr>
<tr>
<td><strong>Step 4</strong></td>
<td>class class-map-name</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Router(config-pmap)# class precedence_0</td>
</tr>
<tr>
<td></td>
<td>Configures the class map and enters policy-map class configuration mode.</td>
</tr>
<tr>
<td></td>
<td>• Enter the name of a previously created class map. See the “Prerequisites for Distribution of Remaining Bandwidth Using Ratio” section on page 2.</td>
</tr>
<tr>
<td><strong>Step 5</strong></td>
<td>bandwidth bandwidth-kbps</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Router(config-pmap-c)# bandwidth 10000</td>
</tr>
<tr>
<td></td>
<td>Specifies the bandwidth, in kbps, to be allocated to this traffic class.</td>
</tr>
<tr>
<td></td>
<td>• Enter the amount of bandwidth, in kilobits per second (kbps).</td>
</tr>
<tr>
<td><strong>Step 6</strong></td>
<td>Repeat Steps 4 and 5 to configure additional traffic classes, if needed.</td>
</tr>
<tr>
<td><strong>Step 7</strong></td>
<td>exit</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Router(config-pmap-c)# exit</td>
</tr>
<tr>
<td></td>
<td>Exits policy-map class configuration mode.</td>
</tr>
<tr>
<td><strong>Step 8</strong></td>
<td>exit</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Router(config-pmap)# exit</td>
</tr>
<tr>
<td></td>
<td>Exits policy-map configuration mode.</td>
</tr>
<tr>
<td><strong>Step 9</strong></td>
<td>policy-map parent-policy-name</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Router(config)# policy-map Parent</td>
</tr>
<tr>
<td></td>
<td>Creates or modifies a parent policy map and enters policy-map configuration mode.</td>
</tr>
<tr>
<td></td>
<td>• Enter the name of the parent policy map.</td>
</tr>
<tr>
<td><strong>Step 10</strong></td>
<td>class class-default</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Router(config-pmap)# class class-default</td>
</tr>
<tr>
<td></td>
<td>Configures the class-default class and enters policy-map class configuration mode.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong> The router interprets any features that are configured under the class-default class as aggregate features on the subinterface.</td>
</tr>
<tr>
<td>Command or Action</td>
<td>Purpose</td>
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<tr>
<td>------------------</td>
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</tr>
<tr>
<td>Step 11 <strong>bandwidth remaining ratio</strong> <em>ratio</em></td>
<td>Specifies the bandwidth-remaining ratio for the subinterface.</td>
</tr>
</tbody>
</table>
| Example: **Router(config-pmap-c)# bandwidth remaining ratio 10** | Enter the ratio.  
The ratio is the value used to determine the amount of unused bandwidth to allocate to each queue on the subinterface during periods of congestion. The scheduler allocates the excess bandwidth relative to other subinterfaces. Valid values are 1 to 1000. The default value is 1. |
| Step 12 **shape** *(average | peak)* **cir** *(bc | be)* | (Optional) Shapes the average or peak rate to the rate that you specify. |
| Example: **Router(config-pmap-c)# shape average 100000000** | Enter either the **average** or **peak** keyword along with the CIR and any optional arguments. Note the following:  
  - **average**—Specifies average-rate shaping.  
  - **peak**—Specifies peak-rate shaping.  
  - **cir**—Specifies the committed information rate (CIR), in bits per second (bps).  
  - (Optional) **bc**—Specifies the committed burst size, in bits.  
  - (Optional) **be**—Specifies the excess burst size, in bits. |
| Step 13 **service-policy** *child-policy-name* | Applies the child policy map that you specify to the traffic class. |
| Example: **Router(config-pmap-c)# service-policy Child** | Enter the name of the previously configured child policy map.  
The router applies the QoS actions (features) specified in the child policy map to the traffic class. |
| Note | The **service-policy** command typically requires that you specify the direction of the traffic using the **input** or **output** keywords. However, when applying a child policy to a parent policy, do not specify a traffic direction. |
| Step 14 **exit** | Exits policy-map class configuration mode. |
| Example: **Router(config-pmap-c)# exit** | |
| Step 15 **exit** | Exits policy-map configuration mode. |
| Example: **Router(config-pmap)# exit** | |
Configuring and Applying Bandwidth-Remaining Ratios to Class Queues

To configure and apply bandwidth-remaining ratios to class queues, complete the following steps.

**SUMMARY STEPS**

1. enable
2. configure terminal
3. policy-map child-policy-name
4. class class-map-name
5. shape [average | peak] cir [bc] [be]
6. bandwidth remaining ratio ratio
7. Repeat Steps 4, 5, and 6 for each class queue you want to define, specifying the bandwidth-remaining ratio as applicable.
### DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong> enable</td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router&gt; enable</td>
<td>• Enter your password if prompted.</td>
</tr>
<tr>
<td><strong>Step 2</strong> configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router# configure terminal</td>
<td></td>
</tr>
<tr>
<td><strong>Step 3</strong> policy-map child-policy-name</td>
<td>Creates or modifies a child policy map and enters policy-map configuration mode.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router(config)# policy-map Child</td>
<td>• Enter the name of the child policy map.</td>
</tr>
<tr>
<td><strong>Step 4</strong> class class-map-name</td>
<td>Configures the class map and enters policy-map class configuration mode.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router(config-pmap)# class precedence_0</td>
<td>• Enter the name of the previously created class map. See the “Prerequisites for Distribution of Remaining Bandwidth Using Ratio” section on page 2.</td>
</tr>
</tbody>
</table>
### Distribution of Remaining Bandwidth Using Ratio

**How to Configure the Distribution of Remaining Bandwidth Using Ratio Feature**

<table>
<thead>
<tr>
<th>Step</th>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
</table>
| 5    | `shape {average | peak} cir [bc] [be]` | (Optional) Shapes the average or peak rate to the rate that you specify.  
- Enter either the *average* or *peak* keyword along with the CIR and any optional arguments. Note the following:  
  - *average*—Specifies average-rate shaping.  
  - *peak*—Specifies peak-rate shaping.  
  - *cir*—Specifies the committed information rate (CIR), in bits per second (bps).  
  - (Optional) *bc*—Specifies the committed burst size, in bits.  
  - (Optional) *be*—Specifies the excess burst size, in bits. |
| 6    | `bandwidth remaining ratio ratio` | Specifies the bandwidth-remaining ratio for the traffic class.  
- Enter the bandwidth-remaining ratio. The ratio is the value used to determine the amount of unused bandwidth to allocate to each queue on the subinterface during periods of congestion. The queueing mechanism or scheduler allocates the excess bandwidth relative to other subinterfaces. Valid values are 1 to 1000. The default value is 1.  
**Note** In a hierarchical policy map structure, the `bandwidth remaining ratio ratio` command must be used for at least one class. Using it in other classes is optional. When this command is not explicitly enabled in the other classes, the queueing mechanism uses 1 as the default. |
| 7    | Repeat Steps 4, 5, and 6 for each class queue you want to define, specifying the bandwidth-remaining ratio as applicable. |
| 8    | `exit` | Exits policy-map class configuration mode. |
|      | Example: | Router(config-pmap-c)# exit |
| 9    | `exit` | Exits policy-map configuration mode. |
|      | Example: | Router(config-pmap)# exit |
| 10   | `policy-map parent-policy-name` | Creates or modifies a parent policy map and enters policy-map configuration mode.  
- Enter the name of the parent policy map. |
|      | Example: | Router(config)# policy-map Parent |
### Command or Action | Purpose
---|---
**Step 11** class class-default | Configures the class-default class and enters policy-map class configuration mode.  
**Example:**  
Router(config-pmap)# class class-default  
**Note** The router interprets any features that are configured under the class-default class as aggregate features on the subinterface.

**Step 12** shape (average | peak) cir [bc] [be] | (Optional) Shapes the average or peak rate to the rate that you specify.  
**Example:**  
Router(config-pmap-c)# shape average 100000000  
- Enter either the **average** or **peak** keyword along with the CIR and any optional arguments. Note the following:  
  - **average**—Specifies average-rate shaping.  
  - **peak**—Specifies peak-rate shaping.  
  - **cir**—Specifies the committed information rate (CIR), in bits per second (bps).  
  - (Optional) **bc**—Specifies the committed burst size, in bits.  
  - (Optional) **be**—Specifies the excess burst size, in bits.

**Step 13** bandwidth remaining ratio ratio | (Optional for class-default or other classes in a hierarchical policy map structure) Specifies the bandwidth-remaining ratio for the subinterface.  
**Example:**  
Router(config-pmap-c)# bandwidth remaining ratio 10  
- Enter the bandwidth-remaining ratio. The ratio is the value used to determine the amount of unused bandwidth to allocate to each queue on the subinterface during periods of congestion. The queueing mechanism or scheduler allocates the excess bandwidth relative to other subinterfaces. Valid values are 1 to 1000. The default value is 1.  
**Note** In a hierarchical policy map structure, the **bandwidth remaining ratio ratio** command must be used for at least one class. Using it in other classes is optional. When this command is not explicitly enabled in the other classes, the queueing mechanism uses 1 as the default.

**Step 14** service-policy child-policy-name | Applies the child policy map that you specify to the traffic class.  
**Example:**  
Router(config-pmap-c)# service-policy Child  
**Note** The **service-policy** command typically requires that you specify the direction of the traffic using the **input** or **output** keywords. However, when applying a child policy map to a parent policy map, do not specify traffic direction.
<table>
<thead>
<tr>
<th>Step</th>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
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<tbody>
<tr>
<td>15</td>
<td>exit</td>
<td>Exits policy-map class configuration mode.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Router(config-pmap-c)# exit</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>exit</td>
<td>Exits policy-map configuration mode.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Router(config-pmap)# exit</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>interface type slot/module/port.subinterface {point-to-point</td>
<td>Creates or modifies the interface that you specify and enters subinterface configuration mode.</td>
</tr>
<tr>
<td></td>
<td>multipoint}</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Router(config)# interface GigabitEthernet 1/0/0.1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>service-policy output parent-policy-name</td>
<td>Attaches the parent policy map to the subinterface.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Router(config-subif)# service-policy output Parent</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>end</td>
<td>Returns to privileged EXEC mode.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
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<td></td>
<td>Router(config-subif)# end</td>
<td></td>
</tr>
</tbody>
</table>

**Command or Action Purpose**

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>exit</td>
<td>Exits policy-map class configuration mode.</td>
</tr>
<tr>
<td>example:</td>
<td>Exits policy-map configuration mode.</td>
</tr>
<tr>
<td>interface type slot/module/port.subinterface {point-to-point</td>
<td>Creates or modifies the interface that you specify and enters subinterface configuration mode.</td>
</tr>
<tr>
<td></td>
<td>multipoint}</td>
</tr>
<tr>
<td>example:</td>
<td>Creates or modifies the interface that you specify and enters subinterface configuration mode.</td>
</tr>
<tr>
<td>service-policy output parent-policy-name</td>
<td>Attaches the parent policy map to the subinterface.</td>
</tr>
<tr>
<td>end</td>
<td>Returns to privileged EXEC mode.</td>
</tr>
</tbody>
</table>

**Configuration Examples for Distribution of Remaining Bandwidth Using Ratio**

This section contains the following examples:

- Configuring Bandwidth-Remaining Ratios on Ethernet Subinterfaces: Example, page 12
- Configuring Bandwidth-Remaining Ratios on Class Queues: Example, page 12
- Verifying Bandwidth Remaining Ratios: Example, page 13
Configuring Bandwidth-Remaining Ratios on Ethernet Subinterfaces: Example

The following example shows how to configure bandwidth-remaining ratios on an Ethernet subinterface using a hierarchical policy. In the example, Gigabit Ethernet subinterface 1/0/0.1 is shaped to 100 Mbps. During congestion, the router uses the bandwidth-remaining ratio of 10 to determine the amount of excess bandwidth (unused by priority traffic) to allocate to the nonpriority traffic on subinterface 1/0/0.1, relative to the other subinterface-level and class-level queues on the interface.

```
policy-map Child
  class precedence_0
    bandwidth 10000
  class precedence_1
    shape average 100000
    bandwidth 100

policy-map Parent
  class class-default
    bandwidth remaining ratio 10
    shape average 100000000
    service-policy Child

interface GigabitEthernet1/0/0.1
  encapsulation dot1Q 100
  ip address 10.1.0.1 255.255.255.0
  service-policy output Parent
```

Configuring Bandwidth-Remaining Ratios on Class Queues: Example

In the following sample configuration, vlan10_policy is applied on the Gigabit Ethernet subinterface 1/0/0.10 and vlan20_policy is applied on the Gigabit Ethernet subinterface 1/0/0.20. During congestion on the interface, subinterface Gigabit Ethernet 1/0/0.20 has 10 times more available bandwidth than subinterface Gigabit Ethernet 1/0/0.10 because the bandwidth-remaining ratio for subinterface Gigabit Ethernet 1/0/0.20 is 10 times more than the bandwidth-remaining ratio for subinterface 1/0/0.10: 100 on subinterface 1/0/0.20 and 10 on subinterface 1/0/0.10.

When congestion occurs within a subinterface level, the class queues receive bandwidth according to the class-level bandwidth-remaining ratios. In the example, the bandwidth for classes precedence_0, precedence_1, and precedence_2 is allocated based on the bandwidth-remaining ratios of the classes: 20, 40, and 60, respectively.

```
Router# show policy-map
Policy Map child-policy
  Class precedence_0
    Average Rate Traffic Shaping
    cir 500000 (bps)
    bandwidth remaining ratio 20 <----- Class-level ratio
  Class precedence_1
    Average Rate Traffic Shaping
    cir 500000 (bps)
    bandwidth remaining ratio 40 <----- Class-level ratio
  Class precedence_2
    Average Rate Traffic Shaping
    cir 500000 (bps)
    bandwidth remaining ratio 60 <----- Class-level ratio

Policy Map vlan10_policy
  Class class-default
    Average Rate Traffic Shaping
```
Distribution of Remaining Bandwidth Using Ratio

Configuration Examples for Distribution of Remaining Bandwidth Using Ratio

cir 1000000 (bps)
bandwidth remaining ratio 10 <---- Subinterface-level ratio
service-policy child-policy

Policy Map vlan20_policy
  Class class-default
  Average Rate Traffic Shaping
cir 1000000 (bps)
bandwidth remaining ratio 100 <---- Subinterface-level ratio
service-policy child-policy

interface GigabitEthernet1/0/0.10
  encapsulation dot1Q 10
  snmp trap link-status
  service-policy output vlan10_policy

interface GigabitEthernet1/0/0.20
  encapsulation dot1Q 20
  snmp trap link-status
  service-policy output vlan20_policy
end

Verifying Bandwidth Remaining Ratios: Example

The following sample output from the show policy-map interface command indicates that bandwidth-remaining ratios are configured on class-level queues in the policy maps named vlan10_policy and child-policy, which are attached to Gigabit Ethernet subinterface 1/0/0.10.

Router# show policy-map interface GigabitEthernet 1/0/0.10

GigabitEthernet1/0/0.10

Service-policy output: vlan10_policy

Class-map: class-default (match-any)
  0 packets, 0 bytes
  5 minute offered rate 0 bps, drop rate 0 bps
match: any
Queueing
queue limit 64 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0
shape (average) cir 1000000, bc 4000, be 4000
target shape rate 1000000
bandwidth remaining ratio 10

Service-policy : child-policy

Class-map: precedence_0 (match-all)
  0 packets, 0 bytes
  5 minute offered rate 0 bps, drop rate 0 bps
match: ip precedence 0
Queueing
queue limit 64 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0
shape (average) cir 500000, bc 2000, be 2000
target shape rate 500000
bandwidth remaining ratio 20

Class-map: precedence_1 (match-all)
0 packets, 0 bytes
5 minute offered rate 0 bps, drop rate 0 bps
Match: ip precedence 1
Queueing
queue limit 64 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0
shape (average) cir 500000, bc 2000, be 2000
target shape rate 500000
bandwidth remaining ratio 40

Class-map: precedence_2 (match-all)
0 packets, 0 bytes
5 minute offered rate 0 bps, drop rate 0 bps
Match: ip precedence 2
Queueing
queue limit 64 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0
shape (average) cir 500000, bc 2000, be 2000
target shape rate 500000
bandwidth remaining ratio 60

Class-map: class-default (match-any)
0 packets, 0 bytes
5 minute offered rate 0 bps, drop rate 0 bps
Match: any
Queueing
queue limit 64 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0

The following sample output from the `show policy-map interface` command indicates that bandwidth-remaining ratios are configured on class-level queues in the policy maps named `vlan20_policy` and `child-policy`, which are attached to Gigabit Ethernet subinterface 1/0/0.20.

Router# `show policy-map interface GigabitEthernet 1/0/0.20`

GigabitEthernet1/0/0.20

Service-policy output: vlan20_policy

Class-map: class-default (match-any)
0 packets, 0 bytes
5 minute offered rate 0 bps, drop rate 0 bps
Match: any
Queueing
queue limit 64 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0
Distribution of Remaining Bandwidth Using Ratio

Configuration Examples for Distribution of Remaining Bandwidth Using Ratio

shape (average) cir 1000000, bc 4000, be 4000
target shape rate 1000000
bandwidth remaining ratio 100

Service-policy : child-policy

Class-map: precedence_0 (match-all)
0 packets, 0 bytes
5 minute offered rate 0 bps, drop rate 0 bps
Match: ip precedence 0
Queueing
queue limit 64 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0
shape (average) cir 500000, bc 2000, be 2000
target shape rate 500000
bandwidth remaining ratio 20

Class-map: precedence_1 (match-all)
0 packets, 0 bytes
5 minute offered rate 0 bps, drop rate 0 bps
Match: ip precedence 1
Queueing
queue limit 64 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0
shape (average) cir 500000, bc 2000, be 2000
target shape rate 500000
bandwidth remaining ratio 40

Class-map: precedence_2 (match-all)
0 packets, 0 bytes
5 minute offered rate 0 bps, drop rate 0 bps
Match: ip precedence 2
Queueing
queue limit 64 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0
shape (average) cir 500000, bc 2000, be 2000
target shape rate 500000
bandwidth remaining ratio 60

Class-map: class-default (match-any)
0 packets, 0 bytes
5 minute offered rate 0 bps, drop rate 0 bps
Match: any
queue limit 64 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0

The following sample output from the `show policy-map` command indicates that a bandwidth-remaining ratio of 10 is configured on the parent class-default class of the policy map named `vlan10_policy`.

Router# show policy-map vlan10_policy

Policy Map vlan10_policy
Class class-default
Average Rate Traffic Shaping
The following sample output from the `show policy-map` command indicates that a bandwidth-remaining ratio of 100 is configured on the parent class-default class of the policy map named `vlan20_policy`.

Router# show policy-map vlan20_policy

Policy Map vlan20_policy
  Class class-default
    Average Rate Traffic Shaping
    cir 1000000 (bps)
    bandwidth remaining ratio 100
    service-policy child-policy

The following sample output from the `show policy-map` command indicates that bandwidth-remaining ratios of 20, 40, and 60 are configured on the class queues precedence_0, precedence_1, and precedence_2, respectively.

Router# show policy-map child-policy

Policy Map child-policy
  Class precedence_0
    Average Rate Traffic Shaping
    cir 500000 (bps)
    bandwidth remaining ratio 20
  Class precedence_1
    Average Rate Traffic Shaping
    cir 500000 (bps)
    bandwidth remaining ratio 40
  Class precedence_2
    Average Rate Traffic Shaping
    cir 500000 (bps)
    bandwidth remaining ratio 60

Additional References

The following sections provide references related to the Distribution of Remaining Bandwidth Using Ratio feature.
## Related Documents

<table>
<thead>
<tr>
<th>Related Topic</th>
<th>Document Title</th>
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</thead>
<tbody>
<tr>
<td>QoS commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples</td>
<td><em>Cisco IOS Quality of Service Solutions Command Reference</em></td>
</tr>
<tr>
<td>Congestion management, queues, scheduling</td>
<td>“Configuring Weighted Fair Queueing” module</td>
</tr>
<tr>
<td>Congestion avoidance</td>
<td>“Congestion Avoidance Overview” module</td>
</tr>
<tr>
<td>Class maps, policy maps, hierarchical policy maps, Modular Quality of Service Command-Line Interface (CLI) (MQC)</td>
<td>“Applying QoS Features Using the MQC” module</td>
</tr>
<tr>
<td>Traffic shaping, traffic policing</td>
<td>“Policing and Shaping Overview” module</td>
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## Standards

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<tr>
<th>Standard</th>
<th>Title</th>
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<td>No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.</td>
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## MIBs

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

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<td>No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.</td>
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Technical Assistance

<table>
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<tr>
<th>Description</th>
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<tr>
<td>The Cisco Support website provides extensive online resources, including</td>
<td><a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a></td>
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<tr>
<td>documentation and tools for troubleshooting and resolving technical issues</td>
<td></td>
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<td>with Cisco products and technologies.</td>
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<tr>
<td>To receive security and technical information about your products, you can</td>
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<td>subscribe to various services, such as the Product Alert Tool (accessed from</td>
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<td>Field Notices), the Cisco Technical Services Newsletter, and Really Simple</td>
<td></td>
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<tr>
<td>Syndication (RSS) Feeds.</td>
<td></td>
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<tr>
<td>Access to most tools on the Cisco Support website requires a Cisco.com user</td>
<td></td>
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<tr>
<td>ID and password.</td>
<td></td>
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</tbody>
</table>

Command Reference

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

- bandwidth remaining ratio
- show policy-map
- show policy-map interface
Feature Information for Distribution of Remaining Bandwidth Using Ratio

Table 1 lists the release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Releases</th>
<th>Feature Information</th>
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</table>
| MQC—Distribution of Remaining Bandwidth Using Ratio | 12.2(31)SB2 | The Distribution of Remaining Bandwidth Using Ratio feature allows service providers to configure a bandwidth-remaining ratio on subinterfaces and class queues. This ratio specifies the relative weight of a subinterface or queue with respect to other subinterfaces or queues. During congestion, the router uses this bandwidth-remaining ratio to determine the amount of excess bandwidth (unused by priority traffic) to allocate to a class of nonpriority traffic. In Release 12.2(31)SB2, this feature was introduced on Cisco 10000 Series Routers.

The following commands were introduced or modified: bandwidth remaining ratio, show policy-map, show policy-map interface. |
| MQC—Distribution of Remaining Bandwidth Using Ratio | 15.0(1)S | This feature was integrated into the Cisco IOS Release 15.0(1)S release. |

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