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.

Contents

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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

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

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

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**policy-map** *child-policy-name* **Example:** `Router(config)# policy-map Child`	Creates or modifies a child policy map and enters policy-map configuration mode. • Enter the name of the child policy map.
Step 4	**class** *class-map-name* **Example:** `Router(config-pmap)# class precedence_0`	Configures the class map and enters policy-map class configuration mode. • Enter the name of a previously created class map. See the "Prerequisites for Distribution of Remaining Bandwidth Using Ratio" section on page 2.
Step 5	**bandwidth** *bandwidth-kbps* **Example:** `Router(config-pmap-c)# bandwidth 10000`	Specifies the bandwidth, in kbps, to be allocated to this traffic class. • Enter the amount of bandwidth, in kilobits per second (kbps).
Step 6	Repeat Steps 4 and 5 to configure additional traffic classes, if needed.	
Step 7	**exit** **Example:** `Router(config-pmap-c)# exit`	Exits policy-map class configuration mode.
Step 8	**exit** **Example:** `Router(config-pmap)# exit`	Exits policy-map configuration mode.
Step 9	**policy-map** *parent-policy-name* **Example:** `Router(config)# policy-map Parent`	Creates or modifies a parent policy map and enters policy-map configuration mode. • Enter the name of the parent policy map.
Step 10	**class class-default** **Example:** `Router(config-pmap)# class class-default`	Configures the class-default class and enters policy-map class configuration mode. **Note** The router interprets any features that are configured under the class-default class as aggregate features on the subinterface.

	Command or Action	Purpose
Step 11	**bandwidth remaining ratio** *ratio* **Example:** `Router(config-pmap-c)# bandwidth remaining ratio 10`	Specifies the bandwidth-remaining ratio for the subinterface. • 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*] **Example:** `Router(config-pmap-c)# shape average 100000000`	(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.
Step 13	**service-policy** *child-policy-name* **Example:** `Router(config-pmap-c)# service-policy Child`	Applies the child policy map that you specify to the traffic class. • 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** **Example:** `Router(config-pmap-c)# exit`	Exits policy-map class configuration mode.
Step 15	**exit** **Example:** `Router(config-pmap)# exit`	Exits policy-map configuration mode.

	Command or Action	Purpose
Step 16	**interface** *type slot/module/port.subinterface* [**point-to-point** | **multipoint**] **Example:** `Router(config)# interface GigabitEthernet 1/0/0.1`	Creates or modifies the interface that you specify and enters subinterface configuration mode. • Enter the interface type. Note the following: – *type*—Specifies the interface type (for example, Gigabit Ethernet). – *slot*/*module*/*port*.*subinterface*—Specifies the number of the subinterface that identifies the subinterface (for example, 1/0/0.1). – (Optional) **point-to-point**—Indicates that the subinterface is a point-to-point subinterface. – (Optional) **multipoint**—Indicates that the subinterface is a point-to-multipoint subinterface.
Step 17	**service-policy output** *parent-policy-name* **Example:** `Router(config-subif)# service-policy output Parent`	Applies the parent policy map to the subinterface. • Enter the **output** keyword and the name of the parent policy map. **Note** The router shapes the subinterface traffic to the shaping rate specified in the parent class-default class and applies the QoS actions (features) specified in the child policy map. **Note** During periods of congestion, the router uses the bandwidth-remaining ratio specified in the parent policy map to allocate unused bandwidth on this subinterface relative to other subinterfaces.
Step 18	**end** **Example:** `Router(config-subif)# end`	Returns to privileged EXEC mode.

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.

8. **exit**
9. **exit**
10. **policy-map** *parent-policy-name*
11. **class class-default**
12. **shape** {**average** | **peak**} *cir* [*bc*] [*be*]
13. **bandwidth remaining ratio** *ratio*
14. **service-policy** *child-policy-name*
15. **exit**
16. **exit**
17. **interface** *type slot*/*module*/*port*.*subinterface* {**point-to-point** | **multipoint**}
18. **service-policy output** *parent-policy-name*
19. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**policy-map** *child-policy-name* **Example:** `Router(config)# policy-map Child`	Creates or modifies a child policy map and enters policy-map configuration mode. • Enter the name of the child policy map.
Step 4	**class** *class-map-name* **Example:** `Router(config-pmap)# class precedence_0`	Configures the class map and enters policy-map class configuration mode. • Enter the name of the previously created class map. See the "Prerequisites for Distribution of Remaining Bandwidth Using Ratio" section on page 2.

	Command or Action	Purpose
Step 5	**shape** {**average** | **peak**} *cir* [*bc*] [*be*] **Example:** `Router(config-pmap-c)# shape average 100000000`	(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.
Step 6	**bandwidth remaining ratio** *ratio* **Example:** `Router(config-pmap-c)# bandwidth remaining ratio 10`	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.
Step 7	Repeat Steps 4, 5, and 6 for each class queue you want to define, specifying the bandwidth-remaining ratio as applicable.	
Step 8	**exit** **Example:** `Router(config-pmap-c)# exit`	Exits policy-map class configuration mode.
Step 9	**exit** **Example:** `Router(config-pmap)# exit`	Exits policy-map configuration mode.
Step 10	**policy-map** *parent-policy-name* **Example:** `Router(config)# policy-map Parent`	Creates or modifies a parent policy map and enters policy-map configuration mode. • Enter the name of the parent policy map.

	Command or Action	Purpose
Step 11	**class class-default** **Example:** `Router(config-pmap)# class class-default`	Configures the class-default class and enters policy-map class configuration mode. **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*] **Example:** `Router(config-pmap-c)# shape average 100000000`	(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.
Step 13	**bandwidth remaining ratio** *ratio* **Example:** `Router(config-pmap-c)# bandwidth remaining ratio 10`	(Optional for class-default or other classes in a hierarchical policy map structure) Specifies the bandwidth-remaining ratio for the subinterface. • 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* **Example:** `Router(config-pmap-c)# service-policy Child`	Applies the child policy map that you specify to the traffic class. • Enter the name of the 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 map to a parent policy map, do not specify traffic direction.

	Command or Action	Purpose
Step 15	**exit** **Example:** `Router(config-pmap-c)# exit`	Exits policy-map class configuration mode.
Step 16	**exit** **Example:** `Router(config-pmap)# exit`	Exits policy-map configuration mode.
Step 17	**interface** *type slot/module/port.subinterface* [**point-to-point** | **multipoint**] **Example:** `Router(config)# interface GigabitEthernet 1/0/0.1`	Creates or modifies the interface that you specify and enters subinterface configuration mode. • Enter the interface type. Note the following: – *type*—Specifies the interface type (for example, Gigabit Ethernet). – *slot/module/port.subinterface*—Specifies the number of the subinterface that identifies the subinterface (for example, 1/0/0.1). – (Optional) **point-to-point**—Indicates that the subinterface is a point-to-point subinterface. – (Optional) **multipoint**—Indicates that the subinterface is a point-to-multipoint subinterface.
Step 18	**service-policy output** *parent-policy-name* **Example:** `Router(config-subif)# service-policy output Parent`	Attaches the parent policy map to the subinterface. • Enter the **output** keyword and the name of the parent policy map. **Note** When congestion occurs, the class queues receive bandwidth according to the specified class-level bandwidth-remaining ratios.
Step 19	**end** **Example:** `Router(config-subif)# end`	Returns to privileged EXEC mode.

Configuration Examples for Distribution of Remaining Bandwidth Using Ratio

This section contains the following examples:

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
```

```
      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

    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
```

```
    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
```

```
    cir 1000000 (bps)
    bandwidth remaining ratio 10
    service-policy child-policy
```

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

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*
Congestion management, queues, scheduling	"Configuring Weighted Fair Queueing" module
Congestion avoidance	"Congestion Avoidance Overview" module
Class maps, policy maps, hierarchical policy maps, Modular Quality of Service Command-Line Interface (CLI) (MQC)	"Applying QoS Features Using the MQC" module
Traffic shaping, traffic policing	"Policing and Shaping Overview" module

Standards

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

MIBs

MIB	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

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

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.

Note 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 1 Feature Information for Distribution of Remaining Bandwidth Using Ratio

Feature Name	Releases	Feature Information
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.