

# Distributed Weighted Fair Queuing

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## Feature Summary

Flow-based weighted fair queuing (WFQ) controls the ratio of transmission bandwidth allocation among different traffic flows during periods of congestion. Class-based WFQ allocates transmission bandwidth among different traffic flows or QoS groups during periods of congestion.

The Distributed Weighted Fair Queuing (DWFQ) feature uses the VIP rather than the RSP to perform the queuing; therefore, it requires a Cisco 7500 series router or Cisco 7000 series router with RSP7000.

The Release 11.1 CC version of DWFQ differs from the previously existing RSP-based version of WFQ. This document describes only the Release 11.1 CC version of DWFQ. Refer to the Cisco IOS Release 11.3 *Configuration Fundamentals Configuration Guide* and *Configuration Fundamentals Command Reference* for information on the RSP version of WFQ.

## Benefits

Flow-based WFQ provides the following benefits:

- All flows are allocated equal bandwidth.
- Well-behaved hosts are protected from badly behaved hosts.

WFQ provides absolute allocation of bandwidth in unequal amounts based on traffic requirements.

DWFQ uses the VIP to provide a faster implementation of WFQ than the RSP implementation.

## List of Terms

**Distributed WFQ (DWFQ)**—An implementation of WFQ. DWFQ performs all of the functions of WFQ, but all of the processing takes place on the VIP.

**Versatile Interface Processor (VIP)**—Interface card used by Cisco 7500 series and Cisco 7000 series with RSP7000 routers.

**weighted fair queuing (WFQ)**—A scheduling mechanism that controls transmission bandwidth allocation.

## Restrictions

Use WFQ with IP traffic. All non-IP traffic is treated as a single flow and, therefore, placed in the same queue.

DWFQ can be configured on interfaces, but not subinterfaces.

DWFQ is not supported with the ATM encapsulations AAL5-MUX and AAL5-NLPID.

DWFQ is not supported on Fast EtherChannel or Tunnel interfaces.

DWFQ cannot be configured on the same interface as RSP-based priority queuing, custom queuing, or weighted fair queuing.

## Platforms

This feature is supported on the following routers with a VIP2-40 card or better:

- Cisco 7000 series with RSP7000
- Cisco 7500 series

A VIP2-50 card is strongly recommended when the aggregate line rate of the port adapters on the VIP is greater than DS-3. A VIP2-50 card is required for OC-3 rates.

## Prerequisites

In order to use DWFQ, Distributed CEF switching must be enabled on the interface. Refer to the Cisco Express Forwarding documentation for configuration information.

## Supported MIBs and RFCs

None

## Functional Description

There are two forms of Distributed Weighted Fair Queuing (DWFQ):

- Flow-based WFQ
- Class-Based WFQ

The “Drop Policy” section described the drop policy used by both types.

### Flow-based WFQ

With flow-based WFQ, packets are classified by flow. Packets with the same source IP address, destination IP address, source TCP or UDP port, destination TCP or UDP port, protocol, and type of service (ToS) field belong to the same flow.

Each flow corresponds to a separate output queue. When a packet is assigned to a flow, it is placed in the queue for that flow. During periods of congestion, WFQ allocates an equal share of the bandwidth to each active queue.

Flow-based WFQ is also called fair queuing (FQ) because all flows are equally weighted.

## Class-Based WFQ

In class-based WFQ, packets are assigned to different queues based on their QoS group or the IP precedence in the ToS field.

QoS groups allow you to customize your QoS policy. A QoS group is an internal classification of packets used by the router to determine how packets are treated by certain QoS features, such as WFQ and CAR. Use a CAR policy or QoS Policy Propagation via BGP to assign packets to QoS groups.

If you want to classify packets based only on the 2 low-order IP precedence bits, use ToS-based WFQ.

Specify a weight for each class. In periods of congestion, each group is allocated a percentage of the output bandwidth equal to the weight of the class. For example, if a class is assigned a weight of 50, packets from this class will be allocated at least 50 percent of the outgoing bandwidth during periods of congestion. When the interface is not congested, queues can use any available bandwidth.

## Drop Policy

WFQ keeps track of the number of packets in each queue and the total number of packets in all queues.

When the total number of packets is below the aggregate limit, queues can buffer more packets than the individual queue limit.

When the total number of packets reaches the aggregate limit, the interface starts enforcing the individual queue limits. Any new packets that arrive for a queue that is over its individual queue limit are dropped. Packets that are already in the queue will not be dropped, even if the queue is over the individual limit.

In some cases, the total number of packets in all queues put together may exceed the aggregate limit.

## Configuration Tasks

To configure DWFQ, perform one of the following mutually-exclusive tasks:

- Configure Flow-Based WFQ
- Configure QoS-Group-Based WFQ
- Configure ToS-Based WFQ

If you enable flow-based WFQ and then enable class-based WFQ (either QoS-group based or ToS-based), class-based WFQ will replace flow-based WFQ.

If you enable class-based WFQ and then want to switch to flow-based WFQ, you must disable class-based WFQ using the **no fair-queue class-based** command before enabling flow-based WFQ.

If you enable one type of class-based WFQ and then enable the other type, the second type will replace the first.

To monitor WFQ, use the **show interfaces** and **show interfaces fair-queue** commands.

## Configure Flow-Based WFQ

To configure flow-based WFQ, perform the following tasks in interface configuration mode:

Task	Command
Enable flow-based WFQ.	<b>fair-queue</b>
(Optional) Set the total number of buffered packets before some packets may be dropped. Below this limit, packets will not be dropped.	<b>fair-queue aggregate-limit</b> <i>aggregate-packet</i>
(Optional) Set the maximum queue size for individual per-flow queues during periods of congestion.	<b>fair-queue individual-limit</b> <i>individual-packet</i>

In general, you should not change the aggregate or individual limit value from the default. Use these commands only if you have determined that you would benefit from using different values, based on your particular situation.

## Configure QoS-Group-Based WFQ

To configure QoS-group-based WFQ, perform the following tasks in interface configuration mode:

Task	Command
Enable QoS-group-based WFQ	<b>fair-queue qos-group</b>
For each QoS group, specify the percentage of the bandwidth to allocate to each class.	<b>fair-queue qos-group</b> <i>number weight weight</i>
(Optional) Set the total number of buffered packets before some packets may be dropped. Below this limit, packets will not be dropped.	<b>fair-queue aggregate-limit</b> <i>aggregate-packet</i>
(Optional) Set the maximum queue size for every per-flow queue during periods of congestion.	<b>fair-queue individual-limit</b> <i>individual-packet</i>
(Optional) Set the maximum queue size for a specific QoS group queue during periods of congestion.	<b>fair-queue qos-group</b> <i>number limit class-packet</i>

In general, you should not change the aggregate, individual, or class limit value from the default. Use these commands only if you have determined that you would benefit from using different values, based on your particular situation.

## Configure ToS-Based WFQ

To configure ToS-based WFQ, perform the following tasks in interface configuration mode:

Task	Command
Enable ToS-based WFQ	<b>fair-queue tos-based</b>

Task	Command
(Optional) For each ToS class, specify the percentage of the bandwidth to allocate to each class.	<b>fair-queue tos number weight weight</b>
(Optional) Set the total number of buffered packets before some packets may be dropped. Below this limit, packets will not be dropped.	<b>fair-queue aggregate-limit aggregate-packet</b>
(Optional) Set the maximum queue size for every per-flow queue during periods of congestion.	<b>fair-queue individual-limit individual-packet</b>
(Optional) Set the maximum queue size for a specific ToS queue during periods of congestion.	<b>fair-queue tos number limit class-packet</b>

In general, you should not change the aggregate, individual, or class limit value from the default. Use these commands only if you have determined that you would benefit from using different values, based on your particular situation.

## Configuration Example

This section contains the following examples:

- Flow-Based WFQ Example
- QoS-Group-Based WFQ Example
- ToS-Based WFQ Example

## Flow-Based WFQ Example

The following example enables WFQ on the HSSI 0/0/0 interface:

```
interface Hssi0/0/0
  description 45Mbps to R2
  ip address 200.200.14.250 255.255.255.252
  fair-queue
```

The following is sample output from the **show interfaces fair-queue** command for this configuration:

```
Router# show interfaces hssi 0/0/0 fair-queue

Hssi0/0/0 queue size 0
  packets output 35, drops 0
WFQ: global queue limit 401, local queue limit 200
```

## QoS-Group-Based WFQ Example

The following example configures WFQ. CAR policies are used to assign packets with an IP precedence of 2 to QoS group 2, and packets with IP precedence 6 are assigned to QoS group 6.

```
interface Hssi0/0/0
 ip address 188.1.3.70 255.255.255.0
 rate-limit output access-group rate-limit 6 155000000 2000000 8000000 conform-action
 set-qos-transmit 6 exceed-action drop
 rate-limit output access-group rate-limit 2 155000000 2000000 8000000 conform-action
 set-qos-transmit 2 exceed-action drop
 fair-queue qos-group
 fair-queue qos-group 2 weight 10
 fair-queue qos-group 2 limit 27
 fair-queue qos-group 6 weight 30
 fair-queue qos-group 6 limit 27
!
access-list rate-limit 2 2
access-list rate-limit 6 6
```

Use the **show interfaces fair-queue** command to view WFQ statistics.

```
Router# show interfaces fair-queue

Hssi0/0/0 queue size 0
      packets output 806232, drops 1
WFQ: aggregate queue limit 54, individual queue limit 27
      max available buffers 54

      Class 0: weight 60 limit 27 qsize 0 packets output 654 drops 0
      Class 2: weight 10 limit 27 qsize 0 packets output 402789 drops 0
      Class 6: weight 30 limit 27 qsize 0 packets output 402789 drops 1
```

## ToS-Based WFQ Example

The following example configures ToS-based WFQ using the default parameters:

```
Router# configure terminal
Router(config)# interface Hssi0/0/0
Router(config-if)# fair-queue tos
Router(config-if)# end
```

The following is output of the **show running-config** command for the Hssi0/0/0 interface. Notice that the router automatically adds the default weights and limits for the ToS classes to the configuration.

```
interface Hssi0/0/0
 ip address 188.1.3.70 255.255.255.0
 fair-queue tos
 fair-queue tos 1 weight 20
 fair-queue tos 1 limit 27
 fair-queue tos 2 weight 30
 fair-queue tos 2 limit 27
 fair-queue tos 3 weight 40
 fair-queue tos 3 limit 27
```

Use the **show interfaces fair-queue** command to view WFQ statistics.

```
Router# show interfaces fair-queue

Hssi0/0/0 queue size 0
      packets output 1417079, drops 2
WFQ: aggregate queue limit 54, individual queue limit 27
      max available buffers 54

      Class 0: weight 10 limit 27 qsize 0 packets output 1150 drops 0
      Class 1: weight 20 limit 27 qsize 0 packets output 0 drops 0
      Class 2: weight 30 limit 27 qsize 0 packets output 775482 drops 1
      Class 3: weight 40 limit 27 qsize 0 packets output 0 drops 0
```

## Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 11.1 command references or the Cisco Express Forwarding feature documentation.

- **fair-queue**
- **fair-queue aggregate-limit**
- **fair-queue individual-limit**
- **fair-queue limit**
- **fair-queue qos-group**
- **fair-queue tos**
- **fair-queue weight**
- **show interfaces**
- **show interfaces fair-queue**

## fair-queue

To enable weighted fair queuing (WFQ), use the **fair-queue** interface configuration command. The **no** form of this command disables WFQ.

**fair-queue**  
**no fair-queue**

### Syntax Description

This command has no arguments or keywords.

### Default

Enabled on all interfaces less than 2 Mbps.

### Command Mode

Interface configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.1.

The command enables WFQ. If you enable this command for an interface on a VIP2-40 or better card, this command enables Distributed WFQ (DWFQ). Otherwise, this command enables RSP-based WFQ.

With WFQ, packets are classified by flow. Packets with the same source IP address, destination IP address, source TCP or UDP port, destination TCP or UDP port, protocol, and type of service (ToS) field belong to the same flow.

WFQ allocates an equal share of the bandwidth to each flow. Flow-based WFQ is also called fair queuing (FQ) because all flows are equally weighted.

### Example

The following example enables WFQ on the HSSI 0/0/0 interface:

```
interface Hssi0/0/0
  description 45Mbps to R2
  ip address 200.200.14.250 255.255.255.252
  fair-queue
```

### Related Commands

**fair-queue aggregate-limit**  
**fair-queue individual-limit**  
**fair-queue qos-group**  
**fair-queue tos**  
**show interfaces**  
**show interfaces fair-queue**

## fair-queue aggregate-limit

To set the maximum number of packets in all queues combined for DWFQ, use the **fair-queue aggregate-limit** interface configuration command. The **no** form of this command returns the value to the default.

**fair-queue aggregate-limit** *aggregate-packets*  
**no fair-queue aggregate-limit**

### Syntax Description

*aggregate-packets* Total number of buffered packets before some packets may be dropped. Below this limit, packets will not be dropped.

### Default

The total number of packets allowed is based on the transmission rate of the interface and the available buffer space on the VIP.

### Command Mode

Interface configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CC.

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**Note** In general, you should not change this value from the default. Use this command only if you have determined that you would benefit from using a different value, based on your particular situation.

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WFQ keeps track of the number of packets in each queue and the total number of packets in all queues.

When the total number of packets is below the aggregate limit, queues can buffer more packets than the individual queue limit.

When the total number of packets reaches the aggregate limit, the interface starts enforcing the individual queue limits. Any new packets that arrive for a queue that is over its individual queue limit are dropped. Packets that are already in the queue will not be dropped, even if the queue is over the individual limit.

In some cases, the total number of packets in all queues put together may exceed the aggregate limit.

### Example

The following example sets the aggregate limit to 54 packets:

```
interface Fddi9/0/0
  fair-queue tos
  fair-queue aggregate-limit 54
```

Related Commands

- fair-queue**
- fair-queue individual-limit**
- fair-queue limit**
- fair-queue qos-group**
- fair-queue tos**
- show interfaces**
- show interfaces fair-queue**

## fair-queue individual-limit

To set the maximum individual queue depth for DWFQ, use the **fair-queue individual-limit** interface configuration command. The **no** form of this command returns the value to the default.

**fair-queue individual-limit** *individual-packet*  
**no fair-queue individual-limit**

### Syntax Description

*individual-packet* Maximum number of packets allowed in each per flow or per class queue during periods of congestion.

### Default

Half of the aggregate queue limit.

### Command Mode

Interface configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CC.

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**Note** In general, you should not change this value from the default. Use this command only if you have determined that you would benefit from using a different value, based on your particular situation.

---

WFQ keeps track of the number of packets in each queue and the total number of packets in all queues.

When the total number of packets is below the aggregate limit, queues can buffer more packets than the individual queue limit.

When the total number of packets reaches the aggregate limit, the interface starts enforcing the individual queue limits. Any new packets that arrive for a queue that is over its individual queue limit are dropped. Packets that are already in the queue will not be dropped, even if the queue is over the individual limit.

In some cases, the total number of packets in all queues put together may exceed the aggregate limit.

### Example

The following example sets the individual queue limit to 27.

```
interface Fddi9/0/0
  mac-address 0000.0c0c.2222
  ip address 106.1.1.1 255.0.0.0
  fair-queue tos
  fair-queue individual-limit 27
```

Related Commands

- fair-queue**
- fair-queue aggregate-limit**
- fair-queue limit**
- fair-queue qos-group**
- fair-queue tos**
- show interfaces**
- show interfaces fair-queue**

## fair-queue limit

To set the maximum queue depth for a specific DWFQ class, use the **fair-queue limit** interface configuration command. The **no** form of this command returns the value to the default.

```
fair-queue {qos-group number | tos number} limit class-packet  
no fair-queue {qos-group number | tos number} limit class-packet
```

### Syntax Description

<b>qos-group</b> <i>number</i>	Number of the QoS group, as assigned by a committed access rate (CAR) policy or BGP policy propagation. The value can range from 1 to 99.
<b>tos</b> <i>number</i>	Two low-order IP precedence bits of the ToS field.
<i>class-packet</i>	Maximum number of packets allowed in the queue for the class during periods of congestion.

### Default

The individual queue depth, as specified by the **fair-queue individual-limit** command. If the **fair-queue individual-limit** command is not configured, the default is half of the aggregate queue limit.

### Command Mode

Interface configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CC.

Use this command to specify the number queue depth for a particular class for class-based DWFQ. This command overrides the global individual limit specified by the **fair-queue individual-limit** command.

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**Note** In general, you should not change this value from the default. Use this command only if you have determined that you would benefit from using a different value, based on your particular situation.

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### Example

The following example sets the individual queue limit for ToS group 3 to 20:

```
interface Fddi9/0/0  
  mac-address 0000.0c0c.2222  
  ip address 106.1.1.1 255.0.0.0  
  fair-queue tos  
  fair-queue tos 3 limit 20
```

Related Commands

**fair-queue aggregate-limit**

**fair-queue individual-limit**

**fair-queue qos-group**

**fair-queue tos**

**show interfaces**

**show interfaces fair-queue**

## fair-queue qos-group

To enable WFQ and classify packets based on the internal QoS-group number, use the **fair-queue qos-group** interface configuration command. The **no** form of this command disables QoS-group-based WFQ.

```
fair-queue qos-group  
no fair-queue qos-group
```

### Syntax Description

This command has no arguments or keywords.

### Default

Disabled

### Command Mode

Interface configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CC.

Use this command to enable qos-group-based WFQ, a type of class-based WFQ. Class-based WFQ overrides flow-based WFQ. Therefore, this command overrides the **fair-queue** command.

When this command is enabled, packets are assigned to different queues based on their QoS group. A QoS group is an internal classification of packets used by the router to determine how packets are treated by certain QoS features, such as WFQ and CAR. Use a CAR policy or the QoS Policy Propagation via BGP feature to assign packets to QoS groups.

Specify a weight for each class. In periods of congestion, each group is allocated a percentage of the output bandwidth equal to the weight of the class. For example, if a class is assigned a weight of 50, packets from this class are allocated at least 50 percent of the outgoing bandwidth during periods of congestion.

### Example

The following example enables QoS-based DWFQ and allocates bandwidth for nine QoS groups (QoS groups 0 through 8):

```
interface Hssi0/0/0  
description 45Mbps to R2  
ip address 200.200.14.250 255.255.255.252  
fair-queue qos-group  
fair-queue qos-group 1 weight 5  
fair-queue qos-group 2 weight 5  
fair-queue qos-group 3 weight 10  
fair-queue qos-group 4 weight 10  
fair-queue qos-group 5 weight 10  
fair-queue qos-group 6 weight 15  
fair-queue qos-group 7 weight 20  
fair-queue qos-group 8 weight 29
```

Related Commands

- fair-queue**
- fair-queue aggregate-limit**
- fair-queue individual-limit**
- fair-queue limit**
- fair-queue tos**
- fair-queue weight**
- show interfaces**
- show interfaces fair-queue**

## fair-queue tos

To enable DWFQ and classify packets using the ToS field of packets, use the **fair-queue tos** interface configuration command. The **no** form of this command disables ToS-based DWFQ.

**fair-queue tos**  
**no fair-queue tos**

### Syntax Description

This command has no arguments or keywords.

### Default

Disabled

### Command Mode

Interface configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CC.

Use this command to enable ToS-based WFQ, a type of class-based WFQ. Class-based WFQ overrides flow-based WFQ. Therefore, this command overrides the **fair-queue** command.

When this command is enabled, packets are assigned to different queues based on the two low-order IP precedence bits in the ToS field of the packet header.

In periods of congestion, each group is allocated a percentage of the output bandwidth equal to the weight of the class. For example, if a class is assigned a weight of 50, packets from this class are allocated at least 50 percent of the outgoing bandwidth during periods of congestion.

By default, class 0 is assigned a weight of 10; class 1 is assigned a weight of 20; class 2 is assigned a weight of 30; and class 3 is assigned a weight of 40.

If you wish to change the weights, use the **fair-queue weight** command.

### Example

The following example enables ToS-based DWFQ on the HSSI 0/0/0 interface.

```
interface Hssi0/0/0
  description 45Mbps to R2
  ip address 200.200.14.250 255.255.255.252
  fair-queue
  fair-queue tos
```

### Related Commands

**fair-queue**  
**fair-queue aggregate-limit**  
**fair-queue individual-limit**  
**fair-queue limit**  
**fair-queue qos-group**

**fair-queue weight**  
**show interfaces**  
**show interfaces fair-queue**

## fair-queue weight

To assign a weight to a class for DWFQ, use the **fair-queue weight** interface configuration command. The **no** form of this command unallocates the bandwidth for the class.

```
fair-queue { qos-group number |  tos number}  weight weight
no fair-queue { qos-group number |  tos number}  weight weight
```

### Syntax Description

<b>qos-group</b> <i>number</i>	Number of the QoS group, as assigned by a committed access rate (CAR) policy or BGP policy propagation. The value can range from 1 to 99
<b>tos</b> <i>number</i>	2 low order IP precedence bits of the ToS field. The value can range from 1 to 3.
<i>weight</i>	Percentage of the output link bandwidth allocated to this class. The sum of weights for all classes cannot exceed 99.

### Default

For QoS WFQ, unallocated bandwidth is assigned to QoS group 0.

For ToS-based WFQ, class 0 is assigned a weight of 10; class 1 is assigned a weight of 20; class 2 is assigned a weight of 30; and class 3 is assigned a weight of 40.

### Command Mode

Interface configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CC.

Use this command to allocate percentages of bandwidth for specific DWFQ classes. You must also enable class-based WFQ on the interface with either the **fair-queue qos-group** or **fair-queue tos** command.

Enter this command once for every class to allocate bandwidth to the class.

For QoS-group-based WFQ, packets that are not assigned to any QoS groups are assigned to QoS group 0. When assigning weights to QoS group class, keep in mind the following:

- One percent of the available bandwidth is automatically allocated to QoS group 0.
- The total weight for all the other QoS groups combined cannot exceed 99.
- Any unallocated bandwidth is assigned to QoS group 0.

For ToS-based WFQ, keep in mind the following:

- One percent of the available bandwidth is automatically allocated to ToS class 0.
- The total weight for all the other ToS classes combined cannot exceed 99.
- Any unallocated bandwidth is assigned to ToS class 0.

### Example

The following example allocates bandwidth to different QoS groups. The remaining bandwidth (5%) is allocated to QoS group 0.

```
interface Fddi9/0/0
  fair-queue qos-group
  fair-queue qos-group 1 weight 10
  fair-queue qos-group 2 weight 15
  fair-queue qos-group 3 weight 20
  fair-queue qos-group 4 weight 20
  fair-queue qos-group 5 weight 30
```

### Related Commands

**fair-queue qos-group**

**fair-queue tos**

**show interfaces**

**show interfaces fair-queue**

## show interfaces

Use the **show interfaces** EXEC command to display statistics for all interfaces. The resulting output varies depending on the network for which an interface has been configured.

**show interfaces** [*type slot/port-adapter/port*] (for ports on VIP cards in the Cisco 7500 series routers)

### Syntax Description

<i>type</i>	(Optional) Interface type.
<i>slot</i>	(Optional) Refer to the appropriate hardware manual for slot information.
<i>port-adapter</i>	(Optional) Refer to the appropriate hardware manual for information about port adapter compatibility.
<i>port</i>	(Optional) Refer to the appropriate hardware manual for port information.

### Command Mode

EXEC

### Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

The **show interfaces** command displays statistics for the network interfaces.

The output of the **show interfaces** command varies based on the interface type and configuration. This document describes the output related to the DWFQ feature. Refer to the Cisco IOS Release 11.1 command references for a complete description of the entire output.

### Sample Display for DWFQ

The following is sample output from the **show interfaces** command when DWFQ is enabled on an interface. Notice that the queuing strategy is listed as “VIP-based fair queuing.”

```
Router# show interfaces FastEthernet1/1/0

FastEthernet1/1/0 is up, line protocol is up
  Hardware is cyBus FastEthernet Interface, address is 0007.f618.4448 (bia 00e0)
  Description: pkt input i/f for WRL tests (to pagent)
  Internet address is 80.0.2.70/24
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive not set, fdx, 100BaseTX/FX
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 01:11:01, output hang never
  Last clearing of "show interface" counters 01:12:31
  Queueing strategy: VIP-based fair queuing
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  30 second input rate 0 bits/sec, 0 packets/sec
  30 second output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
```

```
0 watchdog, 0 multicast
0 input packets with dribble condition detected
1 packets output, 60 bytes, 0 underruns
0 output errors, 0 collisions, 0 interface resets
0 babbles, 0 late collision, 0 deferred
0 lost carrier, 0 no carrier
0 output buffers copied, 0 interrupts, 0 failures
```

## show interfaces fair-queue

To display information about WFQ for an interface, use the **show interfaces fair-queue EXEC** command.

```
show interfaces [interface] fair-queue
```

### Syntax Description

*interface* (Optional) Type and number of the interface.

### Command Mode

EXEC

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CC.

### Sample Display

The following is sample output from the **show interfaces fair-queue** command:

```
Router# show interfaces fair-queue

Hssi0/0/0 queue size 0
      packets output 1417079, drops 2
WFQ: aggregate queue limit 54, individual queue limit 27
      max available buffers 54

      Class 0: weight 10 limit 27 qsize 0 packets output 1150 drops 0
      Class 1: weight 20 limit 27 qsize 0 packets output 0 drops 0
      Class 2: weight 30 limit 27 qsize 0 packets output 775482 drops 1
      Class 3: weight 40 limit 27 qsize 0 packets output 0 drops 0
```

Table 1 describes the fields shown in this display.

**Table 1 Show Interfaces Fair-Queue Field Descriptions**

Field	Description
queue size	Current output queue size for this interface.
packets output	Number of packets transmitted out this interface.
drops	Number of packets dropped.
aggregate queue limit	Aggregate limit, in number of packets.
individual queue limit	Individual limit, in number of packets.
max available buffers	Available buffer space allocated to aggregate queue limit, in number of packets.
Class	QoS group or ToS class.
weight	Percent of bandwidth allocated to this class during periods of congestion.
limit	Queue limit for this class, in number of packets.

**Table 1 Show Interfaces Fair-Queue Field Descriptions (Continued)**

<b>Field</b>	<b>Description</b>
qsize	Current size of the queue for this class.
packets output	Number of packets in this class transmitted out the interface.
drops	Number of packets in this class dropped.