



## Configure Priority Flow Control

- [Priority Flow Control Overview, on page 1](#)
- [Configurable ECN Threshold and Maximum Marking Probability Values, on page 10](#)
- [Priority Flow Control Watchdog Overview, on page 15](#)

## Priority Flow Control Overview

*Table 1: Feature History Table*

Feature Name	Release Information	Feature Description
Priority Flow Control on Cisco 8808 and Cisco 8812 Modular Chassis Line Cards	Release 7.5.3	<p>Priority Flow Control is now supported on the following line card in the buffer-internal mode:</p> <ul style="list-style-type: none"><li>• 88-LC0-34H14FH</li></ul> <p>The feature is supported in the buffer-internal and buffer-extended modes on:</p> <ul style="list-style-type: none"><li>• 88-LC0-36FH</li></ul> <p>Apart from the buffer-external mode, support for this feature now extends to the buffer-internal mode on the following line cards:</p> <ul style="list-style-type: none"><li>• 88-LC0-36FH-M</li><li>• 8800-LC-48H</li></ul>
Shortlink Priority Flow Control	Release 7.3.3	<p>This feature and the <a href="#">hw-module profile priority-flow-control</a> command are supported on 88-LC0-36FH line card.</p>

Feature Name	Release Information	Feature Description
Priority Flow Control Support on Cisco 8800 36x400 GbE QSFP56-DD Line Cards (88-LC0-36FH-M)	Release 7.3.15	<p>This feature and the <a href="#">hw-module profile priority-flow-control</a> command are supported on 88-LC0-36FH-M and 8800-LC-48H line cards.</p> <p>All previous functionalities and benefits of this feature are available on these line cards. However, the buffer-internal mode is not supported.</p> <p>In addition, to use the buffer-extended mode on these line cards, you are required to configure the performance capacity or headroom values. This configuration requirement ensures that you can better provision and balance workloads to achieve lossless behavior, which in turn ensures efficient use of bandwidth and resources.</p>
Priority Flow Control	Release 7.3.1	This feature and the <a href="#">hw-module profile priority-flow-control</a> command are not supported.

Priority-based Flow Control (IEEE 802.1Qbb), which is also referred to as Class-based Flow Control (CBFC) or Per Priority Pause (PPP), is a mechanism that prevents frame loss that is due to congestion. PFC is similar to 802.x Flow Control (pause frames) or link-level flow control (LFC). However, PFC functions on a per class-of-service (CoS) basis.

During congestion, PFC sends a pause frame to indicate the CoS value to pause. A PFC pause frame contains a 2-octet timer value for each CoS that indicates the length of time to pause the traffic. The unit of time for the timer is specified in pause quanta. A quanta is the time required for transmitting 512 bits at the speed of the port. The range is from 0 through 65535 quanta.

PFC asks the peer to stop sending frames of a particular CoS value by sending a pause frame to a well-known multicast address. This pause frame is a one-hop frame and isn't forwarded when received by the peer. When the congestion mitigates, the router stops sending the PFC frames to the upstream node.

You can configure PFC for each line card using the **hw-module profile priority-flow-control** command in one of two modes:

- buffer-internal
- buffer-extended



**Note** PFC threshold configurations are deprecated in `pause` command. Use the `hw-module profile priority-flow-control` command to configure PFC threshold configurations.

#### Related Topics

- [Configure Priority Flow Control, on page 5](#)
- [Priority Flow Control Watchdog Overview, on page 15](#)

## buffer-internal mode

Use this mode if PFC-enabled devices aren't more than 1 km apart.

You can set values for pause-threshold, headroom (both related to PFC), and ECN for the traffic class using the `hw-module profile priority-flow-control` command in this mode. The buffer-internal configuration applies to all ports that the line card hosts, which mean that you can configure a set of these values per line card.

The existing queue limit and ECN configuration in the queueing policy attached to the interface has no impact in this mode.

The effective queue limit for this mode = pause-threshold + headroom (in bytes)

## Restrictions and Guidelines

The following restrictions and guidelines apply while configuring the PFC threshold values using the buffer-internal mode.

- The PFC feature isn't supported on fixed chassis systems.
- Ensure that there's no breakout configured on a chassis that has the PFC configured. Configuring PFC and breakout on the same chassis may lead to unexpected behavior, including traffic loss.
- The feature isn't supported on bundle and non-bundle sub-interface queues.
- The feature is supported on 40GbE, 100 GbE, and 400 GbE interfaces.
- The feature isn't supported in the 4xVOQ queueing mode.
- The feature isn't supported when sharing of VOQ counters is configured.

## buffer-extended mode

Use this mode for PFC-enabled devices with long-haul connections.

You can set the value for pause-threshold using the `hw-module profile priority-flow-control` command in this mode. You must, however, configure the queueing policy attached to the interface to set the ECN and queueing limits. The buffer-extended configuration applies to all ports that the line card hosts, which mean that you can configure a set of these values per line card.

### Configuration Guidelines

- Important points while configuring the buffer-extended mode on 88-LC0-36FH-M line cards:
  - Apart from pause-threshold, you must also configure values for headroom.
  - The headroom value range is from 4 through 75000.
  - Specify pause-threshold and headroom values in units of kilobytes (KB) or megabytes (MB).
- Important points while configuring the buffer-extended mode on 8800-LC-48H line cards:
  - Configure values only for **pause-threshold**. Don't configure headroom values.
  - Configure **pause-threshold** in units of milliseconds (ms) or microseconds.
  - Don't use units of kilobytes (KB) or megabytes (MB) units, even though the CLI displays them as options. Only use units of milliseconds (ms) or microseconds.

(Also see [Configure Priority Flow Control](#), on page 5)

## Important Considerations

- If you configure PFC values in the buffer-internal mode, then the ECN value for the line card is derived from the buffer-internal configuration. If you configure PFC values in the buffer-extended mode, then the ECN value is derived from the policy map. (For details on the ECN feature, see [Explicit Congestion Notification](#).)
- The buffer-internal and buffer-extended modes can't coexist on the same line card.
- If you add or remove traffic-class actions on a line card, you must reload the line card.
- When using the buffer-internal mode, you can change values of the following parameters without having to reload the line card. However, if you add a new traffic class and configure these values for the first time on that traffic class, you must reload the line card for the values to come into effect.
  - pause-threshold
  - headroom
  - ECN
- If you add or remove ECN configuration using the **hw-module profile priority-flow-control** command, you must reload the line card for the ECN changes to take effect.
- The PFC threshold value ranges for the buffer-internal mode are as follows.

Threshold	Configured (bytes)
pause (min)	307200
pause (max)	422400
headroom (min)	345600
headroom (max)	537600

Threshold	Configured (bytes)
ecn (min)	153600
ecn (max)	403200

- For a traffic-class, the ECN value must always be lesser than the configured pause-threshold value.
- The combined configured values for pause-threshold and headroom must not exceed 844800 bytes. Else, the configuration is rejected.
- The pause-threshold value range for buffer-extended mode is from 2 milliseconds (ms) through 25 ms and from 2000 microseconds through 25000 microseconds.

## Hardware Support for Priority Flow Control

The table lists the PIDs that support PFC per release and the PFC mode in which the support is available.

**Table 2: PFC Hardware Support Matrix**

Release	PID	PFC Mode
Release 7.3.15	<ul style="list-style-type: none"> <li>• 88-LC0-36FH-M</li> <li>• 88-LC0-36FH</li> </ul>	buffer-extended
Release 7.0.11	8800-LC-48H	buffer-internal

## Configure Priority Flow Control

You can configure PFC to enable the no-drop behavior for the CoS as defined by the active network QoS policy.



**Note** The system enables shortlink PFC by default when you enable PFC.

### Configuration Example

You must accomplish the following to complete the PFC configuration:

1. Enable PFC at the interface level.
2. Configure ingress classification policy.
3. Attach the PFC policy to the interface.
4. Configure PFC threshold values using either the buffer-internal or buffer-extended mode.

```
Router# configure
Router(config)# priority-flow-control mode on
/*Configure ingress classification policy*/
```

```

Router(config)# class-map match-any prec7
Router(config-cmap)# match precedence
Router(config)# class-map match-any tc7
/*Ingress policy attach*/
Router(config-if)# service-policy input qos_marking
/*Egress policy attach*/
Router(config-if)# service-policy output qos_queueing
Router(config-pmap-c)# exit
Router(config-pmap)# exit
Router(config)#show controllers npu priority-flow-control location <loc>

```

## Running Configuration

```

*Interface Level*
interface HundredGigE0/0/0/0
    priority-flow-control mode on

*Ingress:*
class-map match-any prec7

    match precedence 7

end-class-map

!

class-map match-any prec6

    match precedence 6

end-class-map

!

class-map match-any prec5

    match precedence 5

end-class-map

!

class-map match-any prec4

    match precedence 4

end-class-map

!

class-map match-any prec3
match precedence 3
end-class-map
!
class-map match-any prec2
match precedence 2
end-class-map
!
class-map match-any prec1
match precedence 1
end-class-map
!
!
policy-map QOS_MARKING

```

```
class prec7
  set traffic-class 7
  set qos-group 7
!
class prec6
  set traffic-class 6
  set qos-group 6
!
class prec5
  set traffic-class 5
  set qos-group 5
!
class prec4
  set traffic-class 4
  set qos-group 4
!
class prec3
  set traffic-class 3
  set qos-group 3
!
class prec2
  set traffic-class 2
  set qos-group 2
!
class prec1
  set traffic-class 1
  set qos-group 1
!
class class-default
  set traffic-class 0
  set qos-group 0
!

*Egress:*
class-map match-any tc7
  match traffic-class 7
  end-class-map
!
class-map match-any tc6
  match traffic-class 6
  end-class-map
!
class-map match-any tc5
  match traffic-class 5
  end-class-map

!

class-map match-any tc4

  match traffic-class 4

  end-class-map

!

class-map match-any tc3

  match traffic-class 3

  end-class-map

!
```

```

class-map match-any tc2
match traffic-class 2
end-class-map
!
class-map match-any tc1
match traffic-class 1
end-class-map
!
policy-map QOS_QUEUING
class tc7
    priority level 1
    shape average percent 10
!
class tc6
    bandwidth remaining ratio 1
    queue-limit 100 ms
!
class tc5
    bandwidth remaining ratio 20
    queue-limit 100 ms
!
class tc4
    bandwidth remaining ratio 20
    random-detect ecn
    random-detect 6144 bytes 100 mbytes
!
class tc3
    bandwidth remaining ratio 20
    random-detect ecn
    random-detect 6144 bytes 100 mbytes
!
class tc2
    bandwidth remaining ratio 5
    queue-limit 100 ms
!
class tc1
    bandwidth remaining ratio 5
    queue-limit 100 ms
!
class class-default
    bandwidth remaining ratio 20
    queue-limit 100 ms
!
[buffer-extended]

hw-module profile priority-flow-control location 0/0/CPU0
    buffer-extended traffic-class 3 pause-threshold 10 ms
    buffer-extended traffic-class 4 pause-threshold 10 ms
!

[buffer-internal]

hw-module profile priority-flow-control location 0/1/CPU0
    buffer-internal traffic-class 3 pause-threshold 403200 bytes headroom 441600 bytes ecn
    224640 bytes
    buffer-internal traffic-class 4 pause-threshold 403200 bytes headroom 441600 bytes ecn
    224640 bytes

```

## Verification

```

Router#sh controllers hundredGigE0/0/0/22 priority-flow-control
Priority flow control information for interface HundredGigE0/0/0/22:

```

```

Priority Flow Control:
Total Rx PFC Frames : 0
Total Tx PFC Frames : 313866
Rx Data Frames Dropped: 0
CoS Status Rx Frames
---
0   on   0
1   on   0
2   on   0
3   on   0
4   on   0
5   on   0
6   on   0
7   on   0

/*[buffer-internal]*/
Router#show controllers hundredGigE 0/9/0/24 priority-flow-control

Priority flow control information for interface HundredGigE0/9/0/24:

Priority Flow Control:
Total Rx PFC Frames : 0
Total Tx PFC Frames : 313866
Rx Data Frames Dropped: 0
CoS Status Rx Frames
---
0   on   0
1   on   0
2   on   0
3   on   0
4   on   0
5   on   0
6   on   0
7   on   0
...

/*[buffer-internal, tc3 & tc4 configured. TC4 doesn't have ECN]*/

Router#show controllers npu priority-flow-control location <loc>
Location Id:                0/1/CPU0
PFC:                        Enabled
PFC-Mode:                   buffer-internal
TC   Pause                  Headroom    ECN
-----
3    86800 bytes            120000 bytes    76800 bytes
4    86800 bytes            120000 bytes    Not-configured

/*[buffer-extended PFC, tc3 & tc4 configured]*/

Router#show controllers npu priority-flow-control location <loc>
Location Id:                0/1/CPU0
PFC:                        Enabled
PFC-Mode:                   buffer-extended
TC   Pause
-----
3    5000 us
4    10000 us

/*[No PFC]*/

Router#show controllers npu priority-flow-control location <loc>
Location Id:                0/1/CPU0
PFC:                        Disabled

```

**Related Topics**

- [Priority Flow Control Overview, on page 1](#)

**Related Commands**    hw-module profile priority-flow-control location

# Configurable ECN Threshold and Maximum Marking Probability Values

*Table 3: Feature History Table*

Feature Name	Release Information	Feature Description
Configurable ECN Threshold and Maximum Marking Probability Values	Release 7.5.4	<p>While configuring PFC in the buffer-internal mode, you can now optimize congestion notification from the end router to the transmitting router, thus preventing the aggressive throttle of the source traffic. This optimization is possible because we've provided the flexibility to configure the minimum and maximum values for the ECN threshold and the maximum value for marking probability. With these values configured, the probability percentage marking is applied linearly, starting at the ECN minimum threshold till the ECN Max threshold.</p> <p>Earlier releases fixed the maximum ECN marking probability at 100% at the maximum ECN threshold.</p> <p>This functionality adds the following options to the <a href="#">hw-module profile priority-flow-control</a> command:</p> <ul style="list-style-type: none"> <li>• <b>max-threshold</b></li> <li>• <b>probability-percentage</b></li> </ul>

## ECN Threshold and Maximum Marking Probability Values

So far, the maximum ECN marking probability was not configurable and was fixed at 100%. You couldn't configure the ECN maximum threshold value either. Such an arrangement of preset marking probabilities and

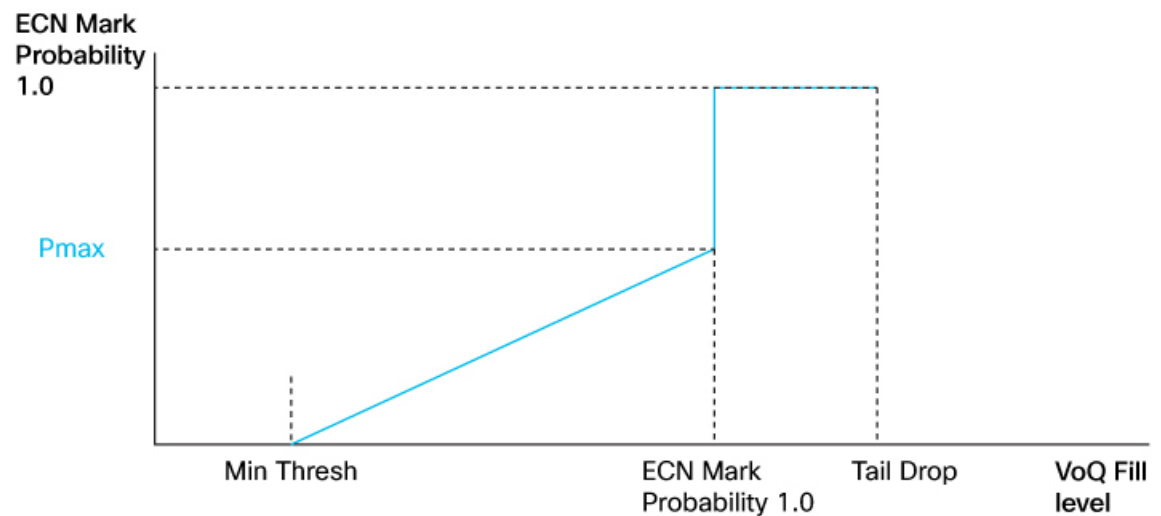
fixed maximum threshold values meant traffic rates began to drop as a function of the queue length. Because of the linear increase in the ECN marking probability—and the consequent congestion signaling from the end host to the transmitting host—traffic rates could begin slowing down even if your link had the necessary bandwidth.

With this feature, you can configure the minimum and maximum ECN threshold values and, depending on your link capability and traffic requirements, configure a marking probability such that the number of packets being marked between the minimum and maximum thresholds is reduced.

The figure depicts the feature implementation visually, where:

- Pmax denotes the configurable maximum marking probability.
- The ECN mark probability is 1 from the maximum threshold to the tail drop threshold.
- Mark probability increases linearly from 0 at the minimum threshold to Pmax at the maximum threshold.

**Figure 1: ECN Mark Probability vs. Queue Length (VOQ Fill Levels)**



You configure the **max-threshold** and **probability-percentage** options for this feature in the **hw-module profile priority-flow-control** command. We have provided you the flexibility to choose one of these configuration options:

- Default **max-threshold** and **probability-percentage** values.
- Configurable **max-threshold** and **probability-percentage** values.
- PFC in the buffer-internal mode without the new options, as you did before Release 7.5.4.

See [Configure ECN Threshold and Maximum Marking Probability Values, on page 13](#) for details.

## Benefits of Configurable ECN Threshold and Maximum Marking Probability Values

A lower mark probability allows the end host to better identify the aggressor flow in the queue and only throttle it without impacting other well-behaved flows. This in turn leads to optimized and efficient deployment and usage of bandwidth.

## ECN Threshold and Maximum Marking Probability Values: FAQs

- **What if I set the ECN marking probability percentage to 100%?**

ECN Marking is linear once queue length exceeds the ECN minimum value. The tail drop comes into play when the average queue size reaches the marking probability percentage of 100%.

- **How does traffic behave beyond my configured value of maximum ECN marking probability?**

Let us say you've set the maximum ECN marking probability to 5%. Any more increase in the average queue length beyond 5% shifts the marking probability to 100%, and [Tail Drop and the FIFO Queue](#) comes into effect.

## Guidelines and Limitations

- This functionality is available only when you configure PFC in the buffer-internal mode.
- If you configure PFC values in the buffer-internal mode, the ECN value for the line card is derived from the buffer-internal configuration, unlike in the buffer-extended mode where the ECN value is derived from the policy map.
- Line Cards that support this functionality:
  - 88-LC0-36FH
  - 88-LC0-36FH-M
- The following interface types support this functionality:
  - Physical interfaces
  - Bundle interfaces
  - Subinterfaces
  - Bundle subinterfaces
- This functionality is supported for all interface speeds.
- If you have a policy map with one or multiple classes with maximum ECN marking probability enabled, you can:
  - Apply the map to any of the supported interface types.
  - Remove the map from any of the supported interface types.
  - Modify the map while you're attaching it to multiple interfaces.
- The probability percentage option is supported only with **random-detect ecn** configured in the same class. Else, the policy is rejected when applied on an interface. (**Not sure this is applicable. Please confirm.**)
- Ensure that the probability percentage configuration is the same for all traffic classes because this is a device-level configuration.

Table 4: Useful Tips

If you...	...you must...
<p>Want to switch from the default configuration mode to the custom configuration mode</p> <p>OR</p> <p>Want to switch from the custom configuration mode to the default configuration</p>	<ol style="list-style-type: none"> <li>1. Use the <b>no</b> form of the <b>hw-module profile priority-flow-control</b> command to remove the existing configuration.</li> <li>2. Configure the new mode and settings using the <b>hw-module profile priority-flow-control</b> command.</li> <li>3. Reload the line card</li> </ol>
Configured PFC in buffer-internal mode without configuring the <b>max-threshold</b> and <b>probability-percentage</b> parameters, but now want to configure them	<ol style="list-style-type: none"> <li>1. Configure the <b>max-threshold</b> and <b>probability-percentage</b> parameters using the <b>hw-module profile priority-flow-control</b> command.</li> <li>2. Reload the line card.</li> </ol>
Want to change the buffer-internal parameters in the custom mode	Configure the buffer-internal parameters using the <b>hw-module profile priority-flow-control</b> command. You needn't reload the line card.
Want to continue configuring PFC in buffer-internal mode the way you did in releases prior to Release 7.5.4.	<p>Configure the buffer-internal parameters using the <b>hw-module profile priority-flow-control</b> command, but ensure that you only configure values for <b>pause-threshold</b>, <b>headroom</b>, and <b>ecn</b>. If you don't configure values for <b>max-threshold</b>, the router takes the <b>ecn</b> value as the ECN maximum threshold value.</p> <p>See Option 3 under <a href="#">Configure ECN Threshold and Maximum Marking Probability Values</a>, on page 13 for details.</p>

## Configure ECN Threshold and Maximum Marking Probability Values

To configure the ECN maximum threshold and maximum probability values:

1. Enable PFC at the interface level.

```
Router(config)#int fourHundredGigE 0/6/0/1
Router(config-if)#priority-flow-control mode on
```

2. [Option 1: Default configuration mode] Configure PFC in buffer-internal mode with pre-defined buffer values enabled along with default **max-threshold** and **probability-percentage** values.

```
Router(config)#hw-module profile priority-flow-control location 0/6/0/1
Router(config-pfc-loc)#buffer-extended traffic-class 3
Router(config-pfc-loc)#buffer-extended traffic-class 4
Router(config-pfc-loc)#commit
```

[Option 2: Custom configuration mode] Configure PFC in buffer-internal mode with custom values for all parameters including **max-threshold** and **probability-percentage**.

```
Router(config)#hw-module profile priority-flow-control location 0/6/0/1
Router(config-pfc-loc)#buffer-internal traffic-class 3 pause-threshold 1574400 bytes
headroom 1651200 bytes ecn 629760 bytes max-threshold 1416960 bytes
probability-percentage 50
Router(config-pfc-loc)#buffer-internal traffic-class 4 pause-threshold 1574400 bytes
headroom 1651200 bytes ecn 629760 bytes max-threshold 1416960 bytes
probability-percentage 50
Router(config-pfc-loc)#commit
```

[Option 3: Without **max-threshold** and **probability-percentage** parameters] Based on your requirements, you can also configure PFC in buffer-internal mode without these parameters.

```
Router(config)#hw-module profile priority-flow-control location 0/6/0/1
Router(config-pfc-loc)#buffer-internal traffic-class 3 pause-threshold 1574400 bytes
headroom 1651200 bytes ecn 629760 bytes
Router(config-pfc-loc)#buffer-internal traffic-class 4 pause-threshold 1574400 bytes
headroom 1651200 bytes ecn 629760 bytes
Router(config-pfc-loc)#commit
```



**Note** See **Useful Tips** at [ECN Threshold and Maximum Marking Probability Values: FAQs](#), on page 12 to know more about the nuances of switching between configuration modes.

### Running Configuration

[Option 1: Default configuration mode]

```
/*Interface Level*/
priority-flow-control mode on
!
/*Line card*/
hw-module profile priority-flow-control location 0/6/0/1
buffer-extended traffic-class 3
buffer-extended traffic-class 4
!
```

[Option 2: Custom configuration mode]

```
/*Interface Level*/
priority-flow-control mode on
!
/*Line card*/

hw-module profile priority-flow-control location 0/6/0/1
buffer-internal traffic-class 3 pause-threshold 1574400 bytes headroom 1651200 bytes ecn
629760 bytes max-threshold 1416960 bytes probability-percentage 50
buffer-internal traffic-class 4 pause-threshold 1574400 bytes headroom 1651200 bytes ecn
629760 bytes max-threshold 1416960 bytes probability-percentage 50
!
```

[Option 3: Without **max-threshold** and **probability-percentage** parameters]

```
/*Interface Level*/
priority-flow-control mode on
!
/*Line card*/
buffer-internal traffic-class 3 pause-threshold 1574400 bytes headroom 1651200 bytes ecn
629760 bytes
```

```
buffer-internal traffic-class 4 pause-threshold 1574400 bytes headroom 1651200 bytes ecn
629760 bytes
!
```

### Verification

[Option 1: Default configuration mode]

```
Router#show controllers npu priority-flow-control location all
```

```
Location:          0/6/CPU0
PFC:               Enabled
PFC Mode:          buffer-internal
TC    Pause-threshold  Headroom      ECN          ECN-MAX      Prob-per
-----
3     1574400 bytes    1651200 bytes  629760 bytes  1416960 bytes  5
4     1574400 bytes    1651200 bytes  629760 bytes  1416960 bytes  5
```

[Option 2: Custom configuration mode]

```
Router#show controllers npu priority-flow-control location all
```

```
Location:          0/6/CPU0
PFC:               Enabled
PFC Mode:          buffer-internal
TC    Pause-threshold  Headroom      ECN          ECN-MAX      Prob-per
-----
3     1574400 bytes    1651200 bytes  629760 bytes  1416960 bytes  50
4     1574400 bytes    1651200 bytes  629760 bytes  1416960 bytes  50
```

[Option 3: Without **max-threshold** and **probability-percentage** parameters]

```
Router#show controllers npu priority-flow-control location all
```

```
Location:          0/6/CPU0
PFC:               Enabled
PFC Mode:          buffer-internal
TC    Pause-threshold  Headroom      ECN          ECN-MAX      Prob-per
-----
3     1574400 bytes    1651200 bytes  629760 bytes  not-configured not-configured
4     1574400 bytes    1651200 bytes  629760 bytes  not-configured not-configured
```

## Priority Flow Control Watchdog Overview

PFC Watchdog is a mechanism to identify any PFC storms (queue-stuck condition) in the network. It also prevents the PFC from propagating on the network and running in a loop. You can configure a PFC watchdog interval to detect whether packets in a no-drop queue are drained within a specified time period. When the time period is exceeded, all outgoing packets are dropped on interfaces that match the PFC queue that is not being drained.

This requires monitoring PFC receiving on each port and detecting ports seeing an unusual number of sustained pause frames. Once detected, the watchdog module can enforce several actions on such ports, which include generating a syslog message for network management systems, shutting down the queue, and autorestoring the queue (after the PFC storm stops).

Here's how the PFC Watchdog works:

1. The Watchdog module monitors the PFC-enabled queues to determine the reception of an unusual amount of PFC pause frames in a given interval (Watchdog interval.)
2. Your hardware notifies the Watchdog module when too many PFC frames are received and traffic on the corresponding queues is halted for a time interval.

3. On receiving such notifications, the Watchdog module starts the shutdown timer and moves the queue state to wait-to-shutdown state.
4. At regular intervals during the shutdown interval, the queue is checked for PFC frames and if the traffic in the queue is stuck. If the traffic isn't stuck because the queue didn't receive any PFC frames, the queue moves back to the monitored state.
5. If the traffic is stuck for a longer time and the shutdown-timer expires, the queue switches to a drop state and the PFC Watchdog begins to drop all packets.
6. At regular intervals, the Watchdog checks the queue for PFC frames and whether the traffic in the queue is still stuck. If traffic is stuck in the queue as PFC packets keep arriving, the queue remains in the drop or shutdown state.
7. When the traffic's no longer stuck, the autorestore timer starts. At regular intervals, the module checks if the queue is stuck because of PFC frames.
8. If the queue receives PFC frames during the last autorestore interval, the auto-restore timer is reset upon expiry.
9. If the queue receives no PFC frames during the last autorestore interval, the Watchdog module restores the queue, and traffic resumes.

#### Related Topics

- [Priority Flow Control Overview, on page 1](#)

## Configure a Priority Flow Control Watchdog Interval

You can configure PFC Watchdog parameters (Watchdog interval, shutdown multiplier, auto-restore multiplier) at the global or interface levels. Note that:

- When global Watchdog mode is disabled or off, Watchdog is disabled on all interfaces. This condition is regardless of the interface level Watchdog mode settings.
- When global Watchdog mode is enabled or on, the interface level Watchdog mode configuration settings override the global Watchdog mode values.
- When you configure interface level Watchdog attributes such as interval, shutdown multiplier, and auto-restore multiplier, they override the global Watchdog attributes.



---

**Note** Configuring the PFC mode and its policies is a prerequisite for PFC Watchdog.

---

#### Configuration Example

You can configure the Watchdog at the global or at the interface level.



**Note** Watchdog is enabled by default, with system default values of:

Watchdog interval = 100 ms

Shutdown multiplier = 1

Auto-restart multiplier = 10

```
RP/0/RP0/CPU0:ios#show controllers hundredGigE 0/2/0/0 priority-flow-control
```

```
Priority flow control information for interface HundredGigE0/2/0/0:
```

```
Priority flow control watchdog configuration:
```

```
(D) : Default value
```

```
U : Unconfigured
```

```
-----  
Configuration Item Global Interface Effective  
-----
```

```
PFC watchdog state : U U Enabled(D)
```

```
Poll interval : U U 100(D)
```

```
Shutdown multiplier : U U 1(D)
```

```
Auto-restore multiplier : U U 10(D)
```

```
RP/0/RP0/CPU0:ios#config
```

```
RP/0/RP0/CPU0:ios(config)#priority-flow-control watchdog mode off
```

```
RP/0/RP0/CPU0:ios(config)#commit
```

```
RP/0/RP0/CPU0:ios(config)#do show controllers hundredGigE 0/2/0/0 priority-flo$
```

```
Priority flow control information for interface HundredGigE0/2/0/0:
```

```
Priority flow control watchdog configuration:
```

```
(D) : Default value
```

```
U : Unconfigured
```

```
-----  
Configuration Item Global Interface Effective  
-----
```

```
PFC watchdog state : Disabled U Disabled
```

```
Poll interval : U U 100(D)
```

```
Shutdown multiplier : U U 1(D)
```

```
Auto-restore multiplier : U U 10(D)
```

```
RP/0/RP0/CPU0:ios(config)#interface hundredGigE 0/2/0/0 priority-flow-control $
```

```
RP/0/RP0/CPU0:ios(config)#commit
```

```
RP/0/RP0/CPU0:ios(config)#do show controllers hundredGigE 0/2/0/0 priority-flo$
```

```
Priority flow control information for interface HundredGigE0/2/0/0:
```

```
Priority flow control watchdog configuration:
```

```
(D) : Default value
```

```
U : Unconfigured
```

```
-----  
Configuration Item Global Interface Effective  
-----
```

```
PFC watchdog state : Disabled Enabled Disabled
```

```
Poll interval : U U 100(D)
```

```
Shutdown multiplier : U U 1(D)
```

```
Auto-restore multiplier : U U 10(D)
```

```
RP/0/RP0/CPU0:ios(config)#interface hundredGigE 0/2/0/1 priority-flow-control $
RP/0/RP0/CPU0:ios(config)#commit
```

```
RP/0/RP0/CPU0:ios(config)#do show controllers hundredGigE 0/2/0/1 priority-flo$
```

```
Priority flow control information for interface HundredGigE0/2/0/1:
```

```
Priority flow control watchdog configuration:
```

```
(D) : Default value
```

```
U: Unconfigured
```

```
-----
Configuration Item Global Interface Effective
-----
```

```
PFC watchdog state : Enabled Disabled Disabled
```

```
Poll interval : U U 100(D)
```

```
Shutdown multiplier : U U 1(D)
```

```
Auto-restore multiplier : U U 10(D)
```

## Verification

To verify that the PFC Watchdog is enabled globally, run the **sh run priority-flow-control watchdog mode** command.

```
Router#sh run priority-flow-control watchdog mode
priority-flow-control watchdog mode on
```

To verify your PFC Watchdog global configuration, run the **priority-flow-control watchdog** command.

```
Router#sh run priority-flow-control watchdog
priority-flow-control watchdog interval 100
priority-flow-control watchdog auto-restore-multiplier 2
priority-flow-control watchdog mode on
priority-flow-control watchdog shutdown-multiplier 2
```

## Related Topics

- [Priority Flow Control Watchdog Overview, on page 15](#)