Configuring Queuing and Scheduling

About Queuing and Scheduling

Traffic queuing is the ordering of packets and applies to both input and output of data. Device modules can support multiple queues, which you can use to control the sequencing of packets in different traffic classes. You can also set weighted random early detection (WRED) and taildrop thresholds. The device drops packets only when the configured thresholds are exceeded.

Traffic scheduling is the methodical output of packets at a desired frequency to accomplish a consistent flow of traffic. You can apply traffic scheduling to different traffic classes to weight the traffic by priority.

The queuing and scheduling processes allow you to control the bandwidth that is allocated to the traffic classes so that you achieve the desired trade-off between throughput and latency for your network.

Modifying Class Maps

System-defined queuing class maps are provided.

Note The provided system-defined queuing class maps cannot be modified.

Congestion Avoidance

You can use the following methods to proactively avoid traffic congestion on the device:

- Apply WRED to TCP or non-TCP traffic.
- Apply tail drop to TCP or non-TCP traffic.

Congestion Management

For egress packets, you can choose one of the following congestion management methods:

- Specify a bandwidth that allocates a minimum data rate to a queue.
- Impose a minimum and maximum data rate on a class of traffic so that excess packets are retained in a queue to shape the output rate.
- Allocate all data for a class of traffic to a priority queue. The device distributes the remaining bandwidth among the other queues.

For information about configuring congestion management, see the Configuring WRED on Egress Queues section.

Explicit Congestion Notification

ECN is an extension to WRED that marks packets instead of dropping them when the average queue length exceeds a specific threshold value. When configured with the WRED ECN feature, routers and end hosts use this marking as a signal that the network is congested to slow down sending packets.

Note Enabling WRED and ECN on a class on a network-qos policy implies that WRED and ECN is enabled for all ports in the system.

Note On extended output queues (EOQ), the approximate fair-drop (AFD) feature for bandwidth management is always enabled. The WRED configuration is ignored on EOQs. The configuration for EOQs is based on the system queuing policy and not on the per port policy.

Traffic Shaping

Traffic shaping allows you to control the traffic going out of an interface in order to match its flow to the speed of the remote target interface and to ensure that the traffic conforms to policies contracted for it. You can shape traffic that adheres to a particular profile to meet downstream requirements. Traffic shaping eliminates bottlenecks in topologies with data-rate mismatches.

Traffic shaping regulates and smooths out the packet flow by imposing a maximum traffic rate for each port's egress queue. Packets that exceed the threshold are placed in the queue and are transmitted later. Traffic shaping is similar to traffic policing, but the packets are not dropped. Because packets are buffered, traffic shaping minimizes packet loss (based on the queue length), which provides better traffic behavior for TCP traffic.

Using traffic shaping, you can control access to available bandwidth, ensure that traffic conforms to the policies established for it, and regulate the flow of traffic to avoid congestion that can occur when the egress traffic exceeds the access speed of its remote, target interface. For example, you can control access to the bandwidth when policy dictates that the rate of a given interface should not, on average, exceed a certain rate even though the access rate exceeds the speed.

Queue length thresholds are configured using the WRED configuration.

Note Traffic shaping is not supported on ALE enabled device 40G front panel ports. When traffic shaping is configured for the system level, the setting is ignored and no error message is displayed. When traffic shaping commands are configured for the port level, the setting is rejected and an error message is displayed.

Licensing Requirements for Queuing and Scheduling

The following table shows the licensing requirements for this feature:

Product	License Requirement
Cisco NX-OS	The QoS feature does not a require license. Any feature not included in a license package is bundled with the NX-OS image and is provided at no extra charge to you. For a complete explanation of the Cisco NX-OS licensing scheme, see the *Cisco NX-OS Licensing Guide*.

Prerequisites for Queuing and Scheduling

Queuing and scheduling have the following prerequisites:

- You must be familiar with using modular QoS CLI.
- You are logged on to the device.

Guidelines and Limitations

Queuing and scheduling have the following configuration guidelines and limitations:

- The device supports a system-level queuing policy, so all ports in the system are impacted when you configure the queuing policy.
- Changes are disruptive. The traffic passing through ports of the specified port type experience a brief period of traffic loss. All ports of the specified type are affected.
- Performance can be impacted. If one or more ports of the specified type do not have a queuing policy applied that defines the behavior for the new queue, the traffic mapping to that queue might experience performance degradation.
- Traffic shaping might increase the latency of packets due to queuing because it falls back to store-and-forward mode when packets are queued.
- Traffic shaping is not supported on the Cisco Nexus 9300 40G ports.
- When configuring priority for one class map queue (SPQ), you need to configure the priority for QoS group 3. When configuring priority for more than one class map queue, you need to configure the priority on the higher numbered QoS groups. In addition, the QoS groups need to be adjacent to each other. For example, if you want to have two SPQs, you have to configure the priority on QoS group 3 and on QoS group 2.

Buffer-boost

The buffer-boost feature enables the line card to use extra buffers. This capability is enabled by default on line cards such as the N9K-X9564PX.

- The command to enable the buffer-boost feature is **buffer-boost**.
- The command to disable the buffer-boost feature is **no buffer-boost**.

Generally, Cisco recommends not to disable the buffer-boost feature. However, disabling the buffer-boost is necessary when there is a need to port channel two different member ports from N9K-X9636PQ based line cards and N9K-X9564PX based line cards. However, Cisco does not recommend to port channel such a configuration between ACI capable leaf line cards and standalone line cards.

Note Line cards like the N9K-X9636PQ and similar, do not offer the buffer-boost feature.

Order of Resolution

The following describes the order of resolution for the pause buffer configuration and the queue-limit for a priority-group.

- Pause Buffer Configuration

  The pause buffer configuration is resolved in the following order:

  - Interface ingress queuing policy (if applied and pause buffer configuration specified for that class).
  - System ingress queuing policy (if applied and pause buffer configuration specified for that class).
  - System network-QoS policy (if applied and pause buffer configuration specified for that class).
  - Default values with regards to the speed of the port.

- Queue-limit for Priority-Group

  The queue-limit for a priority-group is resolved in the following order:

  - Interface ingress queuing policy (if applied and queue-limit configuration specified for that class).
  - System ingress queuing policy (if applied and queue-limit configuration specified for that class).
  - The **hardware qos ing-pg-share** configuration provided value.
  - System default value.

Ingress Queuing

The following are notes about ingress queuing:

- No default system ingress queuing policy exists.
- The ingress queuing policy is used to override the specified pause buffer configuration.
- When downgrading to an earlier release of Cisco Nexus 9000 NX-OS, all ingress queuing configurations have to be removed.
- The ingress queuing feature is supported only on platforms where priority flow control is supported.

Configuring Queuing and Scheduling

Queuing and scheduling are configured by creating policy maps of type queuing that you apply to an egress interface. You can modify system-defined class maps, which are used in policy maps to define the classes of traffic to which you want to apply policies.

For information about configuring policy maps and class maps, see the Using Modular QoS CLI section.

You can configure the congestion-avoidance features, which include tail drop and WRED, in any queue.

You can configure one of the egress congestion management features, such as priority, traffic shaping, and bandwidth in output queues.

Note WRED is not supported on ALE enabled device front panel 40G uplink ports. When WRED is configured for the system level, the setting is ignored and no error message is displayed. When WRED is configured for the port level, the setting is rejected and an error message is displayed.

The system-defined policy map, default-out-policy, is attached to all ports to which you do not apply a queuing policy map. The default policy maps cannot be configured.

Configuring Type Queuing Policies

Type queuing policies for egress are used for scheduling and buffering the traffic of a specific system class. A type queuing policy is identified by its QoS group and can be attached to the system or to individual interfaces for input or output traffic.

Note Ingress queuing policy is used to configure pause buffer thresholds. For more details, see the *Priority Flow Control* section.

SUMMARY STEPS

1. **configure terminal**
2. **policy-map type queuing** *policy-name*
3. **class type queuing** *class-name*
4. **priority**
5. **no priority**
6. **shape** {**kbps** | **mbps** | **gbps**} *burst size* **min** *minimum bandwidth*
7. **bandwidth percent** *percentage*
8. **no bandwidth percent** *percentage*
9. **priority level** *level*
10. **queue-limit** *queue size* [**dynamic** *dynamic threshold*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal**	Enters global configuration mode.
Step 2	**policy-map type queuing** *policy-name*	Creates a named object that represents a set of policies that are to be applied to a set of traffic classes. Policy-map names can contain alphabetic, hyphen, or underscore characters, are case sensitive, and can be up to 40 characters.
Step 3	**class type queuing** *class-name*	Associates a class map with the policy map, and enters configuration mode for the specified system class.
Step 4	**priority**	Specifies that traffic in this class is mapped to a strict priority queue.

	Command or Action	Purpose
Step 5	**no priority**	(Optional) Removes the strict priority queuing from the traffic in this class.
Step 6	**shape** {**kbps** | **mbps** | **gbps**} *burst size* **min** *minimum bandwidth*	Specifies the burst size and minimum guaranteed bandwidth for this queue.
Step 7	**bandwidth percent** *percentage*	Assigns a weight to the class. The class will receive the assigned percentage of interface bandwidth if there are no strict-priority queues. If there are strict-priority queues, however, the strict-priority queues receive their share of the bandwidth first. The remaining bandwidth is shared in a weighted manner among the class configured with a bandwidth percent. For example, if strict-priority queues take 90 percent of the bandwidth, and you configure 75 percent for a class, the class will receive 75 percent of the remaining 10 percent of the bandwidth. **Note** Before you can successfully allocate bandwidth to the class, you must first reduce the default bandwidth configuration on class-default and class-fcoe.
Step 8	**no bandwidth percent** *percentage*	(Optional) Removes the bandwidth specification from this class.
Step 9	**priority level** *level*	(Optional) Specifies the strict priority levels for the Cisco Nexus 9000 Series switches. These levels can be 1, 2, or 3.
Step 10	**queue-limit** *queue size* [**dynamic** *dynamic threshold*]	(Optional) Specifies either the static or dynamic shared limit available to the queue for Cisco Nexus 9000 Series switches. The static queue limit defines the fixed size to which the queue can grow. The dynamic queue limit allows the queue's threshold size to be decided depending on the number of free cells available, in terms of the alpha value.

Configuring Congestion Avoidance

You can configure congestion avoidance with tail drop or WRED features. Both features can be used in egress policy maps.

Note WRED and tail drop cannot be configured in the same class.

Configuring Tail Drop on Egress Queues

You can configure tail drop on egress queues by setting thresholds. The device drops any packets that exceed the thresholds. You can specify a threshold based on the queue size or buffer memory that is used by the queue.

SUMMARY STEPS

1. **configure terminal**
2. **policy-map** [**type queuing**] [**match-first**] [*policy-map-name*]
3. **class type queuing** *class-name*
4. **queue-limit** {*queue-size* [**bytes** | **kbytes** | **mbytes**] | **dynamic** *value*}
5. (Optional) Repeat Steps 3 and 4 to assign tail drop thresholds for other queue classes.
6. **show policy-map** [**type queuing** [*policy-map-name* | **default-out-policy**]]
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal` `switch(config)#`	Enters global configuration mode.
Step 2	**policy-map** [**type queuing**] [**match-first**] [*policy-map-name*] **Example:** `switch(config)# policy-map type queuing shape_queues` `switch(config-pmap-que)#`	Configures the policy map of type queuing and then enters policy-map mode for the policy-map name you specify. Policy-map names can contain alphabetic, hyphen, or underscore characters, are case sensitive, and can be up to 40 characters.
Step 3	**class type queuing** *class-name* **Example:** `switch(config-pmap-que)# class type queuing c-out-q1` `switch(config-pmap-c-que)#`	Configures the class map of type queuing and then enters policy-map class queuing mode. Class queuing names are listed in the previous System-Defined Type queuing Class Maps table.
Step 4	**queue-limit** {*queue-size* [**bytes**	**kbytes**	**mbytes**]	**dynamic** *value*} **Example:** `switch(config-pmap-c-que)# queue-limit 1000 mbytes`	Assigns a tail drop threshold based on the queue size in bytes, kilobytes, or megabytes or allows the queue's threshold size to be determined dynamically depending on the number of free cells available. The device drops packets that exceed the specified threshold. The valid values for byte-based queue size are from 1 to 83886080. The valid values for dynamic queue size are from 0 to 10 as follows: • 0—1/128 • 1—1/64 • 2—1/32 • 3—1/16 • 4—1/8 • 5—1/4

	Command or Action	Purpose
		• 6—1/2 • 7—1 • 8—2 • 9—4 • 10—8 For example, if you configure a dynamic queue size of 6, then the alpha value is ½. If you configure a dynamic queue size of 7, then the alpha value is 1. To calculate the queue-limit consider the following: queue-limit = (alpha/(1 + alpha)) x total buffers For example, if you configure a queue-limit with a dynamic queue size of 7, then the queue-limit can grow up to (1/(1+1)) x total buffers. This means that queue-limit = ½ x total buffers. **Note** Setting the threshold on ALE enabled devices is only supported for the system level. It is not supported for the port level.
Step 5	(Optional) Repeat Steps 3 and 4 to assign tail drop thresholds for other queue classes.	
Step 6	**show policy-map** [**type queuing** [*policy-map-name* | **default-out-policy**]] **Example:** `switch(config-pmap-c-que)# show policy-map type queuing shape_queues`	(Optional) Displays information about all configured policy maps, all policy maps of type queuing, a selected policy map of type queuing, or the default output queuing policy.
Step 7	**copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	(Optional) Saves the running configuration to the startup configuration.

Configuring WRED on Egress Queues

You can configure WRED on egress queues to set minimum and maximum packet drop thresholds. The frequency of dropped packets increases as the queue size exceeds the minimum threshold. When the maximum threshold is exceeded, all packets for the queue are dropped.

Note WRED and tail drop cannot be configured in the same class.

SUMMARY STEPS

1. **configure terminal**
2. **policy-map type queuing** {[**match-first**] *policy-map-name*}
3. **class type queuing** *class-name*
4. **random-detect** [**minimum-threshold** *min-threshold* {**packets** | **bytes** | **kbytes** | **mbytes**} **maximum-threshold** *max-threshold* {**packets** | **bytes** | **kbytes** | **mbytes**} **drop-probability** *value* **weight** *value*] [**threshold** {**burst-optimized** | **mesh-optimized**}] [**ecn**]
5. (Optional) Repeat Steps 3 and 4 to configure WRED for other queuing classes.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal` `switch(config)#`	Enters global configuration mode.
Step 2	**policy-map type queuing** {[**match-first**] *policy-map-name*} **Example:** `switch(config)# policy-map type queuing p1` `switch(config-pmap-que)#`	Configures the policy map of type queuing and then enters policy-map mode for the policy-map name you specify. Policy-map names can contain alphabetic, hyphen, or underscore characters, are case sensitive, and can be up to 40 characters.
Step 3	**class type queuing** *class-name* **Example:** `switch(config-pmap-que)# class type queuing c-out-q1` `switch(config-pmap-c-que)#`	Configures the class map of type queuing and then enters policy-map class queuing mode. Class queuing names are listed in the previous System-Defined Type queuing Class Maps table.
Step 4	**random-detect** [**minimum-threshold** *min-threshold* {**packets** | **bytes** | **kbytes** | **mbytes**} **maximum-threshold** *max-threshold* {**packets** | **bytes** | **kbytes** | **mbytes**} **drop-probability** *value* **weight** *value*] [**threshold** {**burst-optimized** | **mesh-optimized**}] [**ecn**] **Example:** `switch(config-pmap-c-que)# random-detect minimum-threshold 10 mbytes maximum-threshold 20 mbytes`	Configures WRED on the specified queuing class. You can specify minimum and maximum thresholds used to drop packets from the queue. You can configure these thresholds by the number of packets, bytes, kilobytes, or megabytes. The minimum and maximum thresholds must be of the same type. The thresholds are from 1 to 52428800. Alternatively, you can specify a threshold that is optimized for burst or mesh traffic, or you can configure WRED to drop packets based on explicit congestion notification (ECN). **Note** The minimum-threshold and maximum-threshold parameters are not supported on the Cisco Nexus 9300 and N9K-X9564TX and N9K-X9564PX linecards.
Step 5	(Optional) Repeat Steps 3 and 4 to configure WRED for other queuing classes.	

Configuring Congestion Management

You can configure only one of the following congestion management methods in a policy map:

- Allocate a minimum data rate to a queue by using the **bandwidth** and **bandwidth remaining** commands.
- Allocate all data for a class of traffic to a priority queue by using the **priority** command. You can use the **bandwidth remaining** command to distribute remaining traffic among the nonpriority queues. By default, the system evenly distributes the remaining bandwidth among the nonpriority queues.
- Allocate a minimum and maximum data rate to a queue by using the **shape** command.

In addition to the congestion management feature that you choose, you can configure one of the following queue features in each class of a policy map:

- Taildrop thresholds based on the queue size and the queue limit usage. For more information, see the Configuring Tail Drop on Egress Queues section.
- WRED for preferential packet drops. For more information, see the Configuring WRED on Egress Queues section.

Configuring Bandwidth and Bandwidth Remaining

You can configure the bandwidth and bandwidth remaining on the egress queue to allocate a minimum percentage of the interface bandwidth to a queue.

Note When a guaranteed bandwidth is configured, the priority queue must be disabled in the same policy map.

SUMMARY STEPS

1. **configure terminal**
2. **policy-map type queuing** {[**match-first**] *policy-map-name*}
3. **class type queuing***class-name*
4. Assign a minimum rate of the interface bandwidth or assign the percentage of the bandwidth that remains:
   - Bandwidth percent:

     bandwidth {**percent** *percent*}
   - Bandwidth remaining percent:

     bandwidth remaining percent *percent*
5. (Optional) Repeat Steps 3 and 4 to assign tail drop thresholds for other queue classes.
6. exit
7. **show policy-map** [**type queuing** [*policy-map-name* | **default-out-policy**]]
8. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal` `switch(config)#`	Enters global configuration mode.
Step 2	**policy-map type queuing** {[**match-first**] *policy-map-name*} **Example:** `switch(config)# policy-map type queuing shape_queues` `switch(config-pmap-que)#`	Configures the policy map of type queuing and then enters policy-map mode for the policy-map name you specify. Policy-map names can contain alphabetic, hyphen, or underscore characters, are case sensitive, and can be up to 40 characters.
Step 3	**class type queuing***class-name* **Example:** `switch(config-pmap-que)# class type queuing c-out-q1` `switch(config-pmap-c-que)#`	Configures the class map of type queuing and then enters policy-map class queuing mode. Class queuing names are listed in the previous System-Defined Type queuing Class Maps table.
Step 4	Assign a minimum rate of the interface bandwidth or assign the percentage of the bandwidth that remains: • Bandwidth percent: **bandwidth** {**percent** *percent*} • Bandwidth remaining percent: **bandwidth remaining percent** *percent* **Example:** • Bandwidth percent: `switch(config-pmap-c-que)# bandwidth percent 25` • Bandwidth remaining percent: `switch(config-pmap-c-que)# bandwidth remaining percent 25`	• Bandwidth percent: Assigns a minimum rate of the interface bandwidth to an output queue as the percentage of the underlying interface link rate. The range is from 0 to 100. The example shows how to set the bandwidth to a minimum of 25 percent of the underlying link rate. • Bandwidth remaining percent: Assigns the percentage of the bandwidth that remains to this queue. The range is from 0 to 100. The example shows how to set the bandwidth for this queue to 25 percent of the remaining bandwidth.
Step 5	(Optional) Repeat Steps 3 and 4 to assign tail drop thresholds for other queue classes.	
Step 6	exit **Example:** `switch(config-cmap-que)# exit` `switch(config)#`	Exits policy-map queue mode and enters global configuration mode.

	Command or Action	Purpose
Step 7	**show policy-map** [**type queuing** [*policy-map-name* | **default-out-policy**]] **Example:** `switch(config-pmap-c-que)# show policy-map type queuing shape_queues`	(Optional) Displays information about all configured policy maps, all policy maps of type queuing, a selected policy map of type queuing, or the default output queuing policy.
Step 8	**copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	(Optional) Saves the running configuration to the startup configuration.

Configuring Priority

If you do not specify the priority, the system-defined egress pq queues behave as normal queues. For information on the system-defined type queuing class maps, see the Using Modular QoS CLI section.

You can configure only one level of priority on an egress priority queue. You use the system-defined priority queue class for the type of module to which you want to apply the policy map.

For the nonpriority queues, you can configure how much of the remaining bandwidth to assign to each queue. By default, the device evenly distributes the remaining bandwidth among the nonpriority queues.

Note When a priority queue is configured, the other queues can only use the remaining bandwidth in the same policy map.

Note When configuring priority for one class map queue (SPQ), you need to configure the priority for QoS group 3. When configuring priority for more than one class map queue, you need to configure the priority on the higher numbered QoS groups. In addition, the QoS groups need to be adjacent to each other. For example, if you want to have two SPQs, you have to configure the priority on QoS group 3 and on QoS group 2.

SUMMARY STEPS

1. **configure terminal**
2. **policy-map type queuing** {[**match-first**] *policy-map-name*}
3. **class type queuing** *class-name*
4. **priority** [**level** *value*]
5. **class type queuing***class-name*
6. **bandwidth remaining percent** *percent*
7. (Optional) Repeat Steps 5 to 6 to assign the remaining bandwidth for the other nonpriority queues.
8. exit
9. **show policy-map** [**type queuing** [*policy-map-name* | **default-out-policy**]]
10. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal` `switch(config)#`	Enters global configuration mode.
Step 2	**policy-map type queuing** {[**match-first**] *policy-map-name*} **Example:** `switch(config)# policy-map type queuing priority_queue1` `switch(config-pmap-que)#`	Configures the policy map of type queuing and then enters policy-map mode for the policy-map name you specify. Policy-map names can contain alphabetic, hyphen, or underscore characters, are case sensitive, and can be up to 40 characters.
Step 3	**class type queuing** *class-name* **Example:** `switch(config-pmap-que)# class type queuing c-out-q1` `switch(config-pmap-c-que)#`	Configures the class map of type queuing and then enters policy-map class queuing mode. Class queuing names are listed in the previous System-Defined Type queuing Class Maps table.
Step 4	**priority** [**level** *value*] **Example:** `switch(config-pmap-c-que)# priority`	Selects this queue as a priority queue. Only one priority level is supported.
Step 5	**class type queuing***class-name* **Example:** `switch(config-pmap-que)# class type queuing c-out-q2` `switch(config-pmap-c-que)#`	(Optional) Configures the class map of type queuing and then enters policy-map class queuing mode. Class queuing names are listed in the previous System-Defined Type queuing Class Maps table. Choose a nonpriority queue where you want to configure the remaining bandwidth. By default, the system evenly distributes the remaining bandwidth among the nonpriority queues.

	Command or Action	Purpose
Step 6	**bandwidth remaining percent** *percent* **Example:** `switch(config-pmap-c-que)# bandwidth remaining percent 25`	(Optional) Assigns the percent of the bandwidth that remains to this queue. The range is from 0 to 100.
Step 7	(Optional) Repeat Steps 5 to 6 to assign the remaining bandwidth for the other nonpriority queues.	
Step 8	exit **Example:** `switch(config-cmap-que)# exit` `switch(config)#`	Exits policy-map queue mode and enters global configuration mode.
Step 9	**show policy-map** [**type queuing** [*policy-map-name* | **default-out-policy**]] **Example:** `switch(config)# show policy-map type queuing priority_queue1`	(Optional) Displays information about all configured policy maps, all policy maps of type queuing, a selected policy map of type queuing, or the default output queuing policy.
Step 10	**copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	(Optional) Saves the running configuration to the startup configuration.

Configuring Traffic Shaping

You can configure traffic shaping on an egress queue to impose a minimum and maximum rate on it.

Note Configuring traffic shaping for a queue is independent of priority or bandwidth in the same policy map.

Note The system queuing policy is applied to both internal and front panel ports. When traffic shaping is enabled on the system queuing policy, traffic shaping is also applied to the internal ports. As a best practice, do not enable traffic shaping on the system queuing policy.

Note Traffic shaping is not supported on the Cisco Nexus 9300 40G ports.

Before You Begin

Configure random detection minimum and maximum thresholds for packets.

SUMMARY STEPS

1. **configure terminal**
2. **policy-map type queuing** {[**match-first**] *policy-map-name*}
3. **class type queuing** *class-name*
4. **shape min** *value* {**bps** | **gbps** | **kbps** | **mbps** | **pps**} **max** *value* {**bps** | **gbps** | **kbps** | **mbps** | **pps**}
5. (Optional) Repeat Steps 3 and 4 to assign tail drop thresholds for other queue classes.
6. **show policy-map** [**type queuing** [*policy-map-name* | **default-out-policy**]]
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal` `switch(config)#`	Enters global configuration mode.
Step 2	**policy-map type queuing** {[**match-first**] *policy-map-name*} **Example:** `switch(config)# policy-map type queuing shape_queues` `switch(config-pmap-que)#`	Configures the policy map of type queuing and then enters policy-map mode for the policy-map name you specify. Policy-map names can contain alphabetic, hyphen, or underscore characters, are case sensitive, and can be up to 40 characters.
Step 3	**class type queuing** *class-name* **Example:** `switch(config)# class type queuing c-out-q-default` `switch(config-pmap-c-que)#`	Configures the class map of type queuing and then enters policy-map class queuing mode. Class queuing names are listed in the previous System-Defined Type queuing Class Maps table.
Step 4	**shape min** *value* {**bps**	**gbps**	**kbps**	**mbps**	**pps**} **max** *value* {**bps**	**gbps**	**kbps**	**mbps**	**pps**} **Example:** `switch(config-pmap-c-que)# shape min 10 bps max 100 bps`	Assigns a minimum and maximum bit rate on an output queue. The default bit rate is in bits per second (bps). The example shows how to shape traffic to a minimum rate of 10 bits per second (bps) and a maximum rate of 100 bps.
Step 5	(Optional) Repeat Steps 3 and 4 to assign tail drop thresholds for other queue classes.	
Step 6	**show policy-map** [**type queuing** [*policy-map-name*	**default-out-policy**]] **Example:** `switch(config)# show policy-map type queuing shape_queues`	(Optional) Displays information about all configured policy maps, all policy maps of type queuing, a selected policy map of type queuing, or the default output queuing policy.

	Command or Action	Purpose
Step 7	**copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	(Optional) Saves the running configuration to the startup configuration.

Applying a Queuing Policy on a System

You apply a queuing policy globally on a system.

SUMMARY STEPS

1. **configure terminal**
2. **system qos**
3. **service-policy type queuing output** {*policy-map-name* | **default-out-policy**}

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal` `switch(config)#`	Enters global configuration mode.
Step 2	**system qos** **Example:** `switch (config)# system qos` `switch (config-sys-qos)#`	Enters system qos mode.
Step 3	**service-policy type queuing output** {*policy-map-name*	**default-out-policy**} **Example:** `switch (config-sys-qos)# service-policy type queuing map1`	Adds the policy map to the input or output packets of system. **Note** The **output** keyword specifies that this policy map should be applied to traffic transmitted from an interface. **Note** To restore the system to the default queuing service policy, use the **no** form of this command.

Verifying the Queuing and Scheduling Configuration

Use the following commands to verify the queuing and scheduling configuration:

Command	Purpose
show class-map [**type queuing** [*class-name*]]	Displays information about all configured class maps, all class maps of type queuing, or a selected class map of type queuing.
show policy-map [**type queuing** [*policy-map-name* | **default-out-policy**]]	Displays information about all configured policy maps, all policy maps of type queuing, a selected policy map of type queuing, or the default output queuing policy.
show policy-map system	Displays information about all configured policy maps on the system.

Controlling the QoS Shared Buffer

The QoS buffer provides support per port/queue and shared space. You can control the QoS buffer that is shared by all flows by disabling or restricting reservations.

The **hardware qos min-buffer** command is used to control the QoS shared buffer.

hardware qos min-buffer [**all**|**default**|**none**]	• **all** Current behavior where all reservations are enabled ON). • **default** Enables reservations only for qos-group-0. • **none** Disables reservations for all qos-groups.

The **show hardware qos min-buffer** command is used to display the current buffer configuration.

Monitoring the QoS Packet Buffer

The Cisco Nexus 9000 Series device has a 12-MB buffer memory that divides into a dedicated per port and dynamic shared memory. Each front-panel port has four unicast queues and four multicast queues in egress. In the scenario of burst or congestion, each egress port consumes buffers from the dynamic shared memory.

You can display the real-time and peak status of the shared buffer per port. All counters are displayed in terms of the number of cells. Each cell is 208 bytes in size. You can also display the global level buffer consumption in terms of consumption and available number of cells.

Note Monitoring the shared buffer on ALE enabled devices is not supported for the port level.

Note In the examples shown in this section, the port numbers are Broadcom ASIC ports. The following example shows how to determine the Broadcom ASIC port for a front panel interface, where dpid indicates the Broadcom ASIC port 19 and the unit number indicates the ASIC instance number 0:

```
switch# show system internal ethpm info interface ethernet 4/7 | inc IF_STATIC_INFO
IF_STATIC_INFO:
port_name=Ethernet4/7,if_index:0x1a180c00,ltl=2587,slot=3,
nxos_port=6,dmod=10,dpid=19,unit=0,queue=16,xbar_unitbmp=0x1 dev_id=223
```

This example shows how to display the real-time status of the shared buffer per port in egress:

```
switch(config)# show hardware internal buffer info pkt-stats module 4 instance 0
INSTANCE: 0
============
|-------------------------------------------------------------------------------------------|
    Output Shared Service Pool Buffer Utilization (in cells)
                              SP-0       SP-1       SP-2       SP-3

Total Instant Usage              0          0          0          0
Remaining Instant Usage      50356          0          0       7136
Peak/Max Cells Used              0          0          0        165
Switch Cell Count            50356          0          0       7136
```

Note The data/switching traffic and pool is represented by SP-0. The control traffic to the supervisor is represented by SP-3.

Note The **module** and **instance** keywords are optional. You can use them to limit the command to show the output for a specific module, a specific instance, or both. If you do not use these optional keywords, the command displays the output for all instances across all modules.

Usage information is as follows:

- Total Instant Usage—Current shared pool buffer usage in terms of the number of cells on a global basis.
- Remaining Instant Usage—The effective free number of cells available on a global basis.
- Peak/Max Cells Used—The maximum buffer usage that is seen until the last clear.
- Switch Cell Count—Total global shared pool buffer space available in the platform in terms of the number of cells on a global basis.

This example shows how to display the real-time status of the shared buffer per port in ingress:

```
switch(config-pmap-c-que)# show hardware internal buffer info pkt-stats input module 6
INSTANCE: 0
============
|-------------------------------------------------------------------------------------------|
|             Input Shared Service Pool Buffer Utilization (in cells)                       |
|                              SP-0       SP-1       SP-2       SP-3                        |
|-------------------------------------------------------------------------------------------|
Total Instant Usage              0          0          0          0
```

```
Remaining Instant Usage      31879         0         0      4997
Peak/Max Cells Used              0         0         0       133
Switch Cells Count           31879         0         0      4997

INSTANCE: 1
============
|-------------------------------------------------------------------------------|
|             Input Shared Service Pool Buffer Utilization (in cells)           |
|                           SP-0       SP-1       SP-2       SP-3               |
|-------------------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      31879         0         0      4997
Peak/Max Cells Used              0         0         0       133
Switch Cells Count           31879         0         0      4997

INSTANCE: 2
============
|-------------------------------------------------------------------------------|
|             Input Shared Service Pool Buffer Utilization (in cells)           |
|                           SP-0       SP-1       SP-2       SP-3               |
|-------------------------------------------------------------------------------|
Total Instant Usage          25512         0         0       135
Remaining Instant Usage       6367         0         0      4862
Peak/Max Cells Used          38952         0         0       295
Switch Cells Count           31879         0         0      4997

|-------------------------------------------------------------------------------|
|                  Per Port Per PG: Input Instant Buffer utilization            |
|               Each line displays the number of cells utilized for a given     |
|                              port for each pg                                 |
|                      One cell represents approximately 208 bytes              |
|--------------------+-------+-------+-------+-------+-------+-------+-------+------+|
|Port/Buffer Stat       PG0     PG1     PG2     PG3     PG4     PG5     PG6    PG7   |
|--------------------+-------+-------+-------+-------+-------+-------+-------+------+|


[ 3]
Min Count                0       0     270       0       0       0       0       0
Shared Count             0       0    6377       0       0       0       0       0
Headroom Count           0       0      77       0       0       0       0       0
Global Headroom Cnt      0       0       0       0       0       0       0       0
ServicePool: Min=45 Shared=6377


[ 4]
Min Count                0       0     270     270     270       0       0       0
Shared Count             0       0    6359    6376    6390       0       0       0
Headroom Count           0       0       0       3       0       0       0       0
Global Headroom Cnt      0       0       0       0       0       0       0       0
ServicePool: Min=45 Shared=19126
```

This example shows how to display the real-time status of the ns buffer:

```
eor15# show hardware internal ns buffer info pkt-stats module 2

INSTANCE: 0
============


Ingress Straight Traffic:
-------------------------

|-------------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)     |
|                     One cell represents approximately 208 bytes         |
|                                                                         |
|                           DROP      NODROP      SPAN       SUP        |
|-------------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      47946         0       256       450
Shared Cells Count           30666         0       256       450
Total Cells Count            47946         0       256       450
```

```
Ingress Hairpin Traffic:
------------------------

|-------------------------------------------------------------------------|
|                    Shared Service Pool Buffer Utilization (in cells)    |
|                      One cell represents approximately 208 bytes        |
|                                                                         |
|                             DROP      NODROP      SPAN       SUP       |
|-------------------------------------------------------------------------|
Total Instant Usage              0           0         0         0
Remaining Instant Usage      48157           0        45       450
Shared Cells Count           39517           0        45       450
Total Cells Count            48157           0        45       450


Egress Straight Traffic:
------------------------

|-------------------------------------------------------------------------|
|                    Shared Service Pool Buffer Utilization (in cells)    |
|                      One cell represents approximately 208 bytes        |
|                                                                         |
|                             DROP      NODROP      SPAN       SUP       |
|-------------------------------------------------------------------------|
Total Instant Usage              0           0         0         0
Remaining Instant Usage      97309           0        45       450
Shared Cells Count           88669           0        45       450
Total Cells Count            97309           0        45       450

INSTANCE: 1
============


Ingress Straight Traffic:
-------------------------

|-------------------------------------------------------------------------|
|                    Shared Service Pool Buffer Utilization (in cells)    |
|                      One cell represents approximately 208 bytes        |
|                                                                         |
|                             DROP      NODROP      SPAN       SUP       |
|-------------------------------------------------------------------------|
Total Instant Usage              0           0         0         0
Remaining Instant Usage      47946           0       256       450
Shared Cells Count           30666           0       256       450
Total Cells Count            47946           0       256       450


Ingress Hairpin Traffic:
------------------------

|-------------------------------------------------------------------------|
|                    Shared Service Pool Buffer Utilization (in cells)    |
|                      One cell represents approximately 208 bytes        |
|                                                                         |
|                             DROP      NODROP      SPAN       SUP       |
|-------------------------------------------------------------------------|
Total Instant Usage              0           0         0         0
Remaining Instant Usage      48157           0        45       450
Shared Cells Count           39517           0        45       450
Total Cells Count            48157           0        45       450


Egress Straight Traffic:
------------------------

|-------------------------------------------------------------------------|
|                    Shared Service Pool Buffer Utilization (in cells)    |
|                      One cell represents approximately 208 bytes        |
|                                                                         |
|                             DROP      NODROP      SPAN       SUP       |
```

```
|--------------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      97309         0        45       450
Shared Cells Count           88669         0        45       450
Total Cells Count            97309         0        45       450
```

This example shows how to display the real-time status of the ns buffer in detail:

```
eor15# show hardware internal ns buffer info pkt-stats module 2 detail

INSTANCE: 0
============


Ingress Straight Traffic:
-------------------------

|--------------------------------------------------------------------------|
|                    Shared Service Pool Buffer Utilization (in cells)  |
|                      One cell represents approximately 208 bytes     |
|                                                                          |
|                             DROP      NODROP      SPAN       SUP       |
|--------------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      47946         0       256       450
Shared Cells Count           30666         0       256       450
Total Cells Count            47946         0       256       450

|-------------------------------------------------------------------|
|          Instant Buffer utilization per port per pool             |
|     Each line displays number of cells utilized for a given       |
|                  port for each policy class                       |
|          One cell represents approximately 208 bytes              |
|--------------+---------+---------+---------+---------+---------+|
|ASIC Port         Q0        Q1        Q2        Q3        SUP    |
|--------------+---------+---------+---------+---------+---------+|

[MACN0]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN1]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN2]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN3]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN4]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN5]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN6]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN7]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN8]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN9]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN10]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN11]
        UC->         0         0         0         0        --
```

```
        MC->         0         0         0         0        --

Ingress Hairpin Traffic:
------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)   |
|                     One cell represents approximately 208 bytes       |
|                                                                       |
|                             DROP      NODROP      SPAN       SUP      |
|-----------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      48157         0        45       450
Shared Cells Count           39517         0        45       450
Total Cells Count            48157         0        45       450

[MACF0]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF1]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF2]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF3]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF4]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF5]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF6]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF7]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF8]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF9]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF10]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF11]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
|-----------------------------------------------------------------|
|         Instant Buffer utilization per VOQ per pool             |
|       Each line displays number of cells utilized for           |
|            a given voq for each policy class                    |
|          One cell represents approximately 208 bytes            |
|------------------+---------+---------+---------+---------+     |
|   VOQ#/BCM PORT#      Q0        Q1        Q2        Q3      |
|------------------+---------+---------+---------+---------+     |

[VOQ 0           ]         0         0         0         0
[VOQ 1           ]         0         0         0         0
[VOQ 2           ]         0         0         0         0
[VOQ 3           ]         0         0         0         0
[VOQ 4           ]         0         0         0         0
[VOQ 5           ]         0         0         0         0
[VOQ 6           ]         0         0         0         0
[VOQ 7           ]         0         0         0         0
[VOQ 8           ]         0         0         0         0
[VOQ 9           ]         0         0         0         0
[VOQ 10          ]         0         0         0         0
[VOQ 11          ]         0         0         0         0
```

[VOQ 12]	0	0	0	0
[VOQ 13 : BCM 13]	0	0	0	0
[VOQ 14 : BCM 14]	0	0	0	0
[VOQ 15 : BCM 15]	0	0	0	0
[VOQ 16 : BCM 16]	0	0	0	0
[VOQ 17 : BCM 17]	0	0	0	0
[VOQ 18 : BCM 18]	0	0	0	0
[VOQ 19 : BCM 19]	0	0	0	0
[VOQ 20 : BCM 20]	0	0	0	0
[VOQ 21 : BCM 21]	0	0	0	0
[VOQ 22 : BCM 22]	0	0	0	0
[VOQ 23 : BCM 23]	0	0	0	0
[VOQ 24 : BCM 24]	0	0	0	0
[VOQ 25 : BCM 25]	0	0	0	0
[VOQ 26 : BCM 26]	0	0	0	0
[VOQ 27 : BCM 27]	0	0	0	0
[VOQ 28 : BCM 28]	0	0	0	0
[VOQ 29 : BCM 29]	0	0	0	0
[VOQ 30 : BCM 30]	0	0	0	0
[VOQ 31 : BCM 31]	0	0	0	0
[VOQ 32 : BCM 32]	0	0	0	0
[VOQ 33 : BCM 33]	0	0	0	0
[VOQ 34 : BCM 34]	0	0	0	0
[VOQ 35 : BCM 35]	0	0	0	0
[VOQ 36 : BCM 36]	0	0	0	0
[VOQ 37 : BCM 37]	0	0	0	0
[VOQ 38 : BCM 38]	0	0	0	0
[VOQ 39 : BCM 39]	0	0	0	0
[VOQ 40 : BCM 40]	0	0	0	0
[VOQ 41 : BCM 41]	0	0	0	0
[VOQ 42 : BCM 42]	0	0	0	0
[VOQ 43 : BCM 43]	0	0	0	0
[VOQ 44 : BCM 44]	0	0	0	0
[VOQ 45 : BCM 45]	0	0	0	0
[VOQ 46 : BCM 46]	0	0	0	0
[VOQ 47 : BCM 47]	0	0	0	0
[VOQ 48 : BCM 48]	0	0	0	0
[VOQ 49 : BCM 49]	0	0	0	0
[VOQ 50 : BCM 50]	0	0	0	0
[VOQ 51 : BCM 51]	0	0	0	0
[VOQ 52 : BCM 52]	0	0	0	0
[VOQ 53 : BCM 53]	0	0	0	0
[VOQ 54 : BCM 54]	0	0	0	0
[VOQ 55 : BCM 55]	0	0	0	0
[VOQ 56 : BCM 56]	0	0	0	0
[VOQ 57 : BCM 57]	0	0	0	0
[VOQ 58 : BCM 58]	0	0	0	0
[VOQ 59 : BCM 59]	0	0	0	0
[VOQ 60 : BCM 60]	0	0	0	0
[VOQ 61]	0	0	0	0
[VOQ 62]	0	0	0	0
[VOQ 63]	0	0	0	0
[VOQ 64]	0	0	0	0
[VOQ 65]	0	0	0	0
[VOQ 66]	0	0	0	0
[VOQ 67]	0	0	0	0
[VOQ 68]	0	0	0	0
[VOQ 69]	0	0	0	0
[VOQ 70]	0	0	0	0
[VOQ 71]	0	0	0	0
[VOQ 72]	0	0	0	0
[VOQ 73]	0	0	0	0
[VOQ 74]	0	0	0	0
[VOQ 75]	0	0	0	0
[VOQ 76]	0	0	0	0
[VOQ 77]	0	0	0	0
[VOQ 78]	0	0	0	0
[VOQ 79]	0	0	0	0
[VOQ 80]	0	0	0	0
[VOQ 81]	0	0	0	0
[VOQ 82]	0	0	0	0
[VOQ 83]	0	0	0	0
[VOQ 84]	0	0	0	0

```
[VOQ 85          ]          0          0          0          0
[VOQ 86          ]          0          0          0          0
[VOQ 87          ]          0          0          0          0
[VOQ 88          ]          0          0          0          0
[VOQ 89          ]          0          0          0          0
[VOQ 90          ]          0          0          0          0
[VOQ 91          ]          0          0          0          0
[VOQ 92          ]          0          0          0          0
[VOQ 93          ]          0          0          0          0
[VOQ 94          ]          0          0          0          0
[VOQ 95          ]          0          0          0          0

Egress Straight Traffic:
------------------------

|-------------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)     |
|                     One cell represents approximately 208 bytes         |
|                                                                         |
|                             DROP      NODROP      SPAN       SUP       |
|-------------------------------------------------------------------------|
Total Instant Usage              0          0         0         0
Remaining Instant Usage      97309          0        45       450
Shared Cells Count           88669          0        45       450
Total Cells Count            97309          0        45       450

[MACF0]
        UC->         0          0          0          0        --
        MC->         0          0          0          0        --
[MACF1]
        UC->         0          0          0          0        --
        MC->         0          0          0          0        --
[MACF2]
        UC->         0          0          0          0        --
        MC->         0          0          0          0        --
[MACF3]
        UC->         0          0          0          0        --
        MC->         0          0          0          0        --
[MACF4]
        UC->         0          0          0          0        --
        MC->         0          0          0          0        --
[MACF5]
        UC->         0          0          0          0        --
        MC->         0          0          0          0        --
[MACF6]
        UC->         0          0          0          0        --
        MC->         0          0          0          0        --
[MACF7]
        UC->         0          0          0          0        --
        MC->         0          0          0          0        --
[MACF8]
        UC->         0          0          0          0        --
        MC->         0          0          0          0        --
[MACF9]
        UC->         0          0          0          0        --
        MC->         0          0          0          0        --
[MACF10]
        UC->         0          0          0          0        --
        MC->         0          0          0          0        --
[MACF11]
        UC->         0          0          0          0        --
        MC->         0          0          0          0        --
[VOQ 0           ]          0          0          0          0
[VOQ 1           ]          0          0          0          0
[VOQ 2           ]          0          0          0          0
[VOQ 3           ]          0          0          0          0
[VOQ 4           ]          0          0          0          0
[VOQ 5           ]          0          0          0          0
[VOQ 6           ]          0          0          0          0
[VOQ 7           ]          0          0          0          0
[VOQ 8           ]          0          0          0          0
[VOQ 9           ]          0          0          0          0
[VOQ 10          ]          0          0          0          0
```

[VOQ 11]	0	0	0	0
[VOQ 12]	0	0	0	0
[VOQ 13 : BCM 13]	0	0	0	0
[VOQ 14 : BCM 14]	0	0	0	0
[VOQ 15 : BCM 15]	0	0	0	0
[VOQ 16 : BCM 16]	0	0	0	0
[VOQ 17 : BCM 17]	0	0	0	0
[VOQ 18 : BCM 18]	0	0	0	0
[VOQ 19 : BCM 19]	0	0	0	0
[VOQ 20 : BCM 20]	0	0	0	0
[VOQ 21 : BCM 21]	0	0	0	0
[VOQ 22 : BCM 22]	0	0	0	0
[VOQ 23 : BCM 23]	0	0	0	0
[VOQ 24 : BCM 24]	0	0	0	0
[VOQ 25 : BCM 25]	0	0	0	0
[VOQ 26 : BCM 26]	0	0	0	0
[VOQ 27 : BCM 27]	0	0	0	0
[VOQ 28 : BCM 28]	0	0	0	0
[VOQ 29 : BCM 29]	0	0	0	0
[VOQ 30 : BCM 30]	0	0	0	0
[VOQ 31 : BCM 31]	0	0	0	0
[VOQ 32 : BCM 32]	0	0	0	0
[VOQ 33 : BCM 33]	0	0	0	0
[VOQ 34 : BCM 34]	0	0	0	0
[VOQ 35 : BCM 35]	0	0	0	0
[VOQ 36 : BCM 36]	0	0	0	0
[VOQ 37 : BCM 37]	0	0	0	0
[VOQ 38 : BCM 38]	0	0	0	0
[VOQ 39 : BCM 39]	0	0	0	0
[VOQ 40 : BCM 40]	0	0	0	0
[VOQ 41 : BCM 41]	0	0	0	0
[VOQ 42 : BCM 42]	0	0	0	0
[VOQ 43 : BCM 43]	0	0	0	0
[VOQ 44 : BCM 44]	0	0	0	0
[VOQ 45 : BCM 45]	0	0	0	0
[VOQ 46 : BCM 46]	0	0	0	0
[VOQ 47 : BCM 47]	0	0	0	0
[VOQ 48 : BCM 48]	0	0	0	0
[VOQ 49 : BCM 49]	0	0	0	0
[VOQ 50 : BCM 50]	0	0	0	0
[VOQ 51 : BCM 51]	0	0	0	0
[VOQ 52 : BCM 52]	0	0	0	0
[VOQ 53 : BCM 53]	0	0	0	0
[VOQ 54 : BCM 54]	0	0	0	0
[VOQ 55 : BCM 55]	0	0	0	0
[VOQ 56 : BCM 56]	0	0	0	0
[VOQ 57 : BCM 57]	0	0	0	0
[VOQ 58 : BCM 58]	0	0	0	0
[VOQ 59 : BCM 59]	0	0	0	0
[VOQ 60 : BCM 60]	0	0	0	0
[VOQ 61]	0	0	0	0
[VOQ 62]	0	0	0	0
[VOQ 63]	0	0	0	0
[VOQ 64]	0	0	0	0
[VOQ 65]	0	0	0	0
[VOQ 66]	0	0	0	0
[VOQ 67]	0	0	0	0
[VOQ 68]	0	0	0	0
[VOQ 69]	0	0	0	0
[VOQ 70]	0	0	0	0
[VOQ 71]	0	0	0	0
[VOQ 72]	0	0	0	0
[VOQ 73]	0	0	0	0
[VOQ 74]	0	0	0	0
[VOQ 75]	0	0	0	0
[VOQ 76]	0	0	0	0
[VOQ 77]	0	0	0	0
[VOQ 78]	0	0	0	0
[VOQ 79]	0	0	0	0
[VOQ 80]	0	0	0	0
[VOQ 81]	0	0	0	0
[VOQ 82]	0	0	0	0
[VOQ 83]	0	0	0	0

```
[VOQ 84          ]          0          0          0          0
[VOQ 85          ]          0          0          0          0
[VOQ 86          ]          0          0          0          0
[VOQ 87          ]          0          0          0          0
[VOQ 88          ]          0          0          0          0
[VOQ 89          ]          0          0          0          0
[VOQ 90          ]          0          0          0          0
[VOQ 91          ]          0          0          0          0
[VOQ 92          ]          0          0          0          0
[VOQ 93          ]          0          0          0          0
[VOQ 94          ]          0          0          0          0
[VOQ 95          ]          0          0          0          0
INSTANCE: 1
============


Ingress Straight Traffic:
-------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)   |
|                     One cell represents approximately 208 bytes       |
|                                                                       |
|                            DROP      NODROP      SPAN       SUP      |
|-----------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      47946         0       256       450
Shared Cells Count           30666         0       256       450
Total Cells Count            47946         0       256       450

|-----------------------------------------------------------------|
|          Instant Buffer utilization per port per pool           |
|     Each line displays number of cells utilized for a given     |
|                  port for each policy class                     |
|          One cell represents approximately 208 bytes            |
|--------------+---------+---------+---------+---------+---------+|
|ASIC Port         Q0        Q1        Q2        Q3        SUP    |
|--------------+---------+---------+---------+---------+---------+|

[MACN0]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN1]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN2]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN3]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN4]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN5]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN6]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN7]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN8]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN9]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN10]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACN11]
```

```
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --

Ingress Hairpin Traffic:
------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)   |
|                     One cell represents approximately 208 bytes       |
|                                                                       |
|                            DROP      NODROP      SPAN       SUP      |
|-----------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      48157         0        45       450
Shared Cells Count           39517         0        45       450
Total Cells Count            48157         0        45       450

[MACF0]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF1]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF2]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF3]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF4]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF5]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF6]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF7]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF8]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF9]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF10]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
[MACF11]
        UC->         0         0         0         0        --
        MC->         0         0         0         0        --
|-------------------------------------------------------------|
|         Instant Buffer utilization per VOQ per pool         |
|       Each line displays number of cells utilized for       |
|            a given voq for each policy class                |
|           One cell represents approximately 208 bytes       |
|-------------------+---------+---------+---------+---------+|
|   VOQ#/BCM PORT#      Q0        Q1        Q2        Q3     |
|-------------------+---------+---------+---------+---------+|

[VOQ 0            ]         0         0         0         0
[VOQ 1            ]         0         0         0         0
[VOQ 2            ]         0         0         0         0
[VOQ 3            ]         0         0         0         0
[VOQ 4            ]         0         0         0         0
[VOQ 5            ]         0         0         0         0
[VOQ 6            ]         0         0         0         0
[VOQ 7 : BCM 7    ]         0         0         0         0
[VOQ 8 : BCM 8    ]         0         0         0         0
[VOQ 9 : BCM 9    ]         0         0         0         0
[VOQ 10 : BCM 10  ]         0         0         0         0
```

[VOQ 11	]	0	0	0	0
[VOQ 12	]	0	0	0	0
[VOQ 13	]	0	0	0	0
[VOQ 14	]	0	0	0	0
[VOQ 15	]	0	0	0	0
[VOQ 16	]	0	0	0	0
[VOQ 17	]	0	0	0	0
[VOQ 18	]	0	0	0	0
[VOQ 19	]	0	0	0	0
[VOQ 20	]	0	0	0	0
[VOQ 21	]	0	0	0	0
[VOQ 22	]	0	0	0	0
[VOQ 23	]	0	0	0	0
[VOQ 24	]	0	0	0	0
[VOQ 25	]	0	0	0	0
[VOQ 26	]	0	0	0	0
[VOQ 27	]	0	0	0	0
[VOQ 28	]	0	0	0	0
[VOQ 29	]	0	0	0	0
[VOQ 30	]	0	0	0	0
[VOQ 31	]	0	0	0	0
[VOQ 32	]	0	0	0	0
[VOQ 33	]	0	0	0	0
[VOQ 34	]	0	0	0	0
[VOQ 35	]	0	0	0	0
[VOQ 36	]	0	0	0	0
[VOQ 37	]	0	0	0	0
[VOQ 38	]	0	0	0	0
[VOQ 39	]	0	0	0	0
[VOQ 40	]	0	0	0	0
[VOQ 41	]	0	0	0	0
[VOQ 42	]	0	0	0	0
[VOQ 43	]	0	0	0	0
[VOQ 44	]	0	0	0	0
[VOQ 45	]	0	0	0	0
[VOQ 46	]	0	0	0	0
[VOQ 47	]	0	0	0	0
[VOQ 48	]	0	0	0	0
[VOQ 49	]	0	0	0	0
[VOQ 50	]	0	0	0	0
[VOQ 51	]	0	0	0	0
[VOQ 52	]	0	0	0	0
[VOQ 53	]	0	0	0	0
[VOQ 54	]	0	0	0	0
[VOQ 55	]	0	0	0	0
[VOQ 56	]	0	0	0	0
[VOQ 57	]	0	0	0	0
[VOQ 58	]	0	0	0	0
[VOQ 59	]	0	0	0	0
[VOQ 60	]	0	0	0	0
[VOQ 61	]	0	0	0	0
[VOQ 62	]	0	0	0	0
[VOQ 63	]	0	0	0	0
[VOQ 64	]	0	0	0	0
[VOQ 65	]	0	0	0	0
[VOQ 66	]	0	0	0	0
[VOQ 67	]	0	0	0	0
[VOQ 68	]	0	0	0	0
[VOQ 69	]	0	0	0	0
[VOQ 70	]	0	0	0	0
[VOQ 71	]	0	0	0	0
[VOQ 72	]	0	0	0	0
[VOQ 73	]	0	0	0	0
[VOQ 74	]	0	0	0	0
[VOQ 75	]	0	0	0	0
[VOQ 76	]	0	0	0	0
[VOQ 77	]	0	0	0	0
[VOQ 78	]	0	0	0	0
[VOQ 79	]	0	0	0	0
[VOQ 80	]	0	0	0	0
[VOQ 81	]	0	0	0	0
[VOQ 82	]	0	0	0	0
[VOQ 83	]	0	0	0	0

```
[VOQ 84          ]          0          0          0          0
[VOQ 85          ]          0          0          0          0
[VOQ 86          ]          0          0          0          0
[VOQ 87          ]          0          0          0          0
[VOQ 88          ]          0          0          0          0
[VOQ 89          ]          0          0          0          0
[VOQ 90          ]          0          0          0          0
[VOQ 91          ]          0          0          0          0
[VOQ 92          ]          0          0          0          0
[VOQ 93          ]          0          0          0          0
[VOQ 94          ]          0          0          0          0
[VOQ 95          ]          0          0          0          0

Egress Straight Traffic:
------------------------

|-------------------------------------------------------------------------|
|                    Shared Service Pool Buffer Utilization (in cells) |
|                      One cell represents approximately 208 bytes     |
|                                                                         |
|                             DROP      NODROP      SPAN       SUP      |
|-------------------------------------------------------------------------|
Total Instant Usage              0           0         0         0
Remaining Instant Usage      97309           0        45       450
Shared Cells Count           88669           0        45       450
Total Cells Count            97309           0        45       450

[MACF0]
        UC->          0          0          0          0        --
        MC->          0          0          0          0        --
[MACF1]
        UC->          0          0          0          0        --
        MC->          0          0          0          0        --
[MACF2]
        UC->          0          0          0          0        --
        MC->          0          0          0          0        --
[MACF3]
        UC->          0          0          0          0        --
        MC->          0          0          0          0        --
[MACF4]
        UC->          0          0          0          0        --
        MC->          0          0          0          0        --
[MACF5]
        UC->          0          0          0          0        --
        MC->          0          0          0          0        --
[MACF6]
        UC->          0          0          0          0        --
        MC->          0          0          0          0        --
[MACF7]
        UC->          0          0          0          0        --
        MC->          0          0          0          0        --
[MACF8]
        UC->          0          0          0          0        --
        MC->          0          0          0          0        --
[MACF9]
        UC->          0          0          0          0        --
        MC->          0          0          0          0        --
[MACF10]
        UC->          0          0          0          0        --
        MC->          0          0          0          0        --
[MACF11]
        UC->          0          0          0          0        --
        MC->          0          0          0          0        --
[VOQ 0           ]          0          0          0          0
[VOQ 1           ]          0          0          0          0
[VOQ 2           ]          0          0          0          0
[VOQ 3           ]          0          0          0          0
[VOQ 4           ]          0          0          0          0
[VOQ 5           ]          0          0          0          0
[VOQ 6           ]          0          0          0          0
[VOQ 7 : BCM 7   ]          0          0          0          0
[VOQ 8 : BCM 8   ]          0          0          0          0
[VOQ 9 : BCM 9   ]          0          0          0          0
```

[VOQ 10 : BCM 10]	0	0	0	0
[VOQ 11]	0	0	0	0
[VOQ 12]	0	0	0	0
[VOQ 13]	0	0	0	0
[VOQ 14]	0	0	0	0
[VOQ 15]	0	0	0	0
[VOQ 16]	0	0	0	0
[VOQ 17]	0	0	0	0
[VOQ 18]	0	0	0	0
[VOQ 19]	0	0	0	0
[VOQ 20]	0	0	0	0
[VOQ 21]	0	0	0	0
[VOQ 22]	0	0	0	0
[VOQ 23]	0	0	0	0
[VOQ 24]	0	0	0	0
[VOQ 25]	0	0	0	0
[VOQ 26]	0	0	0	0
[VOQ 27]	0	0	0	0
[VOQ 28]	0	0	0	0
[VOQ 29]	0	0	0	0
[VOQ 30]	0	0	0	0
[VOQ 31]	0	0	0	0
[VOQ 32]	0	0	0	0
[VOQ 33]	0	0	0	0
[VOQ 34]	0	0	0	0
[VOQ 35]	0	0	0	0
[VOQ 36]	0	0	0	0
[VOQ 37]	0	0	0	0
[VOQ 38]	0	0	0	0
[VOQ 39]	0	0	0	0
[VOQ 40]	0	0	0	0
[VOQ 41]	0	0	0	0
[VOQ 42]	0	0	0	0
[VOQ 43]	0	0	0	0
[VOQ 44]	0	0	0	0
[VOQ 45]	0	0	0	0
[VOQ 46]	0	0	0	0
[VOQ 47]	0	0	0	0
[VOQ 48]	0	0	0	0
[VOQ 49]	0	0	0	0
[VOQ 50]	0	0	0	0
[VOQ 51]	0	0	0	0
[VOQ 52]	0	0	0	0
[VOQ 53]	0	0	0	0
[VOQ 54]	0	0	0	0
[VOQ 55]	0	0	0	0
[VOQ 56]	0	0	0	0
[VOQ 57]	0	0	0	0
[VOQ 58]	0	0	0	0
[VOQ 59]	0	0	0	0
[VOQ 60]	0	0	0	0
[VOQ 61]	0	0	0	0
[VOQ 62]	0	0	0	0
[VOQ 63]	0	0	0	0
[VOQ 64]	0	0	0	0
[VOQ 65]	0	0	0	0
[VOQ 66]	0	0	0	0
[VOQ 67]	0	0	0	0
[VOQ 68]	0	0	0	0
[VOQ 69]	0	0	0	0
[VOQ 70]	0	0	0	0
[VOQ 71]	0	0	0	0
[VOQ 72]	0	0	0	0
[VOQ 73]	0	0	0	0
[VOQ 74]	0	0	0	0
[VOQ 75]	0	0	0	0
[VOQ 76]	0	0	0	0
[VOQ 77]	0	0	0	0
[VOQ 78]	0	0	0	0
[VOQ 79]	0	0	0	0
[VOQ 80]	0	0	0	0
[VOQ 81]	0	0	0	0
[VOQ 82]	0	0	0	0

```
[VOQ 83          ]          0          0          0          0
[VOQ 84          ]          0          0          0          0
[VOQ 85          ]          0          0          0          0
[VOQ 86          ]          0          0          0          0
[VOQ 87          ]          0          0          0          0
[VOQ 88          ]          0          0          0          0
[VOQ 89          ]          0          0          0          0
[VOQ 90          ]          0          0          0          0
[VOQ 91          ]          0          0          0          0
[VOQ 92          ]          0          0          0          0
[VOQ 93          ]          0          0          0          0
[VOQ 94          ]          0          0          0          0
[VOQ 95          ]          0          0          0          0

eor15#
```

This example shows how to display the real-time status of the ns buffer:

```
eor15# show hardware internal ns buffer info pkt-stats input module 2

INSTANCE: 0
============


Ingress Straight Traffic:
-------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)   |
|                     One cell represents approximately 208 bytes       |
|                                                                       |
|                           DROP      NODROP      SPAN       SUP       |
|-----------------------------------------------------------------------|
Total Instant Usage              0           0          0          0
Remaining Instant Usage      47946           0        256        450
Shared Cells Count           47946           0        256        450
Total Cells Count            47946           0        256        450


Ingress Hairpin Traffic:
------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)   |
|                     One cell represents approximately 208 bytes       |
|                                                                       |
|                           DROP      NODROP      SPAN       SUP       |
|-----------------------------------------------------------------------|
Total Instant Usage              0           0          0          0
Remaining Instant Usage      48157           0         45        450
Shared Cells Count           48157           0         45        450
Total Cells Count            48157           0         45        450


Egress Straight Traffic:
------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)   |
|                     One cell represents approximately 208 bytes       |
|                                                                       |
|                           DROP      NODROP      SPAN       SUP       |
|-----------------------------------------------------------------------|
Total Instant Usage              0           0          0          0
Remaining Instant Usage      97309           0         45        450
Shared Cells Count           97309           0         45        450
Total Cells Count            97309           0         45        450

INSTANCE: 1
============
```

```
Ingress Straight Traffic:
-------------------------

|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                           DROP      NODROP      SPAN       SUP     |
|--------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      47946         0       256       450
Shared Cells Count           47946         0       256       450
Total Cells Count            47946         0       256       450


Ingress Hairpin Traffic:
------------------------

|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                           DROP      NODROP      SPAN       SUP     |
|--------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      48157         0        45       450
Shared Cells Count           48157         0        45       450
Total Cells Count            48157         0        45       450


Egress Straight Traffic:
------------------------

|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                           DROP      NODROP      SPAN       SUP     |
|--------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      97309         0        45       450
Shared Cells Count           97309         0        45       450
Total Cells Count            97309         0        45       450
```

This example shows how to display the real-time status of the ns buffer in detail:

```
eor15# show hardware internal ns buffer info pkt-stats input module 2  detail

INSTANCE: 0
============


Ingress Straight Traffic:
-------------------------

|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                           DROP      NODROP      SPAN       SUP     |
|--------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      47946         0       256       450
Shared Cells Count           47946         0       256       450
Total Cells Count            47946         0       256       450

|-----------------------------------------------------------------|
|          Instant Buffer utilization per port per pool           |
|     Each line displays number of cells utilized for a given     |
|                  port for each policy class                     |
|          One cell represents approximately 208 bytes            |
|--------------+---------+---------+---------+---------+---------+|
```

```
|ASIC Port          Q0        Q1        Q2        Q3        SUP    |
|-------------+---------+---------+---------+---------+---------+|

[MACF0]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF1]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF2]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF3]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF4]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF5]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF6]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF7]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF8]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF9]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF10]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF11]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --

Ingress Hairpin Traffic:
------------------------

|-------------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)     |
|                     One cell represents approximately 208 bytes         |
|                                                                         |
|                            DROP      NODROP      SPAN       SUP       |
|-------------------------------------------------------------------------|
Total Instant Usage              0           0         0         0
Remaining Instant Usage      48157           0        45       450
Shared Cells Count           48157           0        45       450
Total Cells Count            48157           0        45       450

[MACF0]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF1]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF2]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF3]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF4]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF5]
        UC->          0         0         0         0         0
        MC->          0         0         0         0        --
[MACF6]
```

```
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF7]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF8]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF9]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF10]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF11]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --

Egress Straight Traffic:
------------------------

|-------------------------------------------------------------------------|
|                    Shared Service Pool Buffer Utilization (in cells)    |
|                      One cell represents approximately 208 bytes        |
|                                                                         |
|                              DROP       NODROP       SPAN        SUP    |
|-------------------------------------------------------------------------|
Total Instant Usage                0          0          0          0
Remaining Instant Usage        97309          0         45        450
Shared Cells Count             97309          0         45        450
Total Cells Count              97309          0         45        450

[MACN0]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN1]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN2]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN3]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN4]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN5]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN6]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN7]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN8]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN9]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN10]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN11]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
INSTANCE: 1
============


Ingress Straight Traffic:
```

```
-------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes     |
|                                                                       |
|                             DROP      NODROP      SPAN       SUP      |
|-----------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      47946         0       256       450
Shared Cells Count           47946         0       256       450
Total Cells Count            47946         0       256       450

|-----------------------------------------------------------------|
|          Instant Buffer utilization per port per pool           |
|     Each line displays number of cells utilized for a given     |
|                 port for each policy class                      |
|          One cell represents approximately 208 bytes            |
|--------------+---------+---------+---------+---------+---------+|
|ASIC Port         Q0        Q1        Q2        Q3        SUP    |
|--------------+---------+---------+---------+---------+---------+|

[MACF0]
        UC->         0         0         0         0         0
        MC->         0         0         0         0        --
[MACF1]
        UC->         0         0         0         0         0
        MC->         0         0         0         0        --
[MACF2]
        UC->         0         0         0         0         0
        MC->         0         0         0         0        --
[MACF3]
        UC->         0         0         0         0         0
        MC->         0         0         0         0        --
[MACF4]
        UC->         0         0         0         0         0
        MC->         0         0         0         0        --
[MACF5]
        UC->         0         0         0         0         0
        MC->         0         0         0         0        --
[MACF6]
        UC->         0         0         0         0         0
        MC->         0         0         0         0        --
[MACF7]
        UC->         0         0         0         0         0
        MC->         0         0         0         0        --
[MACF8]
        UC->         0         0         0         0         0
        MC->         0         0         0         0        --
[MACF9]
        UC->         0         0         0         0         0
        MC->         0         0         0         0        --
[MACF10]
        UC->         0         0         0         0         0
        MC->         0         0         0         0        --
[MACF11]
        UC->         0         0         0         0         0
        MC->         0         0         0         0        --

Ingress Hairpin Traffic:
------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes     |
|                                                                       |
|                             DROP      NODROP      SPAN       SUP      |
|-----------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      48157         0        45       450
Shared Cells Count           48157         0        45       450
Total Cells Count            48157         0        45       450
```

```
[MACF0]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF1]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF2]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF3]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF4]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF5]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF6]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF7]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF8]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF9]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF10]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACF11]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --

Egress Straight Traffic:
------------------------

|-------------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)     |
|                     One cell represents approximately 208 bytes         |
|                                                                         |
|                             DROP      NODROP      SPAN       SUP       |
|-------------------------------------------------------------------------|
Total Instant Usage              0          0         0         0
Remaining Instant Usage      97309          0        45       450
Shared Cells Count           97309          0        45       450
Total Cells Count            97309          0        45       450

[MACN0]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN1]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN2]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN3]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN4]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN5]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN6]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN7]
```

```
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN8]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN9]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN10]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --
[MACN11]
        UC->          0          0          0          0          0
        MC->          0          0          0          0         --

eor15#
```

This example shows how to display the real-time status of the ns MAC pinning:

```
module-2# show hardware internal ns mac pinning

-------------------------------------------------------------------------------
Mapping for ASIC instance 0
:-------------------------------------------------------------------------------
-
MACN-port       MACF-port       hg-port

0               0               0
1               1               1
2               2               2
3               3               3
4               4               4
5               5               5
6               6               6
7               7               7
8               8               8
9               9               9
10              10              10
11              11              11

-------------------------------------------------------------------------------
Mapping for ASIC instance 1
:-------------------------------------------------------------------------------
-
MACN-port       MACF-port       hg-port

0               0               0
1               1               1
2               2               2
3               3               3
4               4               4
5               5               5
6               6               6
7               7               7
8               8               8
9               9               9
10              10              10
11              11              11

module-2#
```

This example shows how to use the optional **peak** keyword to display the peak buffer usage statistics of the shared buffer per port in ingress:

Note Peak buffer usage is not supported for ACI capable device ports.

```
switch(config-pmap-c-que)# show hardware internal buffer info pkt-stats input module 6 peak
```

```
INSTANCE: 0
============
|-------------------------------------------------------------------------------|
|             Input Shared Service Pool Buffer Utilization (in cells)           |
|                            SP-0       SP-1       SP-2       SP-3               |
|-------------------------------------------------------------------------------|
Total Instant Usage             0          0          0          0
Remaining Instant Usage     31879          0          0       4997
Peak/Max Cells Used             0          0          0        133
Switch Cells Count          31879          0          0       4997

INSTANCE: 1
============
|-------------------------------------------------------------------------------|
|             Input Shared Service Pool Buffer Utilization (in cells)           |
|                            SP-0       SP-1       SP-2       SP-3               |
|-------------------------------------------------------------------------------|
Total Instant Usage             0          0          0          0
Remaining Instant Usage     31879          0          0       4997
Peak/Max Cells Used             0          0          0        133
Switch Cells Count          31879          0          0       4997

INSTANCE: 2
============
|-------------------------------------------------------------------------------|
|             Input Shared Service Pool Buffer Utilization (in cells)           |
|                            SP-0       SP-1       SP-2       SP-3               |
|-------------------------------------------------------------------------------|
Total Instant Usage         25504          0          0         85
Remaining Instant Usage      6375          0          0       4912
Peak/Max Cells Used         38952          0          0        295
Switch Cells Count          31879          0          0       4997

|-------------------------------------------------------------------------------|
|                   Per Port Per PG: Input Peak Buffer utilization              |
|              Each line displays the number of cells utilized for a given      |
|                                port for each pg                               |
|                     One cell represents approximately 208 bytes               |
|--------------------+-------+-------+-------+-------+-------+-------+-------+-------+|
|Port/Buffer Stat       PG0     PG1     PG2     PG3     PG4     PG5     PG6     PG7   |
|--------------------+-------+-------+-------+-------+-------+-------+-------+-------+|


[ 3]
Shared Peak Count     17198       0   15314   12318   15940       0       0       0
Headroom Peak Count       0       0     146     135     136       0       0       0
ServicePool: Shared Peak Count=24736


[ 4]
Shared Peak Count     20149       0   15940   10368   15940       0       0       0
Headroom Peak Count       0       0     104     103     103       0       0       0
ServicePool: Shared Peak Count=25516


[ 7]
Shared Peak Count      1621       0    6745    6627   11052       0       0       0
Headroom Peak Count       0       0     103     103     103       0       0       0
ServicePool: Shared Peak Count=13371


[ 8]
Shared Peak Count     16237       0    7591    6276    9037       0       0       0
Headroom Peak Count       0       0     103     103     103       0       0       0
ServicePool: Shared Peak Count=16237


[11]
Shared Peak Count      9683       0   11575    8778    5692       0       0       0
Headroom Peak Count       0       0     135     103     139       0       0       0
ServicePool: Shared Peak Count=14803
```

```
[12]
Shared Peak Count     12639       0   11039    5549   10084       0       0       0
Headroom Peak Count       0       0     103     103     103       0       0       0
ServicePool: Shared Peak Count=12639
```

This example shows how to use the optional **peak** keyword to display the peak buffer usage statistics of the shared buffer per port in egress:

```
switch(config-pmap-c-que)# show hardware internal buffer info pkt-stats module 6 peak
INSTANCE: 0
============

|-------------------------------------------------------------------------|
             Output Shared Service Pool Buffer Utilization (in cells)
                           SP-0       SP-1       SP-2       SP-3
|-------------------------------------------------------------------------|

Total Instant Usage              0          0          0          0
Remaining Instant Usage      46396          0          0       6344
Peak/Max Cells Used              0          0          0        165
Switch Cell Count            46396          0          0       6344
|-------------------------------------------------------------------------|

|-------------------------------------------------------------------------------|
|                Peak Buffer utilization per queue per port                     |
|        Each line displays the number of cells utilized for a given            |
|                    port for each QoS queue                                    |
|              One cell represents approximately 208 bytes                      |
|--------------+---------+---------+---------+---------+---------+---------+|
|ASIC Port          Q1        Q2        Q3        Q4        CPU       SPAN   |
|--------------+---------+---------+---------+---------+---------+---------+|

 [ 3]
 UC(OOBFC)->          0         0         0         0
        UC->          0         0         0         0        45         0
        MC->          0         0         0         0         0         0
 [ 8]
 UC(OOBFC)->          0         0         0         0
        UC->          0         0         0         0         1         0
        MC->          0         0         0         0         0         0
 [11]
 UC(OOBFC)->          0         0         0         0
        UC->          0         0         0         0        45         0
        MC->          0         0         0         0         0         0
 [13]
 UC(OOBFC)->          0         0         0         0
        UC->          0         0         0         0         8         0
        MC->          0         0         0         0         0         0
```

Note You can add the optional **detail** keyword at the end of the command to display all ports, regardless of whether the usage count is zero. If you do not use this optional keyword, the command displays the output for nonzero ports only. The port count for the Cisco Nexus 9000 Series switches is different in egress from other Cisco Nexus devices. Specifically, "UC(OOBFC)" can be ignored.

This example shows how to use the optional **cpu** keyword to display the peak buffer usage statistics of the shared buffer per port in egress:

```
switch(config-pmap-c-que)# show hardware internal buffer info pkt-stats module 6 instance
0 cpu
INSTANCE: 0
============

|-------------------------------------------------------------------------------|
|          Instant Buffer utilization for CPU port queues (total 48)            |
```

```
|         Each line displays cells  utilized for 8 consectuive queues      |
|         First line display for Q0-Q7, second line for Q8-Q15, so on      |
|               One cell represents approximately 208 bytes                |
|--------------+---------+---------+---------+---------+---------+--------+|

[Q00-07]      0     0     0     0     0     0     0     0
[Q08-15]      0     0     0     0     0     0     0     0
[Q16-23]      0     0     0     0     0     0     0     0
[Q24-31]      0     0     0     0     0     0     0     0
[Q32-39]      0     0     0     0     0     0     0     0
[Q40-47]      0     0     0     0     0     0     0     0
```

This example shows how to clear the system buffer maximum cell usage counter:

```
switch# clear counters buffers
Max Cell Usage has been reset successfully
```

This example shows how to set a buffer utilization threshold for a specific module:

```
switch(config)# hardware profile buffer info port-threshold module 1 threshold 10
Port threshold changed successfully
```

Note The buffer threshold feature is not enabled for ports if they have a no-drop class configured (PFC).

Note The configured threshold buffer count is checked every 5 seconds against all the buffers used by that port across all the queues of that port.

Note You can configure the threshold percentage configuration for all modules or for a specific module, which is applied to all ports. The default threshold value is 90% of the switch cell count of shared pool SP-0. This configuration applies to both Ethernet (front panel) and internal (HG) ports.

Note The buffer threshold feature is not supported for ACI capable device ports.

This example shows how to display the current threshold configuration applied to all ports:

```
switch(config)# show hardware internal buffer info pkt-stats threshold
slot  6
=======

INSTANCE: 0
============

Module  5 Instance  0 Port  1 Threshold 90 Cells 25926

Module  5 Instance  0 Port  2 Threshold 90 Cells 25926

Module  5 Instance  0 Port  3 Threshold 90 Cells 25926

Module  5 Instance  0 Port  4 Threshold 90 Cells 25926
```

Note When a port's buffer usage exceeds the configured/default threshold, a syslog message is generated. The message rate is limited to one syslog message per minute per port.

This example shows how to display the last five times that the buffer utilization exceeded the configured threshold value for all ports:

```
switch(config)# show hardware internal buffer info pkt-stats port-log
slot  6
=======

INSTANCE: 0
============

INSTANCE: 1
============

INSTANCE: 2
============

[ BCM PORT 53 ]
10-22-2013  15:31:53.288058 Module 6 Instance 2 Port 53 buffer threshold 30893 cells[107.2%
 - ~6.1MB] exceeded 25926[90%]
10-22-2013  15:31:48.276873 Module 6 Instance 2 Port 53 buffer threshold 30908 cells[107.3%
 - ~6.1MB] exceeded 25926[90%]
10-22-2013  15:31:43.267519 Module 6 Instance 2 Port 53 buffer threshold 30895 cells[107.2%
 - ~6.1MB] exceeded 25926[90%]
10-22-2013  15:31:38.259104 Module 6 Instance 2 Port 53 buffer threshold 30843 cells[107.1%
 - ~6.1MB] exceeded 25926[90%]
10-22-2013  15:31:33.247011 Module 6 Instance 2 Port 53 buffer threshold 30988 cells[107.6%
 - ~6.1MB] exceeded 25926[90%]


slot  7
=======

INSTANCE: 0
============

INSTANCE: 1
============

INSTANCE: 2
============



slot  8
=======

INSTANCE: 0
============

INSTANCE: 1
============



slot 22
=======

INSTANCE: 0
============

INSTANCE: 1
============

[ BCM PORT 18 ]
```

```
10-22-2013  15:31:52.629807 Module 22 Instance 1 Port 18 buffer threshold 33572 cells[116.5%
 - ~6.7MB] exceeded 25926[90%]
10-22-2013  15:31:47.619395 Module 22 Instance 1 Port 18 buffer threshold 33553 cells[116.5%
 - ~6.7MB] exceeded 25926[90%]
10-22-2013  15:31:42.599171 Module 22 Instance 1 Port 18 buffer threshold 33625 cells[116.7%
 - ~6.7MB] exceeded 25926[90%]
10-22-2013  15:31:37.579255 Module 22 Instance 1 Port 18 buffer threshold 33582 cells[116.6%
 - ~6.7MB] exceeded 25926[90%]
10-22-2013  15:31:32.569250 Module 22 Instance 1 Port 18 buffer threshold 33562 cells[116.5%
 - ~6.7MB] exceeded 25926[90%]
```

This example shows how to display the interface hardware mappings:

```
eor15# show interface hardware-mappings
Legends:
       SMod  - Source Mod. 0 is N/A
       Unit  - Unit on which port resides. N/A for port channels
       HPort - Hardware Port Number or Hardware Trunk Id:
       FPort - Fabric facing port number. 255 means N/A
       NPort - Front panel port number
       VPort - Virtual Port Number. -1 means N/A

--------------------------------------------------------------------
Name       Ifindex  Smod Unit HPort FPort NPort VPort
--------------------------------------------------------------------
Eth2/1     1a080000 4    0    13    255   0     -1
Eth2/2     1a080200 4    0    14    255   1     -1
Eth2/3     1a080400 4    0    15    255   2     -1
Eth2/4     1a080600 4    0    16    255   3     -1
Eth2/5     1a080800 4    0    17    255   4     -1
Eth2/6     1a080a00 4    0    18    255   5     -1
Eth2/7     1a080c00 4    0    19    255   6     -1
Eth2/8     1a080e00 4    0    20    255   7     -1
Eth2/9     1a081000 4    0    21    255   8     -1
Eth2/10    1a081200 4    0    22    255   9     -1
Eth2/11    1a081400 4    0    23    255   10    -1
Eth2/12    1a081600 4    0    24    255   11    -1
Eth2/13    1a081800 4    0    25    255   12    -1
Eth2/14    1a081a00 4    0    26    255   13    -1
Eth2/15    1a081c00 4    0    27    255   14    -1
Eth2/16    1a081e00 4    0    28    255   15    -1
Eth2/17    1a082000 4    0    29    255   16    -1
Eth2/18    1a082200 4    0    30    255   17    -1
Eth2/19    1a082400 4    0    31    255   18    -1
Eth2/20    1a082600 4    0    32    255   19    -1
Eth2/21    1a082800 4    0    33    255   20    -1
Eth2/22    1a082a00 4    0    34    255   21    -1
Eth2/23    1a082c00 4    0    35    255   22    -1
Eth2/24    1a082e00 4    0    36    255   23    -1
```

Monitoring Buffer Usage for ACI Capable Devices

You can monitor and verify the buffer usage of ACI capable devices with the following command:

show hardware internal ns buffer info pkt-stats [**input**] [**module** *module*] [**instance** *instance*] [**detail**].

Use the command to display statistics for the following:

- Ingress or egress buffers
- Global service pools
- Ports per pool

  (Displays statistics for nonzero ports or for all ports when specifying the detail parameter).

Note When no instance (ASICs) is specified, statistics for all instances is displayed.

The command also displays statistics for different directions of traffic (ingress straight, ingress hairpin, egress straight).

The command has XML support.

Note The minimum-threshold and maximum-threshold parameters are not supported on the Cisco Nexus 9300 and N9K-X9564TX and N9K-X9564PX linecards.

Note Peak buffer usage is not supported on ACI capable device ports.

Note For ACI capable devices with regards to unicast queues that extend into the ASIC, you can configure (global, not per port) which QoS group to measure statistics. To specify the QoS group, use the **hardware qos eoq stats-class** *qos-group* command, where *qos-group* can be a QoS group value *<0 - 3>* or *all* for all QoS groups. The default is QoS group value 0.

Note For ACI capable devices, you can configure the buffer with the **hardware qos ns-buffer-profile** command.

The command affects the entire switch across all QoS groups and has the following options:

burst	Burst optimized Allows a given VOQ/flow to have burst absorption up to a maximum of 2 MB. Suitable for medium burst absorption with some fairness among VOQs.
mesh	Mesh optimized Allows a given VOQ/flow to have burst absorption up to a maximum of 500 KB. Suitable for low burst-absorption and provides some fairness among VOQs.
ultra-burst	Ultra burst optimized Allows a given VOQ/flow to have the highest possible burst absorption. (constrained by the maximum pool limit) Suitable for high burst absorption.

This example shows how to display the buffer usage for egress:

```
switch#
switch# show hardware internal ns buffer info pkt-stats

slot  1
=======


INSTANCE: 0
============


Ingress Straight Traffic:
-------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)   |
|                     One cell represents approximately 208 bytes       |
|                                                                       |
|                           DROP      NODROP      SPAN       SUP       |
|-----------------------------------------------------------------------|
Total Instant Usage             0           0         0         0
Remaining Instant Usage      47946           0       256       450
Shared Cells Count           30666           0       256       450
Total Cells Count            47946           0       256       450


Ingress Hairpin Traffic:
------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)   |
|                     One cell represents approximately 208 bytes       |
|                                                                       |
|                           DROP      NODROP      SPAN       SUP       |
|-----------------------------------------------------------------------|
Total Instant Usage          2830           0         0         0
Remaining Instant Usage      45327          0        45       450
Shared Cells Count           39517          0        45       450
Total Cells Count            48157          0        45       450


Egress Straight Traffic:
------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)   |
|                     One cell represents approximately 208 bytes       |
|                                                                       |
|                           DROP      NODROP      SPAN       SUP       |
|-----------------------------------------------------------------------|
Total Instant Usage          3049           0         0         0
Remaining Instant Usage      94260          0        45       450
Shared Cells Count           88669          0        45       450
Total Cells Count            97309          0        45       450


switch#
```

This example shows how to display the buffer usage for ingress:

```
switch# show hardware internal ns buffer info pkt-stats input

slot  1
=======


INSTANCE: 0
============
```

```
Ingress Straight Traffic:
-------------------------

|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                           DROP      NODROP      SPAN       SUP     |
|--------------------------------------------------------------------|
Total Instant Usage             0         0         0         0
Remaining Instant Usage      47946         0       256       450
Shared Cells Count           47946         0       256       450
Total Cells Count            47946         0       256       450


Ingress Hairpin Traffic:
------------------------

|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                           DROP      NODROP      SPAN       SUP     |
|--------------------------------------------------------------------|
Total Instant Usage           2830         0         0         0
Remaining Instant Usage      45327         0        45       450
Shared Cells Count           48157         0        45       450
Total Cells Count            48157         0        45       450

|--------------------------------------------------------------------|
|          Instant Buffer utilization per port per pool              |
|     Each line displays number of cells utilized for a given        |
|                  port for each policy class                        |
|          One cell represents approximately 208 bytes               |
|-------------+---------+---------+---------+---------+---------+---|
|ASIC Port         Q0        Q1        Q2        Q3        SUP    |
|-------------+---------+---------+---------+---------+---------+---|

 [MACF4]
       UC->      2830         0         0         0         0
       MC->         0         0         0         0        --

Egress Straight Traffic:
------------------------

|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                           DROP      NODROP      SPAN       SUP     |
|--------------------------------------------------------------------|
Total Instant Usage           2865         0         0         0
Remaining Instant Usage      94444         0        45       450
Shared Cells Count           97309         0        45       450
Total Cells Count            97309         0        45       450

 [MACN11]
       UC->      2865         0         0         0         0
       MC->         0         0         0         0        --

switch#


slot  1
=======


INSTANCE: 0
============


Ingress Straight Traffic:
```

```
-------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)   |
|                     One cell represents approximately 208 bytes       |
|                                                                       |
|                            DROP      NODROP      SPAN       SUP      |
|-----------------------------------------------------------------------|
Total Instant Usage              0           0         0         0
Remaining Instant Usage      47946           0       256       450
Shared Cells Count           47946           0       256       450
Total Cells Count            47946           0       256       450


Ingress Hairpin Traffic:
------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)   |
|                     One cell represents approximately 208 bytes       |
|                                                                       |
|                            DROP      NODROP      SPAN       SUP      |
|-----------------------------------------------------------------------|
Total Instant Usage           2830           0         0         0
Remaining Instant Usage      45327           0        45       450
Shared Cells Count           48157           0        45       450
Total Cells Count            48157           0        45       450

|-------------------------------------------------------------------|
|          Instant Buffer utilization per port per pool             |
|     Each line displays number of cells utilized for a given       |
|                  port for each policy class                       |
|          One cell represents approximately 208 bytes              |
|--------------+---------+---------+---------+---------+----------+|
|ASIC Port         Q0        Q1        Q2        Q3        SUP     |
|--------------+---------+---------+---------+---------+----------+|

 [MACF4]
       UC->      2830         0         0         0         0
       MC->         0         0         0         0        --

Egress Straight Traffic:
------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)   |
|                     One cell represents approximately 208 bytes       |
|                                                                       |
|                            DROP      NODROP      SPAN       SUP      |
|-----------------------------------------------------------------------|
Total Instant Usage           2865           0         0         0
Remaining Instant Usage      94444           0        45       450
Shared Cells Count           97309           0        45       450
Total Cells Count            97309           0        45       450

 [MACN11]
       UC->      2865         0         0         0         0
       MC->         0         0         0         0        --

switch#
```

This example shows how to display the real-time status of the linecard buffer:

```
switch(config)# show hardware internal ns buffer info pkt-stats module 3

INSTANCE: 0
============


Ingress Straight Traffic:
-------------------------
```

```
|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                            DROP      NODROP      SPAN       SUP    |
|--------------------------------------------------------------------|
Total Instant Usage              0           0          0         0
Remaining Instant Usage      47946           0        256       450
Shared Cells Count           30666           0        256       450
Total Cells Count            47946           0        256       450


Ingress Hairpin Traffic:
------------------------

|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                            DROP      NODROP      SPAN       SUP    |
|--------------------------------------------------------------------|
Total Instant Usage              0           0          0         0
Remaining Instant Usage      48157           0         45       450
Shared Cells Count           39517           0         45       450
Total Cells Count            48157           0         45       450


Egress Straight Traffic:
------------------------

|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                            DROP      NODROP      SPAN       SUP    |
|--------------------------------------------------------------------|
Total Instant Usage              0           0          0         0
Remaining Instant Usage      97309           0         45       450
Shared Cells Count           88669           0         45       450
Total Cells Count            97309           0         45       450

INSTANCE: 1
============


Ingress Straight Traffic:
-------------------------

|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                            DROP      NODROP      SPAN       SUP    |
|--------------------------------------------------------------------|
Total Instant Usage          32691           0          0       314
Remaining Instant Usage      15255           0        256       136
Shared Cells Count           30666           0        256       450
Total Cells Count            47946           0        256       450

|------------------------------------------------------------------|
|          Instant Buffer utilization per port per pool            |
|     Each line displays number of cells utilized for a given      |
|                  port for each policy class                      |
|          One cell represents approximately 208 bytes             |
|--------------+---------+---------+---------+---------+----------|
|ASIC Port         Q0        Q1        Q2        Q3        SUP    |
|--------------+---------+---------+---------+---------+----------|

[MACN0]
        UC->       136         0         0         0        --
        MC->         0         0         0         0        --
[MACN1]
        UC->       136         0         0         0        --
```

```
        MC->          0         0         0         0        --
[MACN2]
        UC->        260         0         0         0        --
        MC->          0         0         0         0        --
[MACN3]
        UC->        260         0         0         0        --
        MC->          0         0         0         0        --
[MACN4]
        UC->      15668         0         0         0        --
        MC->          0         0         0         0        --
[MACN5]
        UC->      19255         0         0         0        --
        MC->          0         0         0         0        --
[MACN6]
        UC->        416         0         0         0        --
        MC->          0         0         0         0        --
[MACN7]
        UC->        432         0         0         0        --
        MC->          0         0         0         0        --
[MACN8]
        UC->      15667         0         0         0        --
        MC->          0         0         0         0        --
[MACN9]
        UC->      17739         0         0         0        --
        MC->          0         0         0         0        --
[MACN10]
        UC->        544         0         0         0        --
        MC->          0         0         0         0        --
[MACN11]
        UC->        565         0         0         0        --
        MC->          0         0         0         0        --

Ingress Hairpin Traffic:
------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)   |
|                     One cell represents approximately 208 bytes       |
|                                                                       |
|                            DROP      NODROP      SPAN       SUP      |
|-----------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      48157         0        45       450
Shared Cells Count           39517         0        45       450
Total Cells Count            48157         0        45       450


Egress Straight Traffic:
------------------------

|-----------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells)   |
|                     One cell represents approximately 208 bytes       |
|                                                                       |
|                            DROP      NODROP      SPAN       SUP      |
|-----------------------------------------------------------------------|
Total Instant Usage              0         0         0         0
Remaining Instant Usage      97309         0        45       450
Shared Cells Count           88669         0        45       450
Total Cells Count            97309         0        45       450


switch(config)# show hardware internal ns buffer info pkt-stats in input instance

switch(config)# show hardware internal ns buffer info pkt-stats input module 3

INSTANCE: 0
============


Ingress Straight Traffic:
-------------------------
```

```
|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                            DROP      NODROP      SPAN       SUP    |
|--------------------------------------------------------------------|
Total Instant Usage              0           0          0         0
Remaining Instant Usage      47946           0        256       450
Shared Cells Count           47946           0        256       450
Total Cells Count            47946           0        256       450


Ingress Hairpin Traffic:
------------------------

|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                            DROP      NODROP      SPAN       SUP    |
|--------------------------------------------------------------------|
Total Instant Usage              0           0          0         0
Remaining Instant Usage      48157           0         45       450
Shared Cells Count           48157           0         45       450
Total Cells Count            48157           0         45       450


Egress Straight Traffic:
------------------------

|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                            DROP      NODROP      SPAN       SUP    |
|--------------------------------------------------------------------|
Total Instant Usage              0           0          0         0
Remaining Instant Usage      97309           0         45       450
Shared Cells Count           97309           0         45       450
Total Cells Count            97309           0         45       450

INSTANCE: 1
============


Ingress Straight Traffic:
-------------------------

|--------------------------------------------------------------------|
|                   Shared Service Pool Buffer Utilization (in cells) |
|                     One cell represents approximately 208 bytes    |
|                                                                    |
|                            DROP      NODROP      SPAN       SUP    |
|--------------------------------------------------------------------|
Total Instant Usage          32691           0          0       314
Remaining Instant Usage      15255           0        256       136
Shared Cells Count           47946           0        256       450
Total Cells Count            47946           0        256       450

|------------------------------------------------------------------|
|          Instant Buffer utilization per port per pool            |
|     Each line displays number of cells utilized for a given      |
|                  port for each policy class                      |
|          One cell represents approximately 208 bytes             |
|--------------+---------+---------+---------+---------+----------|
|ASIC Port         Q0        Q1        Q2        Q3        SUP    |
|--------------+---------+---------+---------+---------+----------|

[MACF0]
        UC->       136         0         0         0         9
        MC->         0         0         0         0        --
[MACF1]
        UC->       260         0         0         0         5
```

```
        MC->          0          0          0          0         --
[MACF2]
        UC->      15668          0          0          0        279
        MC->          0          0          0          0         --
[MACF9]
        UC->        416          0          0          0          7
        MC->          0          0          0          0         --
[MACF10]
        UC->      15667          0          0          0          5
        MC->          0          0          0          0         --
[MACF11]
        UC->        544          0          0          0          9
        MC->          0          0          0          0         --

Ingress Hairpin Traffic:
------------------------

|-------------------------------------------------------------------------|
|                    Shared Service Pool Buffer Utilization (in cells)  |
|                      One cell represents approximately 208 bytes      |
|                                                                         |
|                            DROP      NODROP      SPAN       SUP       |
|-------------------------------------------------------------------------|
Total Instant Usage              0           0         0         0
Remaining Instant Usage      48157           0        45       450
Shared Cells Count           48157           0        45       450
Total Cells Count            48157           0        45       450


Egress Straight Traffic:
------------------------

|-------------------------------------------------------------------------|
|                    Shared Service Pool Buffer Utilization (in cells)  |
|                      One cell represents approximately 208 bytes      |
|                                                                         |
|                            DROP      NODROP      SPAN       SUP       |
|-------------------------------------------------------------------------|
Total Instant Usage              0           0         0         0
Remaining Instant Usage      97309           0        45       450
Shared Cells Count           97309           0        45       450
Total Cells Count            97309           0        45       450


switch(config)#
```

Configuration Examples for Queuing and Scheduling

In this section you can find examples of configuring queuing and scheduling.

Example: Configuring WRED on Egress Queues

The following example shows how to configure the WRED feature on an egress queue:

```
configure terminal
  class-map type queuing match-any c-out-q1
    match qos-group 1
  class-map type queuing match-any c-out-q2
    match qos-group 1
  policy-map type queuing wred
    class type queuing c-out-q1
      random-detect minimum-threshold 10 bytes maximum-threshold 1000 bytes
    class type queuing c-out-q2
      random-detect threshold burst-optimized ecn
```

Example: Configuring Traffic Shaping

The following example shows how to configure traffic shaping using 1000 packets per second (pps)::

```
configure terminal
  class-map type queuing match-any c-out-q1
    match qos-group 1
  class-map type queuing match-any c-out-q2
    match qos-group 1
policy-map type queuing pqu
 class type queuing c-out-q1
  shape min 100 pps max 500 pps
 class type queuing c-out-q2
  shape min 200 pps max 1000 pps
show policy-map type queuing pqu
```