ipinfusion™

# OcNOS®

## Open Compute Network Operating System for Data Centers

# Quality of Service Guide
# Version 7.0.2

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# Preface

This guide describes how to configure OcNOS.

## Audience

This guide is intended for network administrators and other engineering professionals who configure OcNOS.

## Conventions

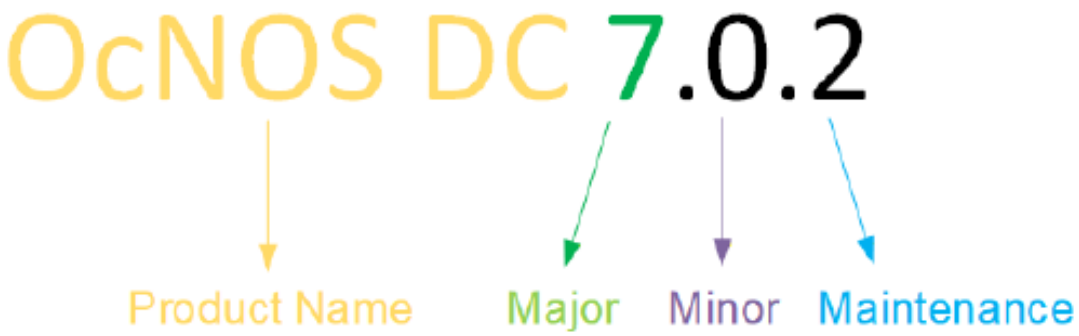
Table 1 on page 8 shows the conventions used in this guide.

**Table 1: Conventions**

| Convention | Description |
|---|---|
| Italics | Emphasized terms or titles of books |
| Note: | Special instructions, suggestions, or warnings |
| `monospaced type` | Code elements such as commands, parameters, files, and directories |

## IP Infusion Product Release Version

Each integer in release number indicates Major, Minor, and Maintenance release versions. Build numbers that follow the release numbers are for internal tracking and verification of the software build process and are visible to customers as part of the software version number.




**Product Name:** IP Infusion Product Family

**Major Version:** New customer-facing functionality that represents a significant change to the code base; including, a significant marketing change or direction in the product.

**Minor Version:** Enhancements or extensions to existing features, changes to address external needs, or internal requirements might be motivated by improvements to satisfy new sales regions or marketing initiatives.

**Maintenance Version:** A collection of product bugs or hotfixes usually scheduled every 30 or 60 days, based on the number of hotfixes.

## Related Documentation

For information about installing OcNOS, see the *Installation Guide* for your platform.

## Feature Availability

Each OcNOS SKU contains a set of supported features. For a list of available features based on the SKU that you purchased. Refer to the *Feature Matrix*.

## Migration Guide

Check the *Migration Guide* for necessary configuration changes before migrating from one version of OcNOS to another.

## IP Maestro Support

Monitor devices running OcNOS Release 6.3.4-70 and above using IP Maestro software.

## Technical Support

IP Infusion maintains an online technical support site that provides a variety of technical support programs for licensed OcNOS customers at the Technical Assistance Center.

Customers and partners enjoy full access to the support website. The site allows customers and partners to open technical support calls, update open calls with new information, and review the status of open or closed calls. The password-protected site includes technical documentation, Release Notes, and descriptions of service offerings.

### Technical Sales

Contact the IP Infusion sales representative for more information about the OcNOS solution.

### Technical Documentation

For core commands and configuration procedures, visit: Product Documentation.

For training videos, visit: OcNOS Free Training Videos.

For a list of supported platforms and SKUs of OcNOS features, refer to the OcNOS Feature Matrix.

### Disclaimer

The global documentation site is evolving to provide an enhanced website user experience for select topics included in this release. Some guides are now available outside the existing documentation library and can be accessed directly from custom documentation landing pages. These guides offer robust in-built search functionality.

For the latest documentation, visit the product-specific documentation landing page and select the relevant guide.

### Comments

If you have comments, or need to report a problem with the content, contact product-documentation@ipinfusion.com.

# Command Line Interface

This chapter introduces the OcNOS Command Line Interface (CLI) and how to use its features.

## Overview

You use the CLI to configure, monitor, and maintain OcNOS devices. The CLI is text-based and each command is usually associated with a specific task.

You can give the commands described in this manual locally from the console of a device running OcNOS or remotely from a terminal emulator such as `putty` or `xterm`. You can also use the commands in scripts to automate configuration tasks.

## Chapter Organization

The chapters in command references are organized as described in Command Description Format.

The chapters in configuration guides are organized into these major sections:

- An overview that explains a configuration in words
- Topology with a diagram that shows the devices and connections used in the configuration
- Configuration steps in a table for each device where the left-hand side shows the commands you enter and the right-hand side explains the actions that the commands perform
- Validation which shows commands and their output that verify the configuration

## Command Line Interface Help

You access the CLI help by entering a full or partial command string and a question mark “?”. The CLI displays the command keywords or parameters along with a short description. For example, at the CLI command prompt, type:

```
> show ?
```

The CLI displays this keyword list with short descriptions for each keyword:

```
show ?
  application-priority          Application Priority
  arp                           Internet Protocol (IP)
  bfd                           Bidirectional Forwarding Detection (BFD)
  bgp                           Border Gateway Protocol (BGP)
  bi-lsp                        Bi-directional lsp status and configuration
  bridge                        Bridge group commands
  ce-vlan                       COS Preservation for Customer Edge VLAN
  class-map                     Class map entry
  cli                           Show CLI tree of current mode
  clns                          Connectionless-Mode Network Service (CLNS)
  control-adjacency             Control Adjacency status and configuration
  control-channel               Control Channel status and configuration
  cspf                          CSPF Information
  customer                      Display Customer spanning-tree
  cvlan                         Display CVLAN information
  debugging                     Debugging functions
```

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```
  etherchannel                    LACP etherchannel
  ethernet                        Layer-2
...
```

If you type the ? in the middle of a keyword, the CLI displays help for that keyword only.

```
> show de?
debugging  Debugging functions
```

If you type the ? in the middle of a keyword, but the incomplete keyword matches several other keywords, OcNOS displays help for all matching keywords.

```
> show i? (CLI does not display the question mark).
interface  Interface status and configuration
ip         IP information
isis       ISIS information
```

## Command Completion

The CLI can complete the spelling of a command or a parameter. Begin typing the command or parameter and then press the tab key. For example, at the CLI command prompt type `sh`:

```
> sh
```

Press the tab key. The CLI displays:

```
> show
```

If the spelling of a command or parameter is ambiguous, the CLI displays the choices that match the abbreviation. Type `show i` and press the tab key. The CLI displays:

```
> show i
  interface  ip         ipv6       isis
> show i
```

The CLI displays the `interface` and `ip` keywords. Type `n` to select `interface` and press the tab key. The CLI displays:

```
> show in
> show interface
```

Type ? and the CLI displays the list of parameters for the `show interface` command.

```
> show interface
  IFNAME  Interface name
  |       Output modifiers
  >       Output redirection
  <cr>
```

The CLI displays the only parameter associated with this command, the `IFNAME` parameter.

## Command Abbreviations

The CLI accepts abbreviations that uniquely identify a keyword in commands. For example:

```
> sh int xe0
```

is an abbreviation for:

```
> show interface xe0
```

## Command Line Errors

Any unknown spelling causes the CLI to display the error `Unrecognized command` in response to the ?. The CLI displays the command again as last entered.

```
> show dd?
% Unrecognized command
> show dd
```

When you press the Enter key after typing an invalid command, the CLI displays:

```
(config)#router ospf here
                        ^
% Invalid input detected at '^' marker.
```

where the ^ points to the first character in error in the command.

If a command is incomplete, the CLI displays the following message:

```
> show
% Incomplete command.
```

Some commands are too long for the display line and can wrap mid-parameter or mid-keyword, as shown below. This does *not* cause an error and the command performs as expected:

```
area 10.10.0.18 virtual-link 10.10.0.19 authent
ication-key 57393
```

## Command Negation

Many commands have a `no` form that resets a feature to its default value or disables the feature. For example:

- The `ip address` command assigns an IPv4 address to an interface
- The `no ip address` command removes an IPv4 address from an interface

## Syntax Conventions

Table 2 on page 13 describes the conventions used to represent command syntax in this reference.

**Table 2: Syntax conventions**

| Convention | Description | Example |
|---|---|---|
| `monospaced font` | Command strings entered on a command line | `show ip ospf` |
| `lowercase` | Keywords that you enter exactly as shown in the command syntax. | `show ip ospf` |
| `UPPERCASE` | See Variable Placeholders | `IFNAME` |
| `()` | Optional parameters, from which you must select one. Vertical bars delimit the selections. Do not enter the parentheses or vertical bars as part of the command. | `(A.B.C.D\|<0-4294967295>)` |

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**Table 2: Syntax conventions (Continued)**

| Convention | Description | Example |
|---|---|---|
| `()` | Optional parameters, from which you select one or none. Vertical bars delimit the selections. Do not enter the parentheses or vertical bars as part of the command. | `(A.B.C.D\|<0-4294967295>\|)` |
| `()` | Optional parameter which you can specify or omit. Do not enter the parentheses or vertical bar as part of the command. | `(IFNAME\|)` |
| `{}` | Optional parameters, from which you must select one or more. Vertical bars delimit the selections. Do not enter the braces or vertical bars as part of the command. | `{intra-area <1-255>\|inter-area <1-255>\|external <1-255>}` |
| `[]` | Optional parameters, from which you select zero or more. Vertical bars delimit the selections. Do not enter the brackets or vertical bars as part of the command. | `[<1-65535>\|AA:NN\|internet\|local-AS\|no-advertise\|no-export]` |
| `?` | Nonrepeatable parameter. The parameter that follows a question mark can only appear once in a command string. Do not enter the question mark as part of the command. | `?route-map WORD` |
| `.` | Repeatable parameter. The parameter that follows a period can be repeated more than once. Do not enter the period as part of the command. | `set as-path prepend .<1-65535>` |

# Variable Placeholders

Table 3 on page 14 shows the tokens used in command syntax use to represent variables for which you supply a value.

**Table 3: Variable placeholders**

| Token | Description |
|---|---|
| `WORD` | A contiguous text string (excluding spaces) |
| `LINE` | A text string, including spaces; no other parameters can follow this parameter |
| `IFNAME` | Interface name whose format varies depending on the platform; examples are: `eth0`, `Ethernet0`, `ethernet0`, `xe0` |
| `A.B.C.D` | IPv4 address |
| `A.B.C.D/M` | IPv4 address and mask/prefix |
| `X:X::X:X` | IPv6 address |
| `X:X::X:X/M` | IPv6 address and mask/prefix |
| `HH:MM:SS` | Time format |

**Table 3: Variable placeholders**

| Token | Description |
|---|---|
| `AA:NN` | BGP community value |
| `XX:XX:XX:XX:XX:XX` | MAC address |
| `<1-5>`<br>`<1-65535>`<br>`<0-2147483647>`<br>`<0-4294967295>` | Numeric range |

# Command Description Format

Table 4 on page 15 explains the sections used to describe each command in this reference.

**Table 4: Command descriptions**

| Section | Description |
|---|---|
| **Command Name** | The name of the command, followed by what the command does and when should it be used |
| **Command Syntax** | The syntax of the command |
| **Parameters** | Parameters and options for the command |
| **Default** | The state before the command is executed |
| **Command Mode** | The mode in which the command runs; see Command Modes |
| **Applicability** | The command introduced in a specific release version and modified or updated in subsequent versions. |
| **Example** | An example of the command being executed |

# Keyboard Operations

Table 5 on page 15 lists the operations you can perform from the keyboard.

**Table 5: Keyboard operations**

| Key combination | Operation |
|---|---|
| Left arrow or Ctrl+b | Moves one character to the left. When a command extends beyond a single line, you can press left arrow or Ctrl+b repeatedly to scroll toward the beginning of the line, or you can press Ctrl+a to go directly to the beginning of the line. |
| Right arrow or Ctrl-f | Moves one character to the right. When a command extends beyond a single line, you can press right arrow or Ctrl+f repeatedly to scroll toward the end of the line, or you can press Ctrl+e to go directly to the end of the line. |

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**Table 5: Keyboard operations (Continued)**

| Key combination | Operation |
|---|---|
| Esc, b | Moves back one word |
| Esc, f | Moves forward one word |
| Ctrl+e | Moves to end of the line |
| Ctrl+a | Moves to the beginning of the line |
| Ctrl+u | Deletes the line |
| Ctrl+w | Deletes from the cursor to the previous whitespace |
| Alt+d | Deletes the current word |
| Ctrl+k | Deletes from the cursor to the end of line |
| Ctrl+y | Pastes text previously deleted with Ctrl+k, Alt+d, Ctrl+w, or Ctrl+u at the cursor |
| Ctrl+t | Transposes the current character with the previous character |
| Ctrl+c | Ignores the current line and redisplays the command prompt |
| Ctrl+z | Ends configuration mode and returns to exec mode |
| Ctrl+l | Clears the screen |
| Up Arrow or Ctrl+p | Scroll backward through command history |
| Down Arrow or Ctrl+n | Scroll forward through command history |

## Show Command Modifiers

Note: The show command output included in the guides is for illustration purposes only. Based on the combination of features enabled and ongoing enhancements made to the commands, the output for these commands may vary. For instance, the actual command output may differ depending on the software version, configuration, and platform. Field names, values, and formats are subject to change.

You can use two tokens to modify the output of a `show` command. Enter a question mark to display these tokens:

```
# show users ?
  | Output modifiers
  > Output redirection
```

You can type the | (vertical bar character) to use output modifiers. For example:

```
> show rsvp | ?
  begin     Begin with the line that matches
  exclude   Exclude lines that match
  include   Include lines that match
  last      Last few lines
  redirect  Redirect output
```

## Begin Modifier

The `begin` modifier displays the output beginning with the first line that contains the input string (everything typed after the `begin` keyword). For example:

```
# show running-config | begin xe1
...skipping
interface xe1
 ipv6 address fe80::204:75ff:fee6:5393/64
!
interface xe2
 ipv6 address fe80::20d:56ff:fe96:725a/64
!
line con 0
 login
!
end
```

You can specify a regular expression after the `begin` keyword, This example begins the output at a line with either “xe2” or “xe4”:

```
# show running-config | begin xe[2-4]

...skipping
interface xe2
 shutdown
!
interface xe4
 shutdown
!
interface svlan0.1
 no shutdown
!
route-map myroute permit 2
!
route-map mymap1 permit 10
!
route-map rmap1 permit 2
!
line con 0
 login
line vty 0 4
 login
!
end
```

## Include Modifier

The `include` modifier includes only those lines of output that contain the input string. In the output below, all lines containing the word “input” are included:

```
# show interface xe1 | include input
    input packets 80434552, bytes 2147483647, dropped 0, multicast packets 0
    input errors 0, length 0, overrun 0, CRC 0, frame 0, fifo 1, missed 0
```

You can specify a regular expression after the `include` keyword. This examples includes all lines with “input” or “output”:

```
#show interface xe0 | include (in|out)put
    input packets 597058, bytes 338081476, dropped 0, multicast packets 0
    input errors 0, length 0, overrun 0, CRC 0, frame 0, fifo 0, missed 0
    output packets 613147, bytes 126055987, dropped 0
    output errors 0, aborted 0, carrier 0, fifo 0, heartbeat 0, window 0
```

## Exclude Modifier

The `exclude` modifier excludes all lines of output that contain the input string. In the following output example, all lines containing the word “input” are excluded:

```
# show interface xe1 | exclude input
Interface xe1
  Scope: both
  Hardware is Ethernet, address is 0004.75e6.5393
  index 3 metric 1 mtu 1500 <UP,BROADCAST,RUNNING,MULTICAST>
  VRF Binding: Not bound
  Administrative Group(s): None
  DSTE Bandwidth Constraint Mode is MAM
  inet6 fe80::204:75ff:fee6:5393/64
    output packets 4438, bytes 394940, dropped 0
    output errors 0, aborted 0, carrier 0, fifo 0, heartbeat 0, window 0
    collisions 0
```

You can specify a regular expression after the `exclude` keyword. This example excludes lines with “output” or “input”:

```
# show interface xe0 | exclude (in|out)put
Interface xe0
  Scope: both
  Hardware is Ethernet  Current HW addr: 001b.2139.6c4a
  Physical:001b.2139.6c4a  Logical:(not set)
  index 2 metric 1 mtu 1500 duplex-full arp ageing timeout 3000
  <UP,BROADCAST,RUNNING,MULTICAST>
  VRF Binding: Not bound
  Bandwidth 100m
  DHCP client is disabled.
  inet 10.1.2.173/24 broadcast 10.1.2.255
  VRRP Master of :  VRRP is not configured on this interface.
  inet6 fe80::21b:21ff:fe39:6c4a/64
    collisions 0
```

## Redirect Modifier

The `redirect` modifier writes the output into a file. The output is not displayed.

```
# show cli history | redirect /var/frame.txt
```

The output redirection token (>) does the same thing:

```
# show cli history >/var/frame.txt
```

## Last Modifier

The `last` modifier displays the output of last few number of lines (As per the user input). The last number ranges from 1 to 9999.

For example:

```
#show running-config | last 10
```

## String Parameters

The restrictions in Table 6 on page 19 apply for all string parameters used in OcNOS commands, unless some other restrictions are noted for a particular command.

**Table 6: String parameter restrictions**

| Restriction | Description |
|---|---|
| Input length | 1965 characters or less |
| Restricted special characters | “?”, “,”, “>”, “\|”, and “=”<br>The “\|” character is allowed only for the `description` command in interface mode. |

## Command Modes

Commands are grouped into modes arranged in a hierarchy. Each mode has its own set of commands. Table P-7 lists the command modes common to all protocols.

**Table 7: Common command modes**

| Name | Description |
|---|---|
| Executive mode | Also called *view* mode, this is the first mode to appear after you start the CLI. It is a base mode from where you can perform basic commands such as `show`, `exit`, `quit`, `help`, and `enable`. |
| Privileged executive mode | Also called *enable* mode, in this mode you can run additional basic commands such as `debug`, `write`, and `show`. |
| Configure mode | Also called *configure terminal* mode, in this mode you can run configuration commands and go into other modes such as interface, router, route map, key chain, and address family.<br><br>Configure mode is single user. Only one user at a time can be in configure mode. |
| Interface mode | In this mode you can configure protocol-specific settings for a particular interface. Any setting you configure in this mode overrides a setting configured in router mode. |
| Router mode | This mode is used to configure router-specific settings for a protocol such as BGP or OSPF. |

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## Command Mode Tree

The diagram below shows the common command mode hierarchy.

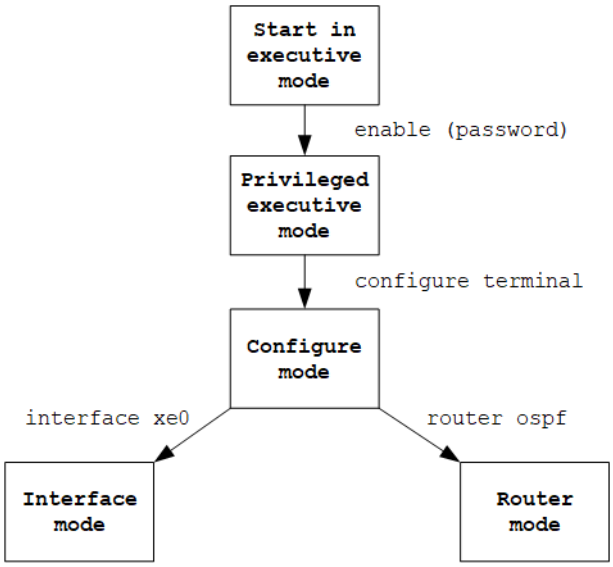



**Figure 1: Common command modes**

To change modes:

1. Enter privileged executive mode by entering `enable` in Executive mode.
2. Enter configure mode by entering `configure terminal` in Privileged Executive mode.

The example below shows moving from executive mode to privileged executive mode to configure mode and finally to router mode:

```
> enable mypassword
# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
(config)# router ospf
(config-router)#
```

Note: Each protocol can have modes in addition to the common command modes. See the command reference for the respective protocol for details.

# Transaction-based Command-line Interface

The OcNOS command line interface is transaction based:

- Any changes done in configure mode are stored in a separate *candidate* configuration that you can view with the `show transaction current` command.
- When a configuration is complete, apply the candidate configuration to the running configuration with the `commit` command.
- If a `commit` fails, no configuration is applied as the entire transaction is considered failed. You can continue to change the candidate configuration and then retry the `commit`.
- Discard the candidate configuration with the `abort transaction` command.
- Check the last aborted transaction with the `show transaction last-aborted` command.
- Multiple configurations cannot be removed with a single `commit`. You must remove each configuration followed by a `commit`.

Note: All commands MUST be executed only in the default CML shell (`cmlsh`). If you log in as root and start `imish`, then the system configurations will go out of sync. The `imish` shell is not supported and should not be started manually.

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# Quality of Service Configuration

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# CHAPTER 1 QoS Introduction

This chapter contains a general overview of QoS functionality and terminology.

## QoS Functionality

Quality of Service (QoS) can be used to give certain traffic priority over other traffic. Without QoS, all traffic in a network has the same priority and chance of being delivered on time. If congestion occurs, all traffic has the same chance of being dropped. With QoS, specific network traffic can be prioritized to receive preferential treatment. In turn, a network performs more predictably, and utilizes bandwidth more effectively.

QoS is based on DiffServ architecture, which stipulates that individual packets be classified upon entry into a network. Classification information can be carried in the Layer-3 IP packet header or the Layer-2 frame. IP packet headers carry the information using 6-bits from the deprecated IP type of service (TOS) field. Layer-2 802.1Q frames carry the information using a 2-byte Tag Control Information field. All switches and routers accessing the Internet depend on class information to give the same forwarding treatment to packets with the same class information, and give different treatment to packets with different class information. A packet can be assigned class information, as follows:

- End hosts or switches along a path, based on a configured policy
- Detailed packet examination, expected to occur nearer to the network edge, to prevent overloading core switches and routers
- A combination of the above two techniques

Class information can be used by switches and routers along a path to limit the amount of allotted resources per traffic class. Per-hop behavior is an individual device's behavior when handling traffic in the DiffServ architecture. An end-to-end QoS solution can be created if all devices along a path have consistent per-hop behavior.

## Terminology

Following is a brief description of terms and concepts used to describe QoS.

### ACL

Access control lists (ACLs) classify traffic with the same characteristics. IP traffic is classified using IP standard or IP extended ACLs. The ACL can have multiple access control entries (ACEs), which are commands that match fields against the contents of the packet. It is not possible to match IP fragments against configured IP extended ACLs to enforce QoS, but it is possible to match IP options against configured IP extended ACLs to enforce QoS.

### CoS Value

Class of Service (CoS) is a 3-bit value used to classify the priority of Layer-2 frames upon entry into a network. QoS classifies frames by assigning priority-indexed CoS values to them, and gives preference to higher-priority traffic. Layer-2 802.1Q frame headers have a 2-byte Tag Control Information field that carries the CoS value in the three most-significant bits, called the User Priority bits. On interfaces configured as Layer-2 802.1Q trunks, all traffic is in 802.1Q frames, except for traffic in the native VLAN. Other frame types cannot carry Layer-2 CoS values. CoS values range from zero to seven, seven being the highest priority.

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## DSCP Value

Differentiated Services Code Point (DSCP) is a 6-bit value used to classify the priority of Layer-3 packets upon entry into a network. DSCP values range from 0 to 63, 63 being the highest priority, 0 being best-effort traffic.

## Classification

Classification distinguishes one kind of traffic from another by examining the fields in the packet. The process generates an internal DSCP for a packet, which identifies all future QoS actions to be taken on the packet. Each packet is classified upon entry into the network. At the ingress, the packet is inspected, and the DSCP is determined based on ACLs or the configuration. The Layer-2 CoS value is then mapped to a DSCP value. The classification is carried in the IP packet header using 6 bits from the deprecated IP TOS field to carry the classification information. Classification can also occur in the Layer-2 frame. Classification is enabled only if QoS is globally enabled on the switch. By default, QoS is globally disabled, thus, no classification occurs. Classification occurs on an ingress physical port, but not at the switch virtual interface level. Classification can be based on QoS ACLs, or class maps and policy maps.

## Policing

Policing determines whether a packet is in or out of profile by comparing the internal DSCP to the configured policer. Policer limits the bandwidth consumed by a traffic flow with the results given to the marker. The two types of policers:

- Individual: QoS applies the bandwidth limits specified in the policer, separately, to each matched traffic class. An individual policer is configured within a policy map.
- Aggregate: QoS applies the bandwidth limits specified in an aggregate policer, cumulatively, to all matched traffic flows. An aggregate policer is configured by specifying the policer name within a policy map. The bandwidth limits of the policer are specified. In this way, multiple classes of traffic across policy map share the aggregate policer.

Policing and policers have the following attributes:

- Policers can occur only on a physical port basis.
- Policing can occur on ingress interfaces.
- Only one policer can be applied to a packet per direction.

## Marking

Marking determines how to handle a packet when it is out of profile. It assesses the policer and the configuration data to determine the action required for the packet, and then handles the packet using one of the following methods:

- Let the packet through without modification
- Drop the packet

Marking can occur on ingress and egress interfaces.

## Queuing

Queuing maps packets to a CoS queue. Each egress port can accommodate up 8 CoS queues, prioritized as 0 lowest and 7 highest. The tagged packet incoming priority can be mapped to one of the 8 queues obtained from the filtering mechanism result. The untagged packet CoS priority is also obtained from the filtering mechanism result. After the packets are mapped to a CoS queue, they are scheduled.

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## Bandwidth Reservation

Bandwidth reservation is the minimum guaranteed bandwidth allocated per queue. Total guaranteed bandwidth of all the queues belonging to a particular port should not exceed the interface Bandwidth. In case if no Bandwidth reservation is done for the queue, minimum guaranteed per each queue will be 1% of the parent node [scheduling node or interface]

## Scheduling

Scheduling forwards or conditions packets using one of the following methods:

- Strict Priority-Based (SP), in which any high-priority packets are first transmitted. Lower-priority packets are transmitted only when the higher-priority queues are empty. A problem may occur when too many lower-priority packets are not transmitted. Strict Priority will be operating on the remaining bandwith available for the Port
- Weighted Round Robin (WRR), in which each queue is assigned a weight to control the number of packets relatively sent from each queue.The weights assigned for the queues will be in the ratio of bandwidth reservation of those queues
- Combination of WRR and SP, the Remaining Bandwidth will be scheduled in the strict order for the SP Queues. The Remaining Bandwidth will be scheduled in the WRR mode for WRR Queues.

## Class Map

A class map names and isolates specific traffic from other traffic. The class map defines the criteria used to match against a specific traffic flow to classify it further. The criteria can include:

- Matching the access group defined by the ACL
- Matching a specific list of DSCP values

If there is more than one type of traffic to be classified, another class map can be created under a different name. After a packet is matched against the class-map criteria, it is further classified using a policy map.

## Policy Map

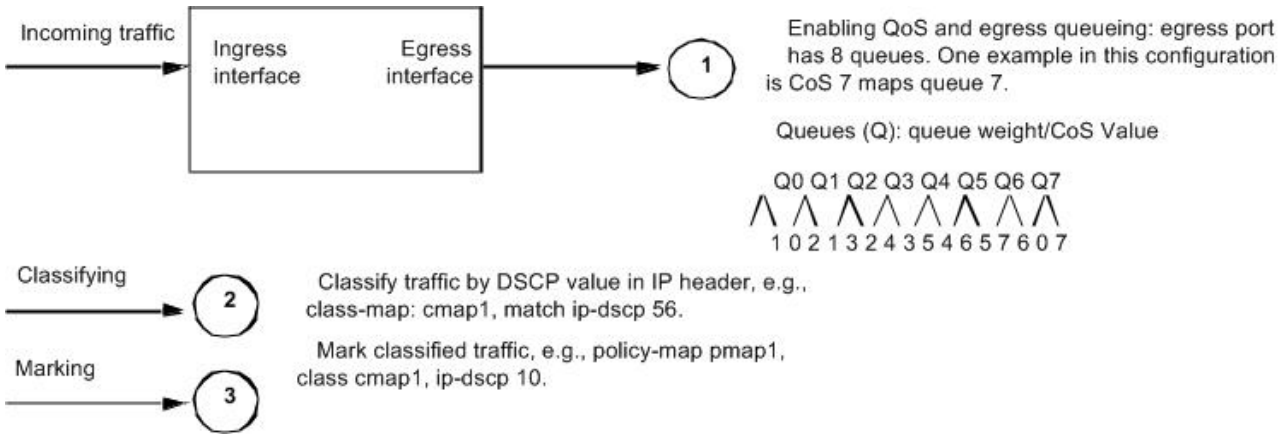
A policy map specifies on which traffic class to act. This can be implemented as follows:

- Set a specific CoS or DSCP value in the traffic class.
- Specify the traffic bandwidth limitations for each matched traffic class (policer) and the action to take (marking) when the traffic is out of profile.

Policy maps have the following attributes:

- A policy map can contain multiple class statements, each with different match criteria and policers.
- A separate policy-map class can exist for each type of traffic received through an interface.
- There can be only one policy map per interface per direction. The same policy map can be applied to multiple interfaces and directions.
- Before a policy map can be effective, it must be attached to an interface.

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# Enable/Disable Configuration

## Topology




**Figure 1-1: Simple configuration of QoS**

## Enabling QoS

The following steps describe how to enable QoS.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable (H)QoS on configuration mode. |
| `(config)#exit` | Exit configure mode. |

### Validation

Enter the commands below to confirm the configurations.

```
#show running-config qos
qos enable
!
```

## Disabling QoS

The following steps disable QoS.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |

| | |
|---|---|
| (config)#qos disable | Disable (H)QoS on configuration mode. |
| (config)#exit | Exit configure mode. |

# Validation

Enter the commands below to confirm the configurations.

```
#show running-config qos
% QoS is not enabled globally
```

# QoS Statistics Configuration

This section show how to enable QoS statistics.

## Topology




**Figure 1-2: Simple configuration of QoS**

## Enabling QoS Statistics

The following steps describe how to enable QoS Statistics.

| | |
|---|---|
| #configure terminal | Enter configure mode. |
| (config)#qos enable | Enable QoS globally. |
| (config)#qos statistics | Enable QoS statistics on configuration mode. |
| (config)#exit | Exit configure mode. |

### Validation

Enter the commands below to confirm the configurations.

```
#show running-config qos
qos enable
qos statistics
!
```

# CHAPTER 2 Dscp-to-queue Map Profile Configuration

This chapter contains a complete sample of configuring Dscp-to-queue map profile.

## Topology

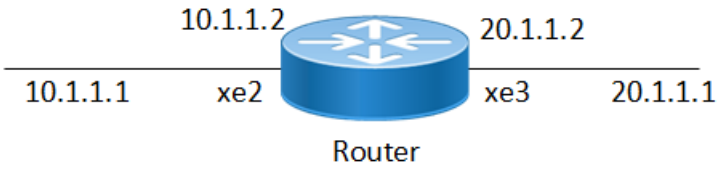



**Figure 2-3: Simple configuration of Dscp-to-queue map**

## Configuration of dcsp-to-queue Map Profile on configuration mode

The following steps describe how to configure dscp-to-queue map on configuration mode.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#qos profile dscp-to-queue Profile1` | Enter Dscp to queue map profile configuration mode |
| `(config)#qos profile dscp-to-queue Dscp2queue` | Enter dscp-to-queue profile configuration mode |
| `(config-ingress-dscp-map)#dscp 10 queue 5` | Map dscp 10 to queue 5 |
| `(config-ingress-dscp-map)#exit` | Exit dscp-to-queue profile configure mode. |
| `(config)#qos profile dscp-to-queue Profile3` | Enter Dscp to queue map profile configuration mode |
| `(config-ingress-dscp-map)#dscp 24 queue 6 color green` | Map dscp 24 to queue 6 for green packets |
| `(config-ingress-dscp-map)#exit` | Exit dscp-to-queue profile configure mode |
| `(config)#exit` | Exit configure mode. |

## Validation

Enter the commands below to confirm the configurations.

```
#show running-config qos
qos enable
qos statistics
!
qos profile dscp-to-queue Profile1
 dscp 10 queue 5
!
qos profile dscp-to-queue Profile3
 dscp 24 queue 6 color green
```

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## Configuration of dscp-to-queue Map Profile on Interface mode

The following steps describe how to configure dscp-to-queue map profile on interface mode.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#interface xe2` | Enter interface mode. |
| `(config-if)#qos map-profile dscp-to-queue Profile1` | Map dscp-to-queue profile to the interface |
| `(config-if)#exit` | Exit interface mode. |
| `(config)#exit` | Exit configure mode. |
| `(config)#interface xe3` | Enter interface mode, |
| `(config-if)#qos map-profile dscp-to-queue Profile3` | Map dscp-to-queue profile to the interface |
| `(config-if)#exit` | Exit interface mode |

## Validation

Enter the commands below to confirm the configurations.

```
#show running-config qos
qos enable
qos statistics
!
qos profile dscp-to-queue Profile1
 dscp 10 queue 5
!
!
!
interface xe2
 qos map-profile dscp-to-queue Profile1
!
interface xe3
 qos map-profile dscp-to-queue Profile3
!
```

```
#show qos-profile type dscp-to-queue Profile1
profile name: Profile1
profile type: dscp-to-queue
profile attached to 1 instances
configured mapping:
 dscp 10 queue 5
Detailed mapping:
 Ingress map for dscp to queue-color
 -------+----------------- | -------+----------------- | -------+----------------- | -------+-----------------
  INPUT |     OUTPUT       |  INPUT |     OUTPUT       |  INPUT |     OUTPUT       |  INPUT |     OUTPUT
 -------+----------------- | -------+----------------- | -------+----------------- | -------+-----------------
  DSCP  | Queue | Color    |  DSCP  | Queue | Color    |  DSCP  | Queue | Color    |  DSCP  | Queue | Color
 -------+-------+--------- | -------+-------+--------- | -------+-------+--------- | -------+-------+---------
  0       0       green    |  16      2       green    |  32      4       green    |  48      6       green
  1       0       green    |  17      2       green    |  33      4       green    |  49      6       green
  2       0       green    |  18      2       green    |  34      4       green    |  50      6       green
  3       0       green    |  19      2       green    |  35      4       green    |  51      6       green
```

```
4       0       green   |  20      2       yellow  |  36      4       yellow  |  52      6       green
5       0       green   |  21      2       green   |  37      4       green   |  53      6       green
6       0       green   |  22      2       red     |  38      4       red     |  54      6       green
7       0       green   |  23      2       green   |  39      4       green   |  55      6       green
8       1       green   |  24      3       green   |  40      5       green   |  56      7       green
9       1       green   |  25      3       green   |  41      5       green   |  57      7       green
10      5       green   |  26      3       green   |  42      5       green   |  58      7       green
11      1       green   |  27      3       green   |  43      5       green   |  59      7       green
12      1       yellow  |  28      3       yellow  |  44      5       green   |  60      7       green
13      1       green   |  29      3       green   |  45      5       green   |  61      7       green
14      1       red     |  30      3       red     |  46      5       green   |  62      7       green
15      1       green   |  31      3       green   |  47      5       green   |  63      7       green
```

# CHAPTER 3 Cos-to-queue Map Configuration

This chapter contains a complete sample of configuring Cos-to-queue map.

## Topology

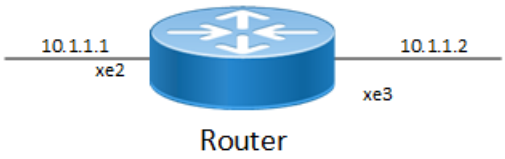



**Figure 3-4: Simple configuration of CoS**

## Configuration of Cos-to-queue Map on configuration mode

The following steps describe how to configure Cos-to-queue map on configuration mode.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#qos profile cos-to-queue Profile2` | Enter cos-to-queue profile configuration mode |
| `(config-ingress-cos-map)#cos 2 queue 4` | Map cos 2 to queue 4 under cos-to-queue profile configuration mode |
| `(config-ingress-cos-map)#exit` | Exit configure mode. |
| `(config)#qos profile cos-to-queue Profile4` | Enter cos-to-queue profile configuration mode |
| `(config-ingress-cos-map)#cos 3 queue 4 color yellow` | Map cos 3 to queue 4 for yellow packets |
| `(config-ingress-cos-map)#exit` | Exit cos-to-queue map profile configuration |
| `(config)#exit` | Exit configure mode. |

## Validation

Enter the commands below to confirm the configurations.

```
#show running-config qos qos enable
qos statistics
!
qos profile cos-to-queue Profile2
 cos 2 dei all queue 4
qos map cos 2 queue 4
!
qos profile cos-to-queue Profile4
 cos 3 dei all queue 4 color yellow
!
```

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## Configuration of Cos-to-queue Map Profile on Interface mode

The following steps describe how to configure Cos-to-queue map profile on interface mode.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#interface xe2` | Enter interface mode. |
| `(config-if)#switchport` | Configure the port as switchport |
| `(config-if)#qos map-profile cos-to-queue Profile2` | Map cos-to-queue profile on the interface |
| `(config-if)#exit` | Exit interface mode. |
| `(config)#exit` | Exit configure mode. |
| `(config)#interface xe3` | Enter interface mode. |
| `(config-if)#switchport` | Configure the port as switchport |
| `(config-if)#qos map-profile cos-to-queue Profile4` | Map cos-to-queue profile on the interface |
| `(config-if)#exit` | Exit interface mode. |
| `(config)#exit` | Exit configure mode. |

## Validation

Enter the commands below to confirm the configurations.

```
#show running-config qos
qos enable
qos statistics
!
qos profile cos-to-queue Profile2
 cos 2 dei all queue 4
!
!
!
interface ce3/1
 qos map-profile cos-to-queue Profile2
!
qos profile cos-to-queue Profile4
 cos 3 dei all queue 4 color yellow
!
!
#show qos-profile type cos-to-queue Profile4
profile name: Profile4
profile type: cos-to-queue
profile attached to 0 instances
configured mapping:
 cos 3 dei all queue 4 color yellow
Detailed mapping:
 ---------------+----------------- | ---------------+-----------------
      INPUT     |     OUTPUT       |       INPUT     |     OUTPUT
```

| COS | DEI | Queue | Color | COS | DEI | Queue | Color |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | green | 0 | 1 | 0 | yellow |
| 1 | 0 | 1 | green | 1 | 1 | 1 | yellow |
| 2 | 0 | 2 | green | 2 | 1 | 2 | yellow |
| 3 | 0 | 4 | yellow | 3 | 1 | 4 | yellow |
| 4 | 0 | 4 | green | 4 | 1 | 4 | yellow |
| 5 | 0 | 5 | green | 5 | 1 | 5 | yellow |
| 6 | 0 | 6 | green | 6 | 1 | 6 | yellow |
| 7 | 0 | 7 | green | 7 | 1 | 7 | yellow |

# CHAPTER 4 Queue-color-to-cos Map Profile Configuration

This chapter contains a complete sample of configuring queue-color-to-cos map profile.

## Topology

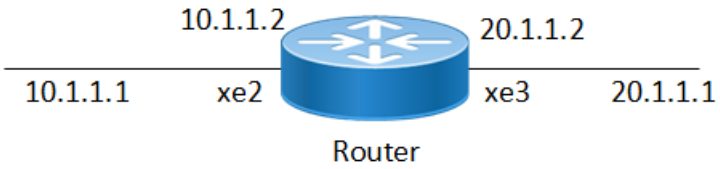



**Figure 4-5: Queue color-to-cos map profile configuration**

## Configuration queue-color-to-qos map profile

The following steps describe how to configure queue-color-to-cos map profile on configuration mode.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#qos profile queue-color-to-cos Profile5` | Enter queue-color-to-cos profile configuration mode |
| `(config-ingress-cos-map)#queue 2 color all cos 7` | Map queue 2 to cos 7 for all colors under cos-to-queue profile configuration mode |
| `(config-egress-cos-map)#exit` | Exit queue-color-to-cos configuration mode |
| `(config)#qos profile queue-color-to-cos default` | Enter queue-color-to-cos default map profile configuration mode |
| `(config-egress-cos-map)#queue 3 cos 5` | Map queue 3 frames to cos 5 |
| `(config-egress-cos-map)#exit` | Exit queue-color-to-cos |
| `(config)#exit` | Exit configure mode. |

## Validation

Enter the commands below to confirm the configurations.

```
#show running-config qos
qos enable
qos statistics
!
qos profile queue-color-to-cos default
 queue 3 color all cos 5
!
qos profile queue-color-to-cos Profile5
 queue 2 color all cos 7
!
```

## Configuration of Queue-color-to-cos Map Profile on Interface mode

The following steps describe how to configure Queue-color-to-cos map profile on interface mode.

| | |
|---|---|
| #configure terminal | Enter configure mode. |
| (config)#qos enable | Enable QoS globally. |
| (config)#qos statistics | Enable QoS statistics. |
| (config)#interface xe2 | Enter interface mode. |
| (config-if)#switchport | Configure the port as switchport |
| (config-if)#qos map-profile queue-color-to-cos Profile5 | map queue-color-to-cos profile on the interface |
| (config-if)#exit | Exit interface mode. |
| (config)#exit | Exit configure mode. |

## Validation

Enter the commands below to confirm the configurations.

```
# show running-config qos
qos enable
qos statistics
!
qos profile queue-color-to-cos default
 queue 3 color all cos 5
!
qos profile queue-color-to-cos Profile5
 queue 2 color all cos 7
!
!
!
interface xe2
 qos map-profile queue-color-to-cos Profile5
!
```

```
#show qos-profile type queue-color-to-cos Profile5
profile name: Profile5
profile type: queue-color-to-cos
profile attached to 1 instances
configured mapping:
 queue 2 color all cos 7
Detailed mapping:
 ----------------+-------- | ----------------+-------- | ----------------+--------
      INPUT      | OUTPUT  |      INPUT      | OUTPUT  |      INPUT      | OUTPUT
 ----------------+-------- | ----------------+-------- | ----------------+--------
  Queue | Color  | COS     |  Queue | Color  | COS     |  Queue | Color  | COS
 -------+--------+-------- | -------+--------+-------- | -------+--------+--------
  0       green    0       |  0       yellow   0       |  0       red      0
  1       green    1       |  1       yellow   1       |  1       red      1
  2       green    7       |  2       yellow   7       |  2       red      7
  3       green    3       |  3       yellow   3       |  3       red      3
  4       green    4       |  4       yellow   4       |  4       red      4
  5       green    5       |  5       yellow   5       |  5       red      5
  6       green    6       |  6       yellow   6       |  6       red      6
  7       green    7       |  7       yellow   7       |  7       red      7
```

# CHAPTER 5 Queue-color-to-dscp Map Profile Configuration

This chapter contains a complete sample of configuring queue-color-to-dscp map profile.

## Topology

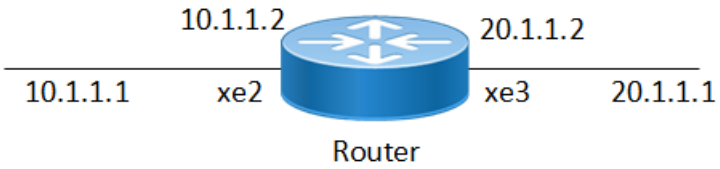



**Figure 5-6: Queue color-to-dscp map profile configuration**

## Configuration queue-color-to-dscp map profile

The following steps describe how to configure queue-color-to-dscp map profile on configuration mode.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#qos profile queue-color-to-dscp Profile6` | Enter queue-color-to-dscp profile configuration mode |
| `(config-egress-dscp-map)#queue 3 color green dscp 48` | Map queue 3 to dscp 48 for green color traffic under queue-color-to-dscp profile configuration mode |
| `(config-egress-dscp-map)#exit` | Exit queue-color-to-dscp map configuration mode |
| `(config)#qos profile queue-color-to-dscp default` | Enter queue-color-to-dscp default map profile configuration mode |
| `(config-egress-dscp-map)#queue 5 dscp 32` | Map queue 5 frames to dscp 32 |
| `(config-egress-cos-map)#exit` | Exit queue-color-to-dscp configuration mode |
| `(config)#exit` | Exit configure mode. |

## Validation

Enter the commands below to confirm the configurations.

```
#show running-config qos
qos enable
qos statistics
!
qos profile queue-color-to-dscp default
 queue 5 color all dscp 32
!
qos profile queue-color-to-dscp Profile6
 queue 3 color green dscp 48
!
```

## Configuration of Queue-color-to-dscp Map Profile on Interface mode

The following steps describe how to configure Queue-color-to-dscp map profile on interface mode.

| | |
|---|---|
| #configure terminal | Enter configure mode. |
| (config)#qos enable | Enable QoS globally. |
| (config)#qos statistics | Enable QoS statistics. |
| (config)#interface xe2 | Enter interface mode. |
| (config-if)#switchport | Configure the port as switchport |
| (config-if)#qos map-profile queue-color-to-dscp Profile6 | map queue-color-to-dscp profile on the interface |
| (config-if)#exit | Exit interface mode. |
| (config)#exit | Exit configure mode. |

## Validation

Enter the commands below to confirm the configurations.

```
# show running-config qos
qos enable
qos statistics
!
qos profile queue-color-to-dscp default
 queue 5 color all dscp 32
!
qos profile queue-color-to-dscp Profile6
 queue 3 color green dscp 48
!
!
!
interface xe2
 qos map-profile queue-color-to-dscp Profile6
!
```

```
#show qos-profile type queue-color-to-dscp Profile6
profile name: Profile6
profile type: queue-color-to-dscp
profile attached to 1 instances
configured mapping:
 queue 3 color green dscp 48
Detailed mapping:
 ----------------+-------- | ----------------+-------- | ----------------+--------
      INPUT      | OUTPUT  |      INPUT      | OUTPUT  |      INPUT      | OUTPUT
 ----------------+-------- | ----------------+-------- | ----------------+--------
  Queue | Color  | DSCP    |  Queue | Color  | DSCP    |  Queue | Color  | DSCP
 -------+--------+-------- | -------+--------+-------- | -------+--------+--------
  0       green    0       |  0       yellow   0       |  0       red      0
  1       green    10      |  1       yellow   12      |  1       red      14
  2       green    18      |  2       yellow   20      |  2       red      22
  3       green    48      |  3       yellow   28      |  3       red      30
  4       green    34      |  4       yellow   36      |  4       red      38
  5       green    40      |  5       yellow   40      |  5       red      40
  6       green    48      |  6       yellow   48      |  6       red      48
  7       green    56      |  7       yellow   56      |  7       red      56
```

# CHAPTER 6 Trust DSCP on Layer 2 Interface Configuration

This chapter contains a complete sample of configuring trust DSCP on Layer 2 interface.

Note: In case of vlan interface, for routed traffic, ingress qos mapping will be decided based upon the trust of member interface. With no trust set, applicable map will be cos map for routed traffic, and with trust set, applicable map will be dscp map.

## Topology

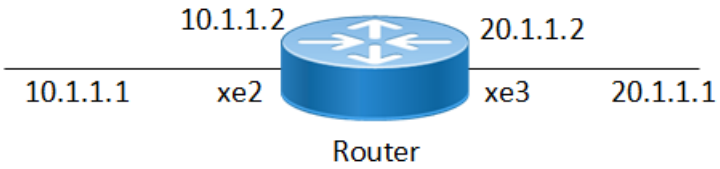



**Figure 6-7: Simple configuration of trust DSCP**

## Configuration Trust DSCP on Interface mode

The following steps describe how to configure trust DSCP on Layer 2 interface.By default, Layer 2 interface will be trust CoS and layer3 interface will be trust DSCP.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#interface xe2` | Enter interface mode. |
| `(config-if)#trust dscp` | Configure trust DSCP on the interface xe2. |
| `(config-if)#exit` | Exit interface mode. |
| `(config)#exit` | Exit configure mode. |

## Validation

Enter the commands below to confirm the configurations.

```
#show running-config qos
!
qos enable
qos statistics
!
interface xe2
 trust dscp
```

# CHAPTER 7 Service based Queue Distribution Configuration

This chapter describes configuring queue distribution based on type of service such as Precedence or DSCP on Layer 3 interface. Prior to this feature support, only one type of configuration was possibile either precedence or DSCP.

Using the most significant three bits of the DSCP such as Class Selector bits which provides backward compatibility with ip precedence, user can set Precedence. For example when user configure Precedence as 101 in CLI, convert this value to DSCPs(101000 ~ 101111), then set the DSCP.

In the configuration section, new precedence profiles are introduced as qos map-profile based on the existing DSCP profiles.

The configuration procedures given below are similar to DSCP, however, both configurations are supported based on requirements.

## Service based Queue configuration

There are 2 Qos-map Precedence profiles used in the configuration procedure.

### Precedence-to-queue:

This is an ingress profile similar to dscp-to-queue. This profile will map precedence value 0-7 to queue 0-7

### Topology

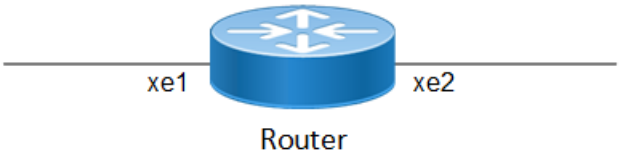



**Figure 7-8: Precedence-to-queue topology**

| | |
|---|---|
| `#configure terminal` | Enter configure mode |
| `(config)#enable qos` | Enable Qos |
| `(config)#exit` | Exit configure mode |
| `(config)# qos profile precedence-to-queue Prec1_que1` | Configure qos-map profile precedence-to-queue with |
| `Profile name as Prece1_que1` | |
| `(config-ingress-prec-map)# precedence 1 queue 2` | Configure mapping of prece 1 to queue 2, so that traffic with precedence 1 should take queue as q2 |
| `(config)#exit` | Exit configure mode |
| `(config)# interface xe1` | Configure ingress interface xe1 |
| `(config-if)#qos map-profile precedence-to-queue Prec1_que1` | Map the profile Prec1_que1 to interface xe1 so that ingress traffic hitting the xe1 interface with prece as 1 should take queue q2 |
| `(config)#commit` | Commit the configuration |
| `(config)#end` | |

## Validation

```
Router#show run int xe1
!
interface xe1
 qos map-profile precedence-to-queue Prec1_que1
!

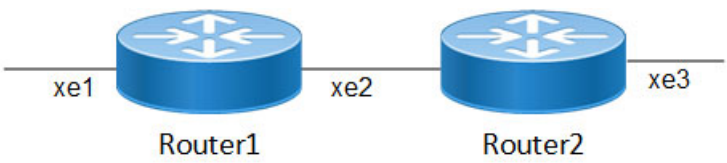
Router#show qos-profile type precedence-to-queue
profile name: Prec1_que1
profile type: precedence-to-queue
profile attached to 1 instances
configured mapping:
 precedence 1 queue 2
 Detailed mapping:
 -------+------------------
  INPUT |    OUTPUT
 -------+------------------
  PREC  | Queue | Out PREC
 -------+-------+----------
  0       0       0
  1       1       2
  2       2       0
  3       3       0
  4       4       0
  5       5       0
  6       6       0
  7       7       0

Router#show run qos
qos enable
!
qos profile precedence-to-queue Prec1_que1
 precedence 1 queue 2
!
interface xe1
 qos map-profile precedence-to-queue Prec1_que1
```

## Queue-to-precedence:

This is egress profile similar to queue-to-dscp. This qos-map profile maps default or corresponding queue to new precedence value that enables the user to see queue corresponding to new precedence mentioned in this profile on the next node egress interface.

### Topology



| | |
|---|---|
| #configure terminal | Enter configure mode |
| (config)#enable qos | Enable Qos |
| (config)#exit | Exit configure mode |
| (config)# qos profile queue-to-precedence queeue_prece1 | Configure qos-map profile queue-to-precedence with Profile name as queeue_prece1 |
| (config-ingress-prec-map)# queue 2 precedence 5 | Configure mapping of queue 2 to precedence 5, so that traffic with precedence 1 should take queue as q2 |
| (config)#exit | Exit configure mode |
| (config)# interface xe2 | Configure egress interface xe2 of 1st node |
| (config-if)#qos map-profile queue-to-precedence queeue_prece1 | Map the profile queeue_prece1 to interface xe2 so that egress traffic from xe2 can be remarked with new precedence value 5 and on next node can verify this on egress interface xe3 |
| (config)#commit | Commit the configuration |
| (config)#end | |

### Validation

```
Router1#show run int ce50
!
interface ce50
 qos map-profile queue-to-precedence queue_prece1
!

Router1#show run qos
!
qos enable
qos statistics
qos remark dscp
!
qos profile queue-to-precedence queeue_prece1
 queue 2 precedence 5
!
!
!
interface ce50
 qos map-profile queue-to-precedence queeue_prece1
!

#show qos-profile queeue_prece1
profile name: queeue_prece1
profile type: queue-to-precedence
profile attached to 1 instances
configured mapping:
 queue 2 precedence 5
Detailed mapping:
 -------+--------
  INPUT | OUTPUT
 -------+--------
```

```
 Queue | PREC
-------+--------
 0       0
 1       1
 2       5
 3       3
 4       4
 5       5
 6       6
 7       7
```

# CHAPTER 8 Weights for Queues Configuration

This chapter contains a complete sample of configuring WRR weights for queues.

## Topology

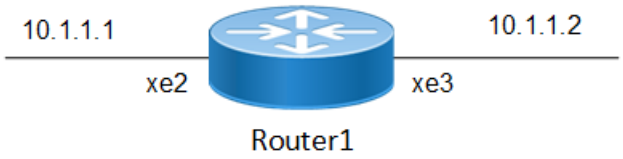



**Figure 8-9: Simple configuration of QoS**

## Configuring WRR Weights for Queues

Do the following to configure WRR weights for queues.

Note: This configuration is supported on supported on the Trident II and Trident II + hardware.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#class-map cmap1` | Enter class-map mode |
| `(config-cmap-qos)#match cos 2` | Configure match criteria as cos 2 |
| `(config-cmap-qos)#exit` | Exit out of class-map mode |
| `(config)#class-map cmap2` | Enter class-map mode |
| `(config-cmap-qos)#match cos 3` | Configure match criteria as cos 3 |
| `(config-cmap-qos)#exit` | Exit out of class-map mode |
| `(config)#policy-map pmap1` | Enter policy-map mode. |
| `(config-pmap-qos)#class cmap1` | Assign class cmap1. |
| `(config-pmap-c-qos)#set qos-group 1` | Remark matched traffic to qos-group 1 |
| `(config-pmap-c-qos)#exit` | Exit out of pmap-c mode |
| `(config-pmap-qos)#exit` | Exit pmap mode. |
| `(config)#policy-map pmap1` | Enter policy-map mode. |
| `(config-pmap-qos)#class cmap2` | Assign class cmap2. |
| `(config-pmap-c-qos)#set qos-group 2` | Remark matched traffic to qos-group 2 |
| `(config-pmap-c-qos)#exit` | Exit out of pmap-c mode |
| `(config-pmap-qos)#exit` | Exit pmap mode. |
| `(config)#class-map type queuing cq1` | Configure class-map of type queuing with name cq1, and enter into class-map mode |
| `(config-cmap-que)#match qos-group 1` | Configure match criteria as qos-group 1 |
| `(config-cmap-que)#exit` | Exit out of class-map mode. |

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| | |
|---|---|
| (config)#class-map type queuing cq2 | Configure class-map of type queuing with name cq2, and enter into class-map mode. |
| (config-cmap-que)#match qos-group 2 | Configure match criteria as qos-group 2. |
| (config-cmap-que)#exit | Exit out of class-map mode. |
| (config)#policy-map type queuing pq1 | Configure policy-map of type queuing with name pq1, and enter into policy-map mode. |
| (config-pmap-que)#class cq1 | Attach class cq1 to Policy-map pq1. |
| (config-pmap-c-que)#wrr-queue weight 2 | Configure WRR Weight of 2. |
| (config-pmap-c-que)#exit | Exit from pmap-c mode. |
| (config-pmap-que)#class cq2 | Assign class (queue) cq2 to pq1. |
| (config-pmap-c-que)#wrr-queue weight 4 | Configure WRR weight of 4. |
| (config-pmap-c-que)#exit | Exit from pmap-c mode. |
| (config-pmap-que)#exit | Exit from pmap mode. |
| (config)#interface xe2 | Enter into interface xe2. |
| (config-if)#service-policy type queuing output pq1 | Assign service policy pq1 of type queueing on out direction. |
| (config-if)#exit | Exit interface mode |
| (config)#exit | Exit configure mode. |
| (config)#bridge 1 protocol rstp vlan-bridge | Specify VLAN for bridge 1. |
| (config)#vlan database | Enter the VLAN configuration mode. |
| (config-vlan)#vlan 2-3 bridge 1 state enable | Enable VLAN (2-3) on bridge 1. Specifying the enable state. |
| (config-vlan)#exit | Exit the VLAN configuration mode. |
| (config)#interface vlan1.2 | Enter interface mode. |
| (config-if)# ip address 10.1.1.1/24 | Configure the IP address. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface xe2 | Enter interface mode. |
| (config-if)#switchport | Configure xe2 as a Layer 2 port. |
| (config-if)#bridge-group 1 | Associate the interface with bridge group 1. |
| (config-if)#switchport mode trunk | Configure port as a trunk. |
| (config-if)#switchport trunk allowed vlan all | Allow all the VLANs on the xe3 interface. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface xe3 | Enter interface mode. |
| (config-if)#switchport | Configure xe3 as a Layer 2 port. |
| (config-if)#bridge-group 1 | Associate the interface with bridge group 1. |
| (config-if)#switchport mode trunk | Configure port as a trunk. |
| (config-if)#switchport trunk allowed vlan all | Allow all the VLANs on the xe3 interface. |
| (config-if)# service-policy type qos input pmap1 | Assign service-policy to interface on in-direction |
| (config-if)#exit | Exit the interface mode. |

## Validation

Enter the commands listed in the sections below to confirm the configurations.

```
#show running-config qos
qos enable
!
qos statistics
!
class-map cmap1
 match cos 2
!
class-map cmap2
 match cos 3
!
class-map type queuing match-any cq1
 match qos-group 1
!
class-map type queuing match-any cq2
 match qos-group 2
!
policy-map pmap1
 class cmap1
  set qos-group 1
  exit
 class cmap2
  set qos-group 2
  exit
!
!
policy-map type queuing pq1
 class type queuing cq1
  wrr-queue weight 2
  exit
 class type queuing cq2
  wrr-queue weight 4
  exit
!
!
interface xe2
 service-policy type queuing output pq1
!
interface xe3
 service-policy type qos input pmap1
!


#show policy-map

Type qos policy-maps
====================

policy-map pmap1
 class cmap1
```

```
  set qos-group 1
  exit
 class cmap2
  set qos-group 2
  exit


Type queuing policy-maps
========================

policy-map type queuing default default-out-policy
 class type queuing default q0
  priority level 1
  exit
 class type queuing default q1
  priority level 1
  exit
 class type queuing default q2
  priority level 1
  exit
 class type queuing default q3
  priority level 1
  exit
 class type queuing default q4
  priority level 1
  exit
 class type queuing default q5
  priority level 1
  exit
 class type queuing default q6
  priority level 1
  exit
 class type queuing default q7
  priority level 1
  exit

policy-map type queuing pq1
 class type queuing cq1
  wrr-queue weight 2
  exit
 class type queuing cq2
  wrr-queue weight 4
  exit


#show class-map

  Type qos class-maps
  ===================
      class-map type qos match-any class-default
```

```
      class-map cmap1
         match cos 2

      class-map cmap2
         match cos 3


  Type queuing class-maps
  =======================
      class-map type queuing match-any cq1
         match qos-group 1

      class-map type queuing match-any cq2
         match qos-group 2

      class-map match-any q0

      class-map match-any q1

      class-map match-any q2

      class-map match-any q3

      class-map match-any q4

      class-map match-any q5

      class-map match-any q6

      class-map match-any q7


  Type Vlan-Queuing class-maps
  ============================

#show policy-map interface xe2
Interface xe2
Global statistics status : enabled

Service-policy (queuing) output: pq1
-----------------------------------
Class-map (queuing): cq1
 match qos-group 1
 wrr-queue weight 2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): cq2
 match qos-group 2
```

```
 wrr-queue weight 4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Service-policy (queuing) output: default-out-policy
-----------------------------------
Class-map (queuing): q0
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q1
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q2
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q3
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q4
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q5
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q6
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q7
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
```

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```
Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Wred Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets

#show policy-map interface xe3

Interface xe3
Global statistics status : enabled

Service-policy (qos) input     : pmap1
--------------------------------
Class-map (qos): cmap1 (match all)
 match cos 2
 set qos-group 1
      matched      : 209681694 packets, 15097081968 bytes
      transmitted  : 209681694 packets, 15097081968 bytes

Class-map (qos): cmap2 (match all)
 match cos 3
 set qos-group 2
```

```
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes


Service-policy (queuing) output: default-out-policy
-----------------------------------
Class-map (queuing): q0
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q1
 priority level 1
      output       : 11789 packets, 754820 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q2
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q3
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q4
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q5
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q6
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q7
 priority level 1
      output       : 1460 packets, 93914 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 39311112 packets, 2830400048 bytes
      dropped      : 0 packets, 0 bytes
```

```
Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 78930334 packets, 5051541376 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 21 packets, 1428 bytes
      dropped      : 0 packets, 0 bytes

Wred Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets
```

## Configuring WRR Weights for Queues

Do the following to configure WRR weights for queues.

Note: This configuration is supported on the TD III and TD IV hardware.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#policy-map type queuing default qmap` | Configure QoS Policy-map |
| `(config-pmap-que-def)#class type queuing default q0` | Configure class type and specify the class-map type |

| | |
|---|---|
| (config-pmap-c-que-def)#wrr-queue weight 10 | Configure WRR Weight of 10. |
| (config-pmap-c-que)#exit | Exit from pmap-c mode. |
| (config-pmap-que-def)#class type queuing default q1 | Configure class type and specify the class-map type |
| (config-pmap-c-que-def)#wrr-queue weight 15 | Configure WRR Weight of 15. |
| (config-pmap-c-que)#exit | Exit from pmap-c mode. |
| (config-pmap-que-def)#class type queuing default q2 | Configure class type and specify the class-map type |
| (config-pmap-c-que-def)#wrr-queue weight 20 | Configure WRR Weight of 20. |
| (config-pmap-c-que)#exit | Exit from pmap-c mode. |
| (config-pmap-que-def)#class type queuing default q3 | Configure class type and specify the class-map type |
| (config-pmap-c-que-def)#wrr-queue weight 25 | Configure WRR Weight of 25. |
| (config-pmap-c-que)#exit | Exit from pmap-c mode. |
| (config-pmap-que-def)#class type queuing default q4 | Configure class type and specify the class-map type |
| (config-pmap-c-que-def)#wrr-queue weight 30 | Configure WRR Weight of 30. |
| (config-pmap-c-que)#exit | Exit from pmap-c mode. |
| (config-pmap-que-def)#class type queuing default q5 | Configure class type and specify the class-map type |
| (config-pmap-c-que-def)#wrr-queue weight 35 | Configure WRR Weight of 35. |
| (config-pmap-c-que)#exit | Exit from pmap-c mode. |
| (config-pmap-que-def)#class type queuing default q6 | Configure class type and specify the class-map type |
| (config-pmap-c-que-def)#wrr-queue weight 40 | Configure WRR Weight of 40. |
| (config-pmap-c-que)#exit | Exit from pmap-c mode. |
| (config-pmap-que-def)#class type queuing default q7 | Configure class type and specify the class-map type |
| (config-pmap-c-que-def)#wrr-queue weight 45 | Configure WRR Weight of 45. |
| (config-pmap-c-que)#exit | Exit from pmap-c mode. |
| (config-pmap-que)#exit | Exit from pmap mode. |
| (config)#interface xe2 | Enter into interface xe2. |
| (config-if)#service-policy type queuing output qmap | Assign service policy pq1 of type queueing on out direction. |
| (config-if)#shape rate 300 mbps burst 100 | Configure QoS egress traffic shape |
| (config-if)#exit | Exit interface mode |
| (config)#exit | Exit configure mode. |

## Validation

Enter the commands listed in the sections below to confirm the configurations.

```
OcNOS#sh interface counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
```

```
 * indicates monitor is active
+-------------+--------------------+--------+-----------------+-------------------+-----------------+-------------------+
|  Interface  |   Queue/Class-map  | Q-Size |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped bytes   |
+-------------+--------------------+--------+-----------------+-------------------+-----------------+-------------------+
 cpu           best-effort      (E) 0        17                2746                0                 0
 cpu           ipmc-miss        (E) 0        7                 1274                0                 0
 cpu           ospf             (E) 0        64                10508               0                 0
 cpu           nd               (E) 0        209               36326               0                 0
 cpu           arp              (E) 0        11                1540                0                 0
 cpu           igmp             (E) 0        4                 560                 0                 0
 cpu           bpdu             (E) 0        206               44163               0                 0
 cd1           q0               (E) 296926   193020            289530000           175171343         262757014500
    Green   drop                --                                   0
    Yellow  drop                --                                   0
    Red     drop                --                                   0
    Non-Red drop                --                                   0
 cd1           q1               (E) 295148   289520            434280000           175074412         262611618000
    Green   drop                --                                   0
    Yellow  drop                --                                   0
    Red     drop                --                                   0
    Non-Red drop                --                                   0
 cd1           q2               (E) 296926   386020            579030000           174977481         262466221500
    Green   drop                --                                   0
    Yellow  drop                --                                   0
    Red     drop                --                                   0
    Non-Red drop                --                                   0
 cd1           q3               (E) 295148   482521            723781500           174880552         262320828000
    Green   drop                --                                   0
    Yellow  drop                --                                   0
    Red     drop                --                                   0
    Non-Red drop                --                                   0
 cd1           q4               (E) 300482   579021            868531500           174783622         262175433000
    Green   drop                --                                   0
    Yellow  drop                --                                   0
    Red     drop                --                                   0
    Non-Red drop                --                                   0
 cd1           q5               (E) 295148   675521            1013281500          174686692         262030038000
    Green   drop                --                                   0
    Yellow  drop                --                                   0
    Red     drop                --                                   0
    Non-Red drop                --                                   0
 cd1           q6               (E) 296926   771972            1157958000          174589811         261884716500
    Green   drop                --                                   0
    Yellow  drop                --                                   0
    Red     drop                --                                   0
    Non-Red drop                --                                   0
 cd1           q7               (E) 293370   868516            1302761198          174492848         261739272000
    Green   drop                --                                   0
    Yellow  drop                --                                   0
    Red     drop                --                                   0
    Non-Red drop                --                                   0
 cd1           mc-q3            (E) 0        88                7704                0                 0
 cd3           q7               (E) 0        2                 180                 0                 0
    Green   drop                --                                   0
    Yellow  drop                --                                   0
    Red     drop                --                                   0
    Non-Red drop                --                                   0
 cd3           mc-q3            (E) 0        18                1676                0                 0
 cd22          mc-q0            (E) 0        4                 560                 0                 0
 cd22          mc-q1            (E) 0        206               44163               0                 0
 cd30/1        q0               (E) 0        1191525716        1787288574000       0                 0
    Green   drop                --                                   0
    Yellow  drop                --                                   0
    Red     drop                --                                   0
    Non-Red drop                --                                   0
 cd30/1        mc-q0            (E) 0        113674337         170511505500        0                 0
 cd30/2        q7               (E) 0        1                 82                  0                 0
    Green   drop                --                                   0
    Yellow  drop                --                                   0
    Red     drop                --                                   0
    Non-Red drop                --                                   0
 cd30/2        mc-q3            (E) 0        25                2498                0                 0
```

```
cd30/3        q7              (E) 0       1               82              0               0
   Green   drop              --                                  0
   Yellow  drop              --                                  0
   Red     drop              --                                  0
   Non-Red drop              --                                  0
cd30/3        mc-q3           (E) 0       26              2580            0               0
cd30/4        q7              (E) 0       1               82              0               0
   Green   drop              --                                  0
   Yellow  drop              --                                  0
   Red     drop              --                                  0
   Non-Red drop              --                                  0
cd30/4        mc-q3           (E) 0       26              2580            0               0
cd30/5        q7              (E) 0       1               82              0               0
   Green   drop              --                                  0
   Yellow  drop              --                                  0
   Red     drop              --                                  0
   Non-Red drop              --                                  0
cd30/5        mc-q3           (E) 0       26              2580            0               0
cd30/6        q7              (E) 0       1               82              0               0
   Green   drop              --                                  0
   Yellow  drop              --                                  0
   Red     drop              --                                  0
   Non-Red drop              --                                  0
cd30/6        mc-q3           (E) 0       26              2580            0               0
cd30/7        q7              (E) 0       1               82              0               0
   Green   drop              --                                  0
   Yellow  drop              --                                  0
   Red     drop              --                                  0
   Non-Red drop              --                                  0
cd30/7        mc-q3           (E) 0       26              2580            0               0
cd30/8        q7              (E) 0       1               82              0               0
   Green   drop              --                                  0
   Yellow  drop              --                                  0
   Red     drop              --                                  0
   Non-Red drop              --                                  0
cd30/8        mc-q3           (E) 0       26              2580            0               0
cd31/1        q7              (E) 0       5               320             0               0
   Green   drop              --                                  0
   Yellow  drop              --                                  0
   Red     drop              --                                  0
   Non-Red drop              --                                  0
cd31/1        mc-q3           (E) 0       90              7588            0               0
cd31/1        pg-q0           (I) 296418  NA              NA              NA              NA
cd31/1        pg-q1           (I) 295148  NA              NA              NA              NA
cd31/1        pg-q2           (I) 298450  NA              NA              NA              NA
cd31/1        pg-q3           (I) 302006  NA              NA              NA              NA
cd31/1        pg-q4           (I) 293370  NA              NA              NA              NA
cd31/1        pg-q5           (I) 300482  NA              NA              NA              NA
cd31/1        pg-q6           (I) 299466  NA              NA              NA              NA
cd31/1        pg-q7           (I) 295148  NA              NA              NA              NA
```

```
OcNOS#sh policy-map interface cd31/1

Interface cd31/1

Type Queuing policy-map : default-out-policy

Class-map (queuing): q0
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q1
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes
```

```
Class-map (queuing): q2
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q3
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q4
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q5
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q6
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q7
 priority
      output              : 5 packets, 320 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 92 packets, 7752 bytes
      dropped      : 0 packets, 0 bytes

Wred/Tail Drop Statistics :
----------------------
 green  : 0 packets
```

```
 yellow : 0 packets
 red    : 0 packets


OcNOS#sh policy-map interface cd1

Interface cd1

Type Queuing policy-map : qmap

Class-map (queuing): q0
 wrr-queue weight 10
      output              : 221421 packets, 332131500 bytes
      dropped             : 200845495 packets, 301268242500 bytes

Class-map (queuing): q1
 wrr-queue weight 15
      output              : 332131 packets, 498196500 bytes
      dropped             : 200734354 packets, 301101531000 bytes

Class-map (queuing): q2
 wrr-queue weight 20
      output              : 442841 packets, 664261500 bytes
      dropped             : 200623215 packets, 300934822500 bytes

Class-map (queuing): q3
 wrr-queue weight 25
      output              : 553551 packets, 830326500 bytes
      dropped             : 200512078 packets, 300768117000 bytes

Class-map (queuing): q4
 wrr-queue weight 30
      output              : 664261 packets, 996391500 bytes
      dropped             : 200400951 packets, 300601426500 bytes

Class-map (queuing): q5
 wrr-queue weight 35
      output              : 774971 packets, 1162456500 bytes
      dropped             : 200289817 packets, 300434725500 bytes

Class-map (queuing): q6
 wrr-queue weight 40
      output              : 885630 packets, 1328445000 bytes
      dropped             : 200178738 packets, 300268107000 bytes

Class-map (queuing): q7
 wrr-queue weight 45
      output              : 996387 packets, 1494567698 bytes
      dropped             : 200067573 packets, 300101359500 bytes
```

```
Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 91 packets, 7962 bytes
      dropped      : 0 packets, 0 bytes

Wred/Tail Drop Statistics :
-----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets



OcNOS#sh policy-map
interface   statistics  type
OcNOS#sh policy-map statistics
Type qos class-map statistics:
+--------------------------------+-----------------+-----------------+-----------------+------------------+
|           Class-map            |    Match pkts   |   Match bytes   |   Dropped pkts  |   Dropped Bytes  |
+--------------------------------+-----------------+-----------------+-----------------+------------------+

Type queuing class-map statistics:
+--------------------------------+-----------------+-----------------+-----------------+------------------+
|           Class-map            |    Total pkts   |   Total bytes   |   Dropped pkts  |   Dropped Bytes  |
+--------------------------------+-----------------+-----------------+-----------------+------------------+
cd1
 q0                              248700            373050000         225492678         338239017000
 q1                              373050            559575000         225367899         338051848500
 q2                              497400            746100000         225243123         337864684500
 q3                              621750            932625000         225118353         337677529500
 q4                              746100            1119150000        224993584         337490376000
 q5                              870449            1305673500        224868812         337303218000
 q6                              994737            1492105500        224744099         337116148500
 q7                              1119122           1678670198        224619288         336928932000
cd3
 q7                              2                 180               0                 0
cd30/1
 q0                              1191525716        1787288574000     0                 0
cd30/2
 q7                              1                 82                0                 0
cd30/3
 q7                              1                 82                0                 0
cd30/4
 q7                              1                 82                0                 0
cd30/5
 q7                              1                 82                0                 0
cd30/6
 q7                              1                 82                0                 0
cd30/7
```

```
 q7                              1               82              0               0
cd30/8
 q7                              1               82              0               0
cd31/1
 q7                              5               320             0               0
OcNOS#
```

## Configuring WRR Weights for Queues

Do the following to configure WRR weights for queues.

Note: This configuration is supported on the TR III hardware.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#policy-map type queuing default qmap` | Configure QoS Policy-map |
| `(config-pmap-que-def)#class type queuing default q0` | Configure class type and specify the class-map type |
| `(config-pmap-c-que-def)#wrr-queue weight 10` | Configure WRR Weight of 10. |
| `(config-pmap-c-que)#exit` | Exit from pmap-c mode. |
| `(config-pmap-que-def)#class type queuing default q1` | Configure class type and specify the class-map type |
| `(config-pmap-c-que-def)#wrr-queue weight 15` | Configure WRR Weight of 15. |
| `(config-pmap-c-que)#exit` | Exit from pmap-c mode. |
| `(config-pmap-que-def)#class type queuing default q2` | Configure class type and specify the class-map type |
| `(config-pmap-c-que-def)#wrr-queue weight 20` | Configure WRR Weight of 20. |
| `(config-pmap-c-que)#exit` | Exit from pmap-c mode. |
| `(config-pmap-que-def)#class type queuing default q3` | Configure class type and specify the class-map type |
| `(config-pmap-c-que-def)#wrr-queue weight 25` | Configure WRR Weight of 25. |
| `(config-pmap-c-que)#exit` | Exit from pmap-c mode. |
| `(config-pmap-que-def)#class type queuing default q4` | Configure class type and specify the class-map type |
| `(config-pmap-c-que-def)#wrr-queue weight 30` | Configure WRR Weight of 30. |
| `(config-pmap-c-que)#exit` | Exit from pmap-c mode. |
| `(config-pmap-que-def)#class type queuing default q5` | Configure class type and specify the class-map type |
| `(config-pmap-c-que-def)#wrr-queue weight 35` | Configure WRR Weight of 35. |
| `(config-pmap-c-que)#exit` | Exit from pmap-c mode. |
| `(config-pmap-que-def)#class type queuing default q6` | Configure class type and specify the class-map type |

| | |
|---|---|
| (config-pmap-c-que-def)#wrr-queue weight 40 | Configure WRR Weight of 40. |
| (config-pmap-c-que)#exit | Exit from pmap-c mode. |
| (config-pmap-que-def)#class type queuing default q7 | Configure class type and specify the class-map type |
| (config-pmap-c-que-def)#wrr-queue weight 45 | Configure WRR Weight of 45. |
| (config-pmap-c-que)#exit | Exit from pmap-c mode. |
| (config-pmap-que)#exit | Exit from pmap mode. |
| (config)#interface xe2 | Enter into interface xe2. |
| (config-if)#service-policy type queuing output qmap | Assign service policy pq1 of type queueing on out direction. |
| (config-if)#shape rate 300 mbps burst 100 | Configure QoS egress traffic shape |
| (config-if)#exit | Exit interface mode |
| (config)#exit | Exit configure mode. |

## Validation

Enter the commands listed in the sections below to confirm the configurations.

```
OcNOS#sh interface counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+-------------+--------------------+--------+----------------+------------------+----------------+------------------+
|  Interface  |   Queue/Class-map  | Q-Size |     Tx pkts    |      Tx bytes    |  Dropped pkts  |   Dropped bytes
```

# CHAPTER 9 Marking/Remarking Configuration

This chapter contains a complete sample of configuring Marking/Remarking.

## Topology

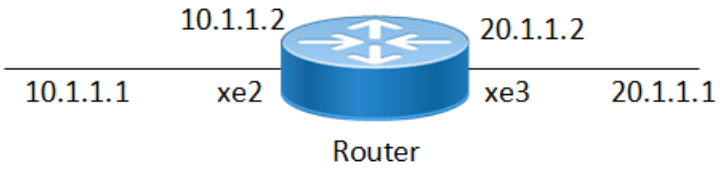



**Figure 9-10: Simple configuration of Marking/Remarking**

## L2 Interface

The following steps describe how to configure Marking/Remarking.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#bridge 1 protocol rstp vlan-bridge` | Configure bridge 1 as RSTP-VLAN aware. |
| `(config)#interface xe2` | Enter interface mode. |
| `(config-if)#switchport` | Configure xe2 as a Layer 2 port. |
| `(config-if)#bridge-group 1` | Associate bridge to an interface. |
| `(config-if)#switchport mode trunk` | Configure port as a trunk. |
| `(config-if)#switchport trunk allowed vlan all` | Allow all the VLANs on the xe2 interface. |
| `(config-if)#exit` | Exit the xe2 interface mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#class-map type qos cmap1` | Enter Class-map mode |
| `(config-cmap-qos)#match cos 2` | Configure match criteria as CoS with Value 2 |
| `(config-cmap-qos)#exit` | Exit Class-map mode |
| `(config)#policy-map type qos pmap1` | Enter policy-map mode |
| `(config-pmap-qos)#class type qos cmap1` | Assign Class cmap1 to Policy-map pmap1 |
| `(config-pmap-c-qos)#set cos 5` | Remark cos from cos 2 to cos 5 |
| `(config-pmap-c-qos)#exit` | Exit out of policy-class-map mode |
| `(config-pmap-qos)#exit` | Exit out of Policy-map mode |
| `(config)#interface xe2` | Enter xe2 interface |
| `(config-if)#service-policy type qos input pmap1` | Assign service-policy to interface on in-direction |

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| | |
|---|---|
| (config-if)#exit | Exit the xe2 interface mode. |
| (config)#interface xe3 | Enter interface mode. |
| (config-if)#switchport | Configure xe3 as a Layer 2 port. |
| (config-if)#bridge-group 1 | Associate bridge to an interface. |
| (config-if)#switchport mode trunk | Configure port as a trunk. |
| (config-if)#switchport trunk allowed vlan all | Allow all the VLANs on the xe3 interface. |
| (config-if)#exit | Exit the xe3 interface mode. |
| (config)#class-map type qos cmap2 | Enter Class-map mode |
| (config-cmap-qos)#match protocol arp | Configure match criteria as protocol with arp |
| (config-cmap-qos)#exit | Exit Class-map mode |
| (config)#policy-map type qos pmap2 | Enter policy-map mode |
| (config-pmap-qos)#class type qos cmap2 | Assign Class cmap2 to Policy-map pmap2 |
| (config-pmap-c-qos)#set cos 6 | Remark all frame with ethertype as arp to cos 6 |
| (config-pmap-c-qos)#exit | Exit out of policy-class-map mode |
| (config-pmap-qos)#exit | Exit out of Policy-map mode |
| (config)#interface xe3 | Enter xe3 interface |
| (config-if)#service-policy type qos input pmap2 | Assign service-policy to interface on in-direction |
| (config-if)#exit | Exit out of interface mode |
| (config)#bridge 1 protocol rstp vlan-bridge | Specify VLAN for bridge 1. |
| (config)#vlan database | Enter the VLAN configuration mode. |
| (config-vlan)#vlan 2-3 bridge 1 state enable | Enable VLAN (2-3) on bridge 1. Specifying the enable state. |
| (config-vlan)#exit | Exit the VLAN configuration mode. |
| (config)#interface vlan1.2 | Enter interface mode. |
| (config-if)# ip address 10.1.1.2/24 | Configure the IP address. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface vlan1.3 | Enter interface mode. |
| (config-if)# ip address 20.1.1.1/24 | Configure the IP address. |
| (config-if)#exit | Exit the interface mode. |

## Validation

Enter the commands listed in the sections below to confirm the configurations.

```
#show running-config qos
qos enable
!
qos statistics
!
class-map type qos cmap1
 match cos 2
!
class-map type qos cmap2
```

```
 match protocol arp
!
policy-map type qos pmap1
 class type qos cmap1
  set cos 5
  exit
!
policy-map type qos pmap2
 class type qos cmap2
  set cos 6
  exit
!
!
!
interface xe2
 service-policy type qos input pmap1
!
interface xe3
 service-policy type qos input pmap2
!

#show class-map cmap1

  Type qos class-maps
  ===================

      class-map type qos cmap1
         match cos 2


#show policy-map

Type qos policy-maps
====================

policy-map type qos pmap1
 class type qos cmap1
  set cos 5
  exit

policy-map type qos pmap2
 class type qos cmap2
  set cos 6
  exit


Type queuing policy-maps
========================

policy-map type queuing default default-out-policy
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
```

```
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit

#show policy-map interface xe2

Interface xe2
Global statistics status : enabled

Class-map (qos): cmap1 (match all)
 match cos 2
 set cos 5
      matched      : 8 packets, 680 bytes
      transmitted  : 8 packets, 680 bytes


Service-policy (queuing) output: default-out-policy
-----------------------------------
Class-map (queuing): q0
 priority
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q1
 priority
      output       : 12 packets, 1416 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q2
 priority
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q3
 priority
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q4
 priority
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
```

```
Class-map (queuing): q5
 priority
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q6
 priority
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q7
 priority
      output       : 589 packets, 37876 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 7 packets, 448 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 12 packets, 852 bytes
      dropped      : 0 packets, 0 bytes

Wred Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets


OcNOS#show policy-map interface xe3

Interface xe3
```

```
Type QoS statistics status : enabled

Class-map (qos): cmap2 (match all)
 match protocol arp
 set cos 6

      matched      : 7 packets, 448 bytes
      transmitted  : 7 packets, 448 bytes


Service-policy (queuing) output: default-out-policy
-----------------------------------
Class-map (queuing): q0
 priority
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q1
 priority
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q2
 priority
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q3
 priority
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q4
 priority
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q5
 priority
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q6
 priority
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q7
 priority
      output       : 699 packets, 59550 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
```

```
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 1 packets, 64 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 2 packets, 136 bytes
      dropped      : 0 packets, 0 bytes

Wred Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets
```

## L3 Interface

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#interface xe3` | Enter interface mode. |
| `(config-if)#ip address 10.1.1.1/24` | Assign IP Address on interface to 10.1.1.2 with mask 255.255.255.0 |
| `(config-if)#exit` | Exit out of interface mode |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#class-map type qos cmap3` | Configure class-map of type qos with name cmap3 and enter into Class-map mode |
| `(config-cmap-qos)#match dscp 10` | Configure match criteria as dscp with a value of 10. |
| `(config-cmap-qos)#exit` | Exit Class-map mode |

| | |
|---|---|
| (config)#policy-map type qos pmap3 | Enter policy-map mode |
| (config-pmap-qos)#class type qos cmap3 | Assign Class cmap3 to Policy-map pmap3 |
| (config-pmap-c-qos)#set dscp ef | Remark frames with dscp value 10 to dscp 46 |
| (config-pmap-c-qos)#exit | Exit out of policy-class-map mode |
| (config-pmap-qos)#exit | Exit out of Policy-map mode |
| (config)#interface xe3 | Enter xe3 interface |
| (config-if)#service-policy type qos input pmap3 | Assign service-policy pmap3 to interface xe3 on in-direction |
| (config-if)#exit | Exit out of interface mode |
| (config)#ip access-list 101 | Configure access-list 101 with action as permit for tcp traffic with destination port as ftp port |
| (config-ip-acl)#permit tcp any any eq ftp | Permit for tcp traffic with destination port as ftp port. |
| (config-ip-acl)#exit | Exit access list mode |
| (config)#class-map type qos match-any cmap4 | Enter Class-map mode |
| (config-cmap-qos)#match access-group 101 | Configure access-group 101 as match criteria |
| (config-cmap-qos)#exit | Exit class-map mode |
| (config)#policy-map type qos pmap4 | Enter policy map mode |
| (config-pmap-qos)#class cmap4 | Assign Class cmap4 to Policy-map pmap4 |
| (config-pmap-c-qos)#set precedence 7 | Remark frames matching access-group 101 to precedence 7 |
| (config-pmap-c-qos)#exit | Exit out of policy-class-map mode |
| (config-pmap-qos)#exit | Exit out of Policy-map mode |
| (config)#interface xe2 | Enter interface mode. |
| (config-if)#ip address 20.1.1.1/24 | Assign IP Address on interface to 20.1.1.1 with mask 255.255.255.0 |
| (config-if)#service-policy type qos input pmap4 | Assign service-policy to interface on in-direction |

## Validation

Enter the commands listed in the sections below to confirm the configurations.

```
#show running-config qos
qos enable
!
qos statistics
!
class-map type qos cmap3
```

```
 match dscp af11
!
class-map type qos match-any cmap4
 match access-group 101
!
policy-map type qos pmap3
 class type qos cmap3
  set dscp ef
  exit
policy-map type qos pmap4
 class type qos cmap4
  set precedence network
  exit
!
interface xe2
 service-policy type qos input pmap4
!
interface xe3
 service-policy type qos input pmap3


#show class-map type qos

  Type qos class-maps
  ===================
      class-map type qos match-any class-default

      class-map type qos cmap3
         match dscp af11

      class-map type qos match-any cmap4
         match access-group 101



#show policy-map

Type qos policy-maps
====================

policy-map type qos pmap3
 class type qos cmap3
  set dscp ef

policy-map type qos pmap4
 class type qos cmap4
  set precedence network


Type queuing policy-maps
```

```
========================

policy-map type queuing default default-out-policy
 class type queuing default q0
  priority
 class type queuing default q1
  priority
 class type queuing default q2
  priority
 class type queuing default q3
  priority
 class type queuing default q4
  priority
 class type queuing default q5
  priority
 class type queuing default q6
  priority
 class type queuing default q7
priority

#show policy-map interface xe2


Interface xe2
Type Qos statistics status : enabled
--------------------------------
 Class-map (qos): cmap4 (match any)
 match access-group 101
 set precedence 7
      matched    : 375594046 packets, 25540397168 bytes

Service-policy (queuing) output: default-out-policy
--------------------------------
 Class-map (queuing): q0
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q1
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q2
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes
```

```
 Class-map (queuing): q3
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q4
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q5
 priority
      output     : 391282612 packets, 25042086656 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q6
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q7
 priority
      output     : 4 packets, 256 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q0
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q1
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q2
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q3
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes
```

```
Class-map (queuing): mc-q4
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q5
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q6
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q7
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Wred Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets

#show policy-map interface xe3


Interface xe3
Global statistics status : enabled
---------------------------------
 Class-map (qos): cmap3 (match all)
 match dscp af11
 set dscp 46
      matched    : 401497149 packets, 25695819008 bytes


Service-policy (queuing) output: default-out-policy
---------------------------------
 Class-map (queuing): q0
 priority level 1
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q1
 priority
      output     : 0 packets, 0 bytes
```

```
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q2
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q3
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q4
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q5
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q6
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q7
 priority
      output     : 382211720 packets, 25990396484 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q0
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q1
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q2
```

```
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q3
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q4
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q5
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q6
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q7
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Wred Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets
```

# CHAPTER 10 Policing Configuration

## Topology

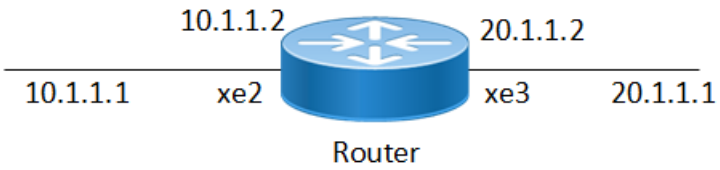



**Figure 10-11: Simple configuration of Policing**

## L2 Interface

Do the following to configure policing on an L2 interface.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#bridge 1 protocol mstp` | Configure bridge 1 as mstp aware. |
| `(config)#interface xe2` | Enter interface mode. |
| `(config-if)#switchport` | Configure xe2 as a Layer 2 port. |
| `(config-if)#bridge-group 1` | Associate bridge to an interface. |
| `(config-if)#switchport mode trunk` | Configure port as a trunk. |
| `(config-if)#switchport trunk allowed vlan all` | Allow all the VLANs on the xe2 interface. |
| `(config-if)#exit` | Exit the xe2 interface mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#class-map type qos 1234` | Enter Class-map mode |
| `(config-cmap-qos)#match cos 3` | Configure match criteria as CoS with Value 3 |
| `(config-cmap-qos)#exit` | Exit Class-map mode |
| `(config)#policy-map type qos 1234` | Enter policy-map mode |
| `(config-pmap-qos)#class type qos 1234` | Assign Class 1234 to Policy-map 1234 |
| `(config-pmap-c-qos))# police cir 2 mbps pir 3 mbps bc 2 mbytes be 2 mbytes conform transmit exceed set-cos-transmit 1 violate drop` | Police access-list 102 frames @ Committed information rate 2 mbps, committed bust 2 mbyte, peak information rate 3 mbps, peak burst 2 mbytes when traffic is > CIR and <= PIR then Set the class of service (CoS) field to 1, if traffic violate the action then drop the frames. |
| `(config-pmap-c-qos)#exit` | Exit out of policy-class-map mode |
| `(config-pmap-qos)#exit` | Exit out of Policy-map mode |
| `(config)#interface xe2` | Enter xe2 interface |
| `(config-if)#service-policy type qos input 1234` | Assign service-policy to interface on in-direction |
| `(config)#interface xe3` | Enter interface mode. |
| `(config-if)#switchport` | Configure xe3 as a Layer 2 port. |

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| | |
|---|---|
| (config-if)#bridge-group 1 | Associate bridge to an interface. |
| (config-if)#switchport mode trunk | Configure port as a trunk. |
| (config-if)#switchport trunk allowed vlan all | Allow all the VLANs on the xe3 interface. |
| (config-if)#exit | Exit the xe3 interface mode. |
| (config)#mac access-list 102 | Configure mac access-list with action |
| (config-mac-acl)#permit host 0000.0101.1010 host 0000.0202.2020 | Permit when frames matches Source mac address 00:00:01:01:10:10 and destination mac address 00:00:02:02:20:20 |
| (config-mac-acl)#exit | Exit mac access-list mode |
| (config)#class-map type qos match-any 2345 | Enter Class-map mode |
| (cmap-qos-match-any-mode)#match access-group 102 | Configure match criteria as access-group 102 |
| (cmap-qos-match-any-mode)#exit | Exit Class-map mode |
| (config)#policy-map type qos 2345 | Enter policy-map mode |
| (config-pmap-qos)#class type qos 2345 | Assign Class 2345 to Policy-map 2345 |
| (config-pmap-c-qos))# police cir 2 mbps pir 3 mbps bc 2 mbytes be 2 mbytes conform transmit exceed set-cos-transmit 1 violate drop | Police access-list 102 frames @ Committed information rate 2 mbps, committed bust 2 mbytes, peak information rate 3 mbps, peak burst 2 mbytes when traffic is > CIR and <= PIR, then set the class of service (CoS) field to 1, if traffic violate the action, then drop the frames. |
| (config-pmap-qos)#exit | Exit Policy-class mode |
| (config-pmap-qos)#exit | Exit Policy-map mode |
| (config)#interface xe3 | Enter interface mode. |
| (config-if)#service-policy type qos input 2345 | Assign service-policy 2345 to interface on in-direction |
| (config-if)#exit | Exit interface mode |

## Validation

Enter the commands below to confirm the configurations.

```
#show running-config qos
qos enable
!
qos statistics
!
class-map type qos 1234
 match cos 2
!
class-map type qos match-any 2345
 match access-group 102
!
policy-map type qos 1234
 class type qos 1234
  police cir 2 mbps pir 3 mbps bc 2 mbytes be 2 mbytes conform transmit exceed set-cos-transmit 1 violate drop
  exit
```

```
policy-map type qos 2345
 class type qos 2345
  police cir 2 mbps pir 3 mbps bc 2 mbytes be 2 mbytes conform transmit exceed set-cos-
transmit 1 violate drop
  exit
!
interface xe2
 service-policy type qos input 1234
!
interface xe3
 service-policy type qos input 2345
#show class-map type qos

  Type qos class-maps
  ===================
      class-map type qos 1234
         match cos 2

      class-map type qos match-any 2345
         match access-group 102

      class-map type qos match-any class-default

#show policy-map type qos

Type qos policy-maps
====================

policy-map type qos 1234
 class type qos 1234
  police colour-aware cir 1 mbps bc 1 mbytes conform set-cos-transmit 5 violate
drop
  exit

policy-map type qos 2345
 class type qos 2345
  police colour-aware cir 2 mbps pir 3 mbps bc 2 mbytes be 2 mbytes conform tran
smit exceed set-cos-transmit 1 violate drop
  exit
#
#show policy-map interface xe2


Interface xe2
Global statistics status : enabled


Service-policy (qos) input     : 1234
--------------------------------
 Class-map (qos): 1234 (match all)
 match cos 3
```

```
 police cir 2 mbps pir 3 mbps bc 2 mbytes be 2 mbytes conform transmit exceed set-cos-
transmit 1 violate drop
      matched    : 7419394 packets, 504519132 bytes
      dropped    : 7409793 packets, 503866264 bytes


Service-policy (queuing) output: default-out-policy
---------------------------------
 Class-map (queuing): q0
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q1
 priority
      output     : 7222 packets, 491096 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q2
 priority
      output     : 14444 packets, 982192 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q3
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q4
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q5
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q6
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes
```

```
 Class-map (queuing): q7
 priority
      output     : 2 packets, 246 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q0
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q1
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q2
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q3
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q4
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q5
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q6
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q7
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Wred Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
```

```
 red    : 0 packets


#show policy-map interface xe3


Interface xe3
Global statistics status : enabled


Service-policy (qos) input     : 2345
--------------------------------
 Class-map (qos): 2345 (match any)
 match access-group 102
 police colour-aware cir 2 mbps pir 3 mbps bc 2 mbytes be 2 mbytes conform trans
mit exceed set-cos-transmit 1 violate drop
      matched    : 16218780 packets, 1102879420 bytes


Service-policy (queuing) output: default-out-policy
--------------------------------
 Class-map (queuing): q0
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q1
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q2
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q3
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q4
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes
```

```
 Class-map (queuing): q5
 priority
      output     : 18527 packets, 1259836 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q6
 priority
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q7
 priority
      output     : 5 packets, 615 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q0
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q1
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q2
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q3
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q4
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q5
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q6
```

```
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q7
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


Wred Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets
```

# CHAPTER 11 Bandwidth Configuration

This chapter contains a complete sample of configuring Bandwidth.

## Topology

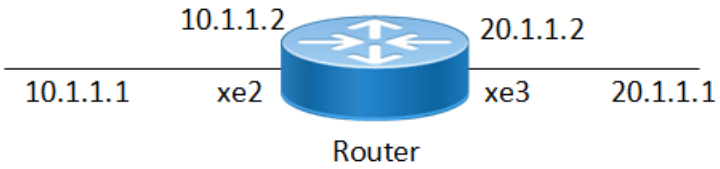



**Figure 11-12: Simple configuration of Bandwidth**

## L2/L3 Interface

The following steps describe how to configure bandwidth.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#policy-map type queuing default P1` | Configure policy-map of type queuing as default with name P1, and enter into policy-map mode |
| `(config-pmap-que)#class type queuing default q2` | Configure class-map of type queuing as default for q0 and enter into class-map mode |
| `(config-pmap-c-que)#bandwidth percent 70` | Configure minimum bandwidth as 70 percent of total bandwidth available on interface |
| `(config-pmap-c-que)#exit` | Exit out of policy-class mode |
| `(config-pmap-que)#class type queuing default q3` | Attach class q3 to Policy-map P1 |
| `(config-pmap-c-que)#bandwidth percent 30` | Configure minimum bandwidth as 30 percent of remaining bandwidth available on interface after all allocations are done. |
| `(config-pmap-c-que)#exit` | Exit out of policy-class mode |
| `(config-pmap-que)#exit` | Exit out of Policy-map mode |
| `(config)#class-map type qos c1` | Enter Class-map mode |
| `(config-cmap-qos)#match dscp 10` | Configure match criteria as dscp 10 |
| `(config-cmap-qos)#match cos 3` | Configure match criteria as cos 3 |
| `(config-cmap-qos)#exit` | Exit out of class-map mode |
| `(config)#class-map type qos c2` | Enter Class-map mode |
| `(config-cmap-qos)#match dscp 22` | Configure match criteria as dscp 22 |
| `(config-cmap-qos)#match cos 4` | Configure match criteria as cos 4 |
| `(config-cmap-qos)#exit` | Exit out of class-map mode |

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| | |
|---|---|
| (config)#policy-map type qos pmap1 | Configure policy-map with name pmap1 and enter policy-map mode |
| (config-pmap-qos)#class type qos c1 | Assign Class c1 to Policy-map pmap1 |
| (config-pmap-c-qos)#set precedence 2 | Set precedence to value 2 |
| (config-pmap-c-qos)#exit | Exit out of pmap-c mode |
| (config-pmap-qos)#class type qos c2 | Assign Class c2 to Policy-map pmap1 |
| (config-pmap-c-qos)#set cos 2 | Set cos to value 2 |
| (config-pmap-c-qos)#exit | Exit out of pmap-c mode |
| (config)#interface xe3 | Enter interface mode |
| (config-if)#service-policy type queuing output P1 | Attach service-policy P1 of type queuing on out direction |
| (config-if)#exit | Exit out of interface mode |
| (config)#interface xe2 | Enter interface mode |
| (config-if)#service-policy type qos input pmap1 | Attach service-policy pmap1 of type qos on in direction |
| (config-if)#exit | Exit out of interface mode |
| (config)#bridge 1 protocol rstp vlan-bridge | Specify VLAN for bridge 1. |
| (config)#vlan database | Enter the VLAN configuration mode. |
| (config-vlan)#vlan 2-3 bridge 1 state enable | Enable VLAN (2-3) on bridge 1. Specifying the enable state. |
| (config-vlan)#exit | Exit the VLAN configuration mode. |
| (config)#interface vlan1.2 | Enter interface mode. |
| (config-if)# ip address 10.1.1.2/24 | Configure the IP address. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface vlan1.3 | Enter interface mode. |
| (config-if)# ip address 20.1.1.1/24 | Configure the IP address. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface xe2 | Enter interface mode. |
| (config-if)#switchport | Configure xe2 as a Layer 2 port. |
| (config-if)#bridge-group 1 | Associate the interface with bridge group 1. |
| (config-if)#switchport mode trunk | Configure port as a trunk. |
| (config-if)#switchport trunk allowed vlan all | Allow all the VLANs on the xe3 interface. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface xe3 | Enter interface mode. |
| (config-if)#switchport | Configure xe3 as a Layer 2 port. |
| (config-if)#bridge-group 1 | Associate the interface with bridge group 1. |
| (config-if)#switchport mode trunk | Configure port as a trunk. |
| (config-if)#switchport trunk allowed vlan all | Allow all the VLANs on the xe3 interface. |
| (config-if)#exit | Exit the interface mode. |

## Validation

Enter the commands listed in the sections below to confirm the configurations.

```
#show running-config qos
qos enable
!
qos statistics
!
class-map type qos c1
 match dscp af11
 match cos 2
!
class-map type qos c2
 match dscp af23
 match cos 4
!
policy-map type qos pmap1
 class type qos c1
  set precedence
  immediate
  exit
 class type qos
  c2
   set cos 2
   exit

!
policy-map type queuing default P1
class type queuing default q1
priority
  bandwidth percent 70
  exit
 class type queuing q2
priority
  bandwidth percent 30
  exit
!
!
!
interface xe2
 service-policy type qos input pmap1
!
interface xe3
 service-policy type queuing output P1
!

#show policy-map interface xe2

Interface xe2

Type QoS statistics status : enabled

Class-map (qos): c1 (match all)
```

```
 match dscp af11
 match cos 3
 set precedence 2

Class-map (qos): c2 (match all)
 match dscp af23
 match cos 4
 set cos 2


Type Queuing policy-map : default-out-policy

Class-map (queuing): q0
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q1
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q2
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q3
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q4
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q5
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q6
 priority
      output              : 6 packets, 724 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q7
 priority
      output              : 0 packets, 0 bytes
```

```
      dropped             : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 1 packets, 90 bytes
      dropped      : 0 packets, 0 bytes

Wred/Tail Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets


#show policy-map interface xe3

Interface xe3
Type Queuing policy-map : P1

Class-map (queuing): q0
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes
```

```
Class-map (queuing): q1
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q2
 priority
 bandwidth percent 70
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q3
 priority
 bandwidth percent 30
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q4
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q5
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q6
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q7
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
```

```
Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Wred/Tail Drop Statistics :
-----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets
```

# CHAPTER 12 Shaping Configuration

This chapter contains a complete sample of configuring Shaping.

## Topology

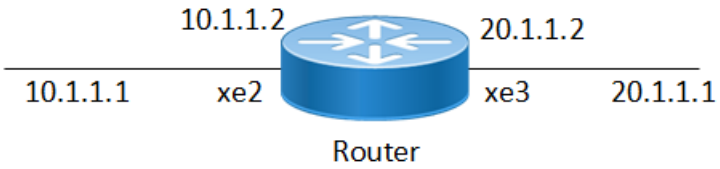



**Figure 12-13: Simple configuration of Shaping**

## L2/L3 Interface

The following steps describe how to configure Shaping.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#policy-map type queuing default P1` | Configure policy-map of type queuing with name P1, and enter into policy-map mode |
| `(config-pmap-que)#class type queuing default q0` | Configure class type queuing of type default and enter into class map configuration mode |
| `(config-pmap-c-que)#shape 200 mbps` | Configure shaping to 200 mbps |
| `(config-pmap-c-que)#exit` | Exit out of policy-class mode |
| `(config-pmap-que)#exit` | Exit out of Policy-map mode |
| `(config)#class-map type qos c1` | Enter Class-map mode |
| `(config-cmap-qos)#match dscp 10` | Configure match criteria as dscp 10 |
| `(config-cmap-qos)#match cos 3` | Configure match criteria as cos 3 |
| `(config-cmap-qos)#exit` | Exit out of class-map mode |
| `(config)#class-map type qos c2` | Enter Class-map mode |
| `(config-cmap-qos)#match dscp 22` | Configure match criteria as dscp 22 |
| `(config-cmap-qos)#match cos 4` | Configure match criteria as cos 4 |
| `(config-cmap-qos)#exit` | Exit out of class-map mode |
| `(config)#policy-map type qos pmap1` | Configure policy-map with name pmap1 and enter policy-map mode |
| `(config-pmap-qos)#class type qos c1` | Assign Class c1 to Policy-map pmap1 |
| `(config-pmap-c-qos)#set queue 2` | Set queue 2 for frames with either cos 3 or dscp 10 |
| `(config-pmap-c-qos)#exit` | Exit out of pmap-c mode |
| `(config-pmap-qos)#class type qos c2` | Assign Class c2 to Policy-map pmap1 |

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| | |
|---|---|
| (config-pmap-c-qos)#set queue 3 | Set queue 3 for frames with either cos 4 or dscp 22 |
| (config-pmap-c-qos)#exit | Exit out of pmap-c mode |
| (config-pmap-qos)#exit | Exit policy-map mode |
| (config)#interface xe3 | Enter interface mode |
| (config-if)#service-policy type queuing output P1 | Attach service-policy P1 of type queuing on out direction |
| (config-if)#exit | Exit out of interface mode |
| (config)#interface xe2 | Enter interface mode |
| (config-if)#service-policy type qos input pmap1 | Attach service-policy pmap1 of type qos on in direction |
| (config-if)#exit | Exit out of interface mode |
| (config)#bridge 1 protocol rstp vlan-bridge | Specify VLAN for bridge 1. |
| (config)#vlan database | Enter the VLAN configuration mode. |
| (config-vlan)#vlan 2-3 bridge 1 state enable | Enable VLAN (2-3) on bridge 1. Specifying the enable state. |
| (config-vlan)#exit | Exit the VLAN configuration mode. |
| (config)#interface vlan1.2 | Enter interface mode. |
| (config-if)# ip address 10.1.1.2/24 | Configure the IP address. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface vlan1.3 | Enter interface mode. |
| (config-if)# ip address 20.1.1.1/24 | Configure the IP address. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface xe2 | Enter interface mode. |
| (config-if)#switchport | Configure xe2 as a Layer 2 port. |
| (config-if)#bridge-group 1 | Associate the interface with bridge group 1. |
| (config-if)#switchport mode trunk | Configure port as a trunk. |
| (config-if)#switchport trunk allowed vlan all | Allow all the VLANs on the xe3 interface. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface xe3 | Enter interface mode. |
| (config-if)#switchport | Configure xe3 as a Layer 2 port. |
| (config-if)#bridge-group 1 | Associate the interface with bridge group 1. |
| (config-if)#switchport mode trunk | Configure port as a trunk. |
| (config-if)#switchport trunk allowed vlan all | Allow all the VLANs on the xe3 interface. |
| (config-if)#exit | Exit the interface mode |

# Validation

Enter the commands listed in the sections below to confirm the configurations.

```
#show policy-map type queuing

Type queuing policy-maps
========================
```

```
policy-map type queuing default P1
 class type queuing default q0
  shape 200 mbps
  priority
 class type queuing default q1
  priority
 class type queuing default q2
  priority
 class type queuing default q3
  priority
 class type queuing default q4
  priority
 class type queuing default q5
  priority
 class type queuing default q6
  priority
 class type queuing default q7
  priority

policy-map type queuing default default-out-policy
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit


#show policy-map type qos
Type qos policy-maps
====================
```

```
policy-map type qos pmap1
  class type qos c1
    set queue 2
    exit
  class type qos c2
    set queue 3
    exit

#show class-map type queuing

  Type queuing class-maps
  =======================
     class-map type queuing q0

  class-map type queuing q1

  class-map type queuing q2

  class-map type queuing q3

  class-map type queuing q4

  class-map type queuing q5

  class-map type queuing q6

      class-map type queuing q7

#show class-map type qos
  Type qos class-maps
   ====================
   class-map type qos match-all c1
    match cos 3
    match dscp af11

   class-map type qos match-all c2
    match cos 4
    match dscp af23

#show queuing interface xe2

Egress Queuing for Ethernet xe2 [System]
------------------------------------------------------------------------------------------
-------------
L0              L1              L2              Group  PrioLevel   Shape          Bandwidth
------------------------------------------------------------------------------------------
-------------
q0                                                -      High        200 mbps       -
q1                                                -      High        -              -
q2                                                -      High        -              -
q3                                                -      High        -              -
```

```
q4                                                  -       High        -               -
q5                                                  -       High        -               -
q6                                                  -       High        -               -
q7                                                  -       High        -               -

#show queuing interface xe3

Egress Queuing for Ethernet xe3 [System]
------------------------------------------------------------------------------------------
L0              L1              L2              Group  PrioLevel   Shape          Bandwidth
------------------------------------------------------------------------------------------
q0                                                  -       High        -               -
q1                                                  -       High        -               -
q2                                                  -       High        -               -
q3                                                  -       High        -               -
q4                                                  -       High        -               -
q5                                                  -       High        -               -
q6                                                  -       High        -               -
q7                                                  -       High        -               -

#show policy-map interface xe3

Interface xe3
Type QoS statistics status : enabled

Class-map (qos): c1 (match all)
 match dscp af11
 match cos 3
 set queue 2

Class-map (qos): c2 (match all)
 match dscp af23
 match cos 4
 set queue 3


Type Queuing policy-map : default-out-policy

Class-map (queuing): q0
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q1
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q2
 priority
```

```
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q3
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q4
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q5
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q6
 priority
      output              : 6 packets, 724 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q7
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
```

```
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 1 packets, 90 bytes
      dropped      : 0 packets, 0 bytes

Wred/Tail Drop Statistics :
-----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets
```

# CHAPTER 13 Scheduling Configuration

This chapter contains a complete sample of configuring weight, strict priority on queues and weight between uc and mc queue.

## Topology

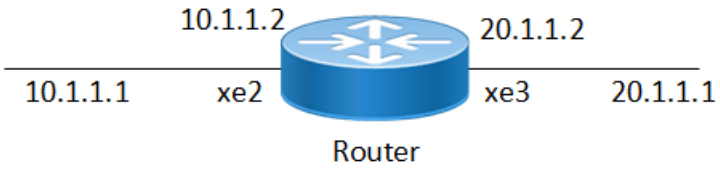



**Figure 13-14: Simple configuration of Priority**

## Configuring Weight on L2 /L3 Interface

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#policy-map type queuing default default-out-policy` | Enter policy-map type queueing default. |
| `(config-pmap-que-def)#class type queuing default q0` | Enter policy-class-map mode. |
| `(config-pmap-c-que-def)#wrr-queue weight 2` | Modify strict queue to wrr-queue with weight 2. |
| `(config-pmap-c-que-def)#exit` | Exit from policy-class-map mode. |
| `(config-pmap-que-def)#exit` | Exit from policy-map mode. |
| `(config)#exit` | Exit configure mode. |

## Validation

Enter the commands listed in the sections below to confirm the configurations.

```
#show policy-map type queuing

Type queuing policy-maps
========================

policy-map type queuing default default-out-policy
 class type queuing default q0
  wrr-queue weight 2
 class type queuing default q1
  priority
 class type queuing default q2
  priority
```

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```
     class type queuing default q3
      priority
     class type queuing default q4
      priority
     class type queuing default q5
      priority
     class type queuing default q6
      priority
     class type queuing default q7
      priority
```

## Configuring Strict priority on L2 /L3 Interface

| | |
|---|---|
| #configure terminal | Enter configure mode. |
| (config)#qos enable | Enable QoS globally. |
| (config)#qos statistics | Enable QoS statistics. |
| (config)#policy-map type queuing default p3 | Enter policy-map type queueing default. |
| (config-pmap-que-def)#class type queuing default q0 | Enter policy-class-map mode. |
| (config-pmap-c-que-def)#priority | Configure priority for q0. |
| (config-pmap-c-que-def)#exit | Exit from policy-class-map mode. |
| (config-pmap-que-def)#exit | Exit from policy-map mode. |
| (config)#interface xe2 | Enter interface mode. |
| (config-if)#service-policy type queuing output p3 | Attach policy-map of type queuing on egress interface |
| (config)#exit | Exit configure mode. |

## Validation

Enter the commands listed in the sections below to confirm the configurations.

```
# show running-config qos
qos enable
qos statistics
!
!
policy-map type queuing default p3
 class type queuing default q0
  priority
  exit
!
interface xe2
 service-policy type queuing output p3
!

# show policy-map type queuing

Type queuing policy-maps
========================
```

```
policy-map type queuing default default-out-policy
 class type queuing default q0
  priority
 class type queuing default q1
  priority
 class type queuing default q2
  priority
 class type queuing default q3
  priority
 class type queuing default q4
  priority
 class type queuing default q5
  priority
 class type queuing default q6
  priority
 class type queuing default q7
  priority

policy-map type queuing default p3
 class type queuing default q0
  priority
 class type queuing default q1
  priority
 class type queuing default q2
  priority
 class type queuing default q3
  priority
 class type queuing default q4
  priority
 class type queuing default q5
  priority
 class type queuing default q6
  priority
 class type queuing default q7
  priority

OcNOS#
```

## Configuring weight between unicast and multicast queues

Use the following configuration to set weights between unicast and multicast traffic of same traffic class.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)# set qos wrr uc 3 non-uc 1` | Schedule unicast and multicast traffic in 3:1 |
| `(config)#exit` | Exit configure mode. |

Note: Unicast weight should be always higher than multicast weight (except on Trident+ platforms). Between unicast and multicast traffic of different traffic class, scheduling will be as per configuration given in the queuing policy-map attached on the interface.

This hardware limitation is for Trident3 platform which is scheduled between unicast and multicast that requires the unicast weight to be higher than the multicast queues weights.

## Validation

Enter the commands listed in the sections below to confirm the configurations.

```
#sh run qos
qos enable
qos statistics
set qos wrr uc 3 non-uc 1
!

#show int cou queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+-------------+--------------------+--------+-----------------+-------------------+----
-------------+-------------------+
|  Interface  |   Queue/Class-map  | Q-Size |     Tx pkts     |      Tx bytes     |
Dropped pkts   |   Dropped bytes   |
+-------------+--------------------+--------+-----------------+-------------------+----
-------------+-------------------+
 ce1/1       q1             (E) 373152   1256            1256000           15245
15241000
 ce1/1       mc-q1           (E) 92352    418             418000           16048
16045000
 ce24/1       pg-q0           (I) 419536   NA              NA               NA
NA
 ce24/1       pg-q1           (I) 468000   NA              NA               NA
NA

Validation
Enter the commands listed in the sections below to confirm the configurations.
#show policy-map type queuingdefault default-out-policy Type queuing policy-maps
========================

policy-map type queuing default default-out-policy class type queuing default q0
wrr-queue weight 2
bandwidth percent 1 exit
class type queuing default q1 priority level 1
bandwidth percent 1 exit
class type queuing default q2 priority level 1


bandwidth percent 1 exit
class type queuing default q3 priority level 1
bandwidth percent 1 exit
class type queuing default q4 priority level 1
bandwidth percent 1 exit
```

```
class type queuing default q5 priority level 1
bandwidth percent 1 exit
class type queuing default q6 priority level 1
bandwidth percent 1 exit
class type queuing default q7 priority level 1
bandwidth percent 1 exit


#show queuing interface xe2

Egress Queuing for Ethernet xe2 [System]

L0  L1  L2  GroupPrioLevelShape Bandwidth


q0  -   -   -
-
q1  -   High-
-
q2  -   High-
-
q3  -   High-
-
q4  -   High-
-
q5  -   High-
-
q6  -   High-
-
q7  -   High-
-
#
```

Note: Unicast weight should be always higher than multicast weight. Between unicast and multicast traffic of different traffic class, scheduling will be as per configuration given in the queueing policy-map attached on the interface.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)# set qos wrr uc 1 non-uc 1` | Schedule unicast and multicast traffic in 1:1 |
| `(config)#exit` | Exit configure mode. |

## Validation

Enter the commands listed in the sections below to confirm the configurations.

```
#show running-configuration qos
qos enable
qos statistics
set qos wrr uc 1 non-uc 1
```

```
!

#show policy-map

Type queuing policy-maps
========================

policy-map type queuing default default-out-policy
 class type queuing default q0
  priority
 class type queuing default q1
  priority
 class type queuing default q2
  priority
 class type queuing default q3
  priority
 class type queuing default q4
  priority
 class type queuing default q5
  priority
 class type queuing default q6
  priority
 class type queuing default q7
  priority
#show interface counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+-------------+--------------------+--------+-----------------+-------------------+----
-------------+-------------------+
|  Interface  |   Queue/Class-map  | Q-Size |     Tx pkts     |      Tx bytes     |
Dropped pkts   |   Dropped bytes   |
+-------------+--------------------+--------+-----------------+-------------------+----
-------------+-------------------+
 cpu          bpdu            (E) 0       1               68                0
0
 ce1/1        q1              (E) 424320   0              0                16817
16814000
 ce1/1        q7              (E) 0       1               64                0
0
 ce1/1        mc-q2           (E) 102336   1710           1710000           15059
15055000
 ce24/1       q7              (E) 0       1               64                0
0
 ce24/1       pg-q1           (I) 509600   NA             NA                NA
NA
 ce24/1       pg-q2           (I) 103584   NA             NA                NA
NA
By default, default-out-policy with priority on all queues is applied on ce1/1, hence
receiving only q2 multicast traffic

#show interface counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
```

```
+-------------+--------------------+--------+-----------------+--------------------+----
-------------+-------------------+
|  Interface  |   Queue/Class-map  | Q-Size |     Tx pkts     |      Tx bytes      |
Dropped pkts   |   Dropped bytes   |
+-------------+--------------------+--------+-----------------+--------------------+----
-------------+-------------------+
 cpu          bpdu            (E) 0       1               68                0
0
 ce1/1        q1             (E) 424320   816             816000            15279
15276000
 ce1/1        q7              (E) 0       1               64                0
0
 ce1/1        mc-q1          (E) 106080   816             816000            15229
15226000
 ce24/1       q7              (E) 0       1               64                0
0
 ce24/1       pg-q1           (I) 513344   NA              NA                NA
NA
```

| | |
|---|---|
| #configure terminal | Enter configure mode. |
| (config)#qos enable | Enable QoS globally. |
| (config)#qos statistics | Enable QoS statistics. |
| (config)#policy-map type queuing default default-out-policy | Enter policy-map type queueing default. |
| (config-pmap-que-def)#class type queuing default q0 | Enter policy-class-map mode. |
| (config-pmap-c-que-def)#wrr-queue weight 2 | Modify strict queue to wrr-queue with weight 2. |
| (config-pmap-c-que-def)# class type queuing default q1 | |
| (config-pmap-c-que-def)# wrr-queue weight 2 | |
| (config-pmap-c-que-def)# class type queuing default q2 | |
| (config-pmap-c-que-def)#wrr-queue weight 4 | |
| (config-pmap-c-que-def)#exit | Exit from policy-class-map mode. |
| (config-pmap-que-def)#exit | Exit from policy-map mode. |
| (config)#exit | Exit configure mode. |

## Validation

```
#show policy-map

Type queuing policy-maps
========================

policy-map type queuing default default-out-policy
 class type queuing default q0
wrr-queue weight 2
 class type queuing default q1
wrr-queue weight 2
```

```
 class type queuing default q2
wrr-queue weight 4
 class type queuing default q3
  priority
 class type queuing default q4
  priority
 class type queuing default q5
  priority
 class type queuing default q6
  priority
 class type queuing default q7
  priority

#show interface counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+-------------+--------------------+--------+-----------------+-------------------+----
-------------+-------------------+
|  Interface  |   Queue/Class-map  | Q-Size |     Tx pkts     |      Tx bytes     |
Dropped pkts   |   Dropped bytes   |
+-------------+--------------------+--------+-----------------+-------------------+----
-------------+-------------------+
 cpu          bpdu            (E) 0       1               68                0
0
 ce1/1        q1             (E) 421824   312             312000            8957
8954000
 ce1/1        q7              (E) 0       1               64                0
0
 ce1/1        mc-q2          (E) 106080   624             624000            8607
8592000
 ce24/1       q7              (E) 0       1               64                0
0
 ce24/1       pg-q1           (I) 411008   NA              NA                NA
NA
 ce24/1       pg-q2           (I) 106080   NA              NA                NA
NA
```

# CHAPTER 14 WRED Configuration

This chapter contains a complete sample of configuring WRED.

## Topology

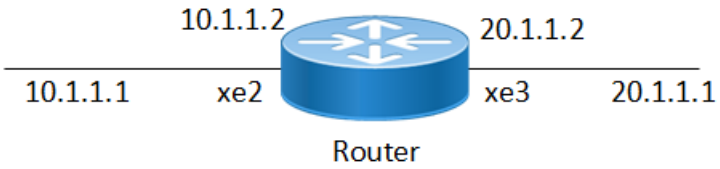



**Figure 14-15: Simple configuration of WRED**

## L2/L3 Interface

The following steps describe how to configure WRED.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#class-map type qos match-all C1` | Configure class-map of type qos with name C1, and enter into class-map mode |
| `(config-cmap-que)#match cos 1` | Configure match cos value 1 |
| `(config-cmap-que)#exit` | Exit out of class-map mode |
| `(config)#policy-map type qos p1` | Configure plicy-map of type qos with name p1, and enter into policy-map mode |
| `(config-cmap-que)#class type qos C1` | Enter class-map configuration mode |
| `(config-cmap-que)# police cir 100 mbps pir 200 mbpsexit` | Configure police rate of cir 100 mbps and pir 200 mbpsExit out of class-map mode |
| `(config-pmap-c-que)#exit` | Exit out of policy-class mode |
| `(config-pmap-qos)#exi` | Exit out of policy-class mode |
| `(config)#policy-map type queuing default p3` | Configure policy-map of type queuing with name p3, and enter into policy-map mode |
| `(config-cmap-que)#class type queuing default q0` | Enter class type of type queuing default configuration mode for q0 |
| `(config-pmap-c-que-def)#wrr-queue weight 10` | Configure WRR weight of 10 |
| `(config-pmap-c-que-def)#random-detect min-threshold 50 max-threshold 80 kbytes` | Configure WRED for minimum threshold of 50 kbytest and maximum threshold of 80 kbytes of queue size. |
| `(config-pmap-c-que-def)#exit` | Exit out of class configuration mode |
| `(config)#interface xe3` | Enter interface mode |
| `(config-if)#service-policy type queuing output P3` | Attach service-policy p3 of type queuing on out direction |
| `(config-if)#exit` | Exit out of interface mode |
| `(config)#interface xe2` | Enter interface mode |

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| | |
|---|---|
| (config-if)#service-policy type qos input p1 | Attach service-policy p1 of type qos on in direction |
| (config-if)#exit | Exit out of interface mode |
| (config)#bridge 1 protocol rstp vlan-bridge | Specify VLAN for bridge 1. |
| (config)#vlan database | Enter the VLAN configuration mode. |
| (config-vlan)#vlan 2-3 bridge 1 state enable | Enable VLAN (2-3) on bridge 1. Specifying the enable state. |
| (config-vlan)#exit | Exit the VLAN configuration mode. |
| (config)#interface vlan1.2 | Enter interface mode. |
| (config-if)# ip address 10.1.1.2/24 | Configure the IP address. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface vlan1.3 | Enter interface mode. |
| (config-if)# ip address 20.1.1.1/24 | Configure the IP address. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface xe2 | Enter interface mode. |
| (config-if)#switchport | Configure xe2 as a Layer 2 port. |
| (config-if)#bridge-group 1 | Associate the interface with bridge group 1. |
| (config-if)#switchport mode trunk | Configure port as a trunk. |
| (config-if)#switchport trunk allowed vlan all | Allow all the VLANs on the xe3 interface. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface xe3 | Enter interface mode. |
| (config-if)#switchport | Configure xe3 as a Layer 2 port. |
| (config-if)#bridge-group 1 | Associate the interface with bridge group 1. |
| (config-if)#switchport mode trunk | Configure port as a trunk. |
| (config-if)#switchport trunk allowed vlan all | Allow all the VLANs on the xe3 interface. |
| (config-if)#exit | Exit the interface mode. |

## Validation

Enter the commands below to confirm the configurations.

```
#show running-config qos
os enable
qos statistics
!
class-map type qos match-all 1
!
class-map type qos match-all C1
 match cos 1
!
policy-map type qos p1
 class type qos C1
  police cir 100 mbps pir 200 mbps
  exit
!
!
```

```
policy-map type queuing default p3
 class type queuing default q0
  wrr-queue weight 10
  random-detect min-threshold 50 max-threshold 80 kbytes drop-probability 80
  exit
!
interface xe2
 service-policy type qos input p1
!
interface xe3
service-policy type queuing output p3

#show policy-map interface xe2

Interface xe2
Type QoS statistics status : enabled
Class-map (qos): C1 (match all)
 match cos 1
 police cir 100 mbps pir 200 mbps


Type Queuing policy-map : default-out-policy

Class-map (queuing): q0
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q1
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q2
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q3
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q4
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q5
 priority
```

```
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q6
 priority
      output              : 6 packets, 724 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q7
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 1 packets, 90 bytes
      dropped      : 0 packets, 0 bytes

Wred/Tail Drop Statistics :
-----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets
```

```
#show policy-map interface xe3

Interface xe3
Type Queuing policy-map : p3
Class-map (queuing): q0
 wrr-queue weight 10
 random-detect min-threshold 50 kbytes max-threshold 80 kbytes drop-probability 80
weight 8
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q1
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q2
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q3
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q4
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q5
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q6
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q7
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes
Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
```

```
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Wred/Tail Drop Statistics :
-----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets

#show queuing interface xe1/2

Egress Queuing for Ethernet ce2/1 [System]
------------------------------------------------------------------------------------------
L0             L1             L2             Group  PrioLevel   Shape          Bandwidth
------------------------------------------------------------------------------------------
q0                                               -      High        -              -
q1                                               -      High        -              -
q2                                               -      High        -              -
q3                                               -      High        -              -
q4                                               -      High        -              -
q5                                               -      High        -              -
q6                                               -      High        -              -
q7                                               -      High        -              -
```

# CHAPTER 15 Tail-Drop Configuration

## Topology

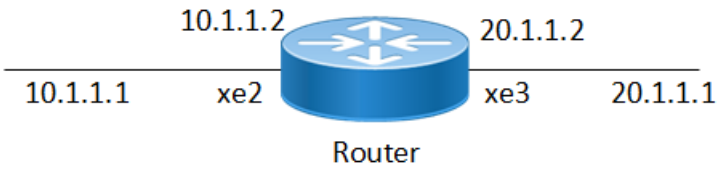



**Figure 15-16: Simple configuration of Tail-Drop**

## Configuring Tail-Drop

The following steps describe how to configure Tail-Drop.

### Configuration on L2/L3 Interfaces

Do the following to configure Tail-Drop on a queue.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#class-map type qos match-all C1` | Configure class-map of type qos with name C1, and enter into class-map mode |
| `(config-cmap-que)#match cos 1` | match cos value 1 |
| `(config-cmap-qos)#exit` | Exit out of class-map |
| `(config)#policy-map type qos p1` | Enter policy-map configuration mode of type qos |
| `(config-cmap-que)#class type qos C1` | Enter class-map configuration mode |
| `(config-cmap-que)# police cir 100 mbps pir 200 mbps` | Configure police rate of cir 100 mbps and pir 200 mbps |
| `(config-pmap-c-que)#exit` | Exit out of policy-class mode |
| `(config-pmap-qos)#exit` | Exit out of policy-class mode |
| `(config)#policy-map type queuing default p3` | Configure policy-map of type queuing with name p3 and enter into policy-map mode |
| `(config-cmap-que)#class type queuing default q1` | Enter class type of type queuing default configuration mode for q1 |
| `(config-pmap-c-que)#shape percent 20` | Configure shaping to 20 percent of bandwidth available on interface |
| `(config-pmap-c-que)#exit` | Exit out of policy-class mode |
| `(config-pmap-que)#class type queuing default q2` | Enter class type of type queuing default configuration mode for q2 |
| `(config-pmap-c-que)#bandwidth 25000 kbps` | Configure bandwidth to 25000 kbps |

| | |
|---|---|
| (config-pmap-c-que)#queue-limit 99 packets | Configure tail-drop to 99 packets |
| (config-pmap-c-que)#exit | Exit out of policy-class mode |
| (config-pmap-que)#class type queuing default q3 | Enter class type of type queuing default configuration mode for q3 |
| (config-pmap-c-que)#queue-limit 101 packets | Configure tail-drop to 101 packets |
| (config-pmap-c-que)#exit | Exit out of policy-class mode |
| (config-pmap-que)#exit | Exit out of policy-map mode |
| (config)#interface xe2 | Enter interface mode |
| (config-if)#service-policy type queuing output p3 | Attach service-policy p3 of type queuing on out direction |
| (config-if)#exit | Exit out of interface mode |
| (config)#interface xe3 | Enter interface mode |
| (config-if)#service-policy type qos input p1 | Attach service-policy p1 of type qos on in direction |
| (config-if)#exit | Exit out of interface mode |
| (config)#bridge 1 protocol rstp vlan-bridge | Specify VLAN for bridge 1. |
| (config)#vlan database | Enter the VLAN configuration mode. |
| (config-vlan)#vlan 2-3 bridge 1 state enable | Enable VLAN (2-3) on bridge 1. Specifying the enable state. |
| (config-vlan)#exit | Exit the VLAN configuration mode. |
| (config)#interface vlan1.2 | Enter interface mode. |
| (config-if)# ip address 10.1.1.2/24 | Configure the IP address. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface vlan1.3 | Enter interface mode. |
| (config-if)# ip address 20.1.1.1/24 | Configure the IP address. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface xe2 | Enter interface mode. |
| (config-if)#switchport | Configure xe2 as a Layer 2 port. |
| (config-if)#bridge-group 1 | Associate the interface with bridge group 1. |
| (config-if)#switchport mode trunk | Configure port as a trunk. |
| (config-if)#switchport trunk allowed vlan all | Allow all the VLANs on the xe3 interface. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface xe3 | Enter interface mode. |
| (config-if)#switchport | Configure xe3 as a Layer 2 port. |
| (config-if)#bridge-group 1 | Associate the interface with bridge group 1. |
| (config-if)#switchport mode trunk | Configure port as a trunk. |
| (config-if)#switchport trunk allowed vlan all | Allow all the VLANs on the xe3 interface. |
| (config-if)#exit | Exit the interface mode. |

## Validation

Enter the commands below to confirm the configurations.

```
#show running-config qos
```

```
qos enable
!
qos statistics
!
class-map type qos match-all C1
 match cos 1
!
policy-map type qos p1
 class type qos C1
  police cir 100 mbps pir 200 mbps
  exit
!
!
policy-map type queuing default p3
 class type queuing default q1
  shape percent 20
  priority
  exit
 class type queuing default q2
  priority
  queue-limit 99 packets
  bandwidth 25000 kbps
  exit
 class type queuing default q3
  priority
  queue-limit 101 packets
  exit

#show class-map
Type qos class-maps
  ====================
      class-map type qos match-all C1
         match cos 1

      class-map type qos match-any class-default


  Type queuing class-maps
  =======================
      class-map type queuing q0

      class-map type queuing q1

      class-map type queuing q2

      class-map type queuing q3

      class-map type queuing q4

      class-map type queuing q5
```

```
      class-map type queuing q6

      class-map type queuing q7


  Type Vlan-Queuing class-maps


#show policy-map

Type qos policy-maps
====================

policy-map type qos p1
 class type qos C1
  police cir 100 mbps pir 200 mbps


Type queuing policy-maps
========================

policy-map type queuing default default-out-policy
 class type queuing default q0
  priority
 class type queuing default q1
  priority
 class type queuing default q2
  priority
 class type queuing default q3
  priority
 class type queuing default q4
  priority
 class type queuing default q5
  priority
 class type queuing default q6
  priority
 class type queuing default q7
  priority

policy-map type queuing default p3
 class type queuing default q0
  priority
 class type queuing default q1
  shape percent 20
  priority
 class type queuing default q2
  priority
  queue-limit 99 packets
  bandwidth 25000 kbps
```

```
 class type queuing default q3
  priority
  queue-limit 101 packets
 class type queuing default q4
  priority
 class type queuing default q5
  priority
 class type queuing default q6
  priority
 class type queuing default q7
  priority

#show policy-map interface xe2

QoS statistics status : enabled

Class-map (qos): C1 (match all)
 match cos 1
 police cir 100 mbps pir 200 mbps


Type Queuing policy-map : default-out-policy

Class-map (queuing): q0
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q1
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q2
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q3
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q4
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q5
 priority
```

```
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q6
 priority
      output              : 6 packets, 724 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q7
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 1 packets, 90 bytes
      dropped      : 0 packets, 0 bytes

Wred/Tail Drop Statistics :
-----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets
```

```
#show policy-map interface xe3

Type Queuing policy-map : p3

Class-map (queuing): q0
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q1
 shape percent 20
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q2
 priority
 queue-limit 99 packets
 bandwidth 25000 kbps
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q3
 priority
 queue-limit 101 packets
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q4
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q5
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q6
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q7
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): mc-q0
```

```
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Wred/Tail Drop Statistics :
-----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets

Router#show queuing interface xe2

Egress Queuing for Ethernet xe2 [System]
L0             L1             L2             Group  PrioLevel   Shape          Bandwidth
------------------------------------------------------------------------------------------
-------------
q0                                             -      High        -              -
q1                                             -      High        -              -
q2                                             -      High        -              -
q3                                             -      High        -              -
q4                                             -      High        -              -
q5                                             -      High        -              -
q6                                             -      High        -              -
q7                                             -      High        -              -
```

```
Router#show queuing interface xe3

Egress Queuing for Ethernet xe3 [System]
------------------------------------------------------------------------------------------
L0              L1              L2              Group  PrioLevel   Shape          Bandwidth
------------------------------------------------------------------------------------------
q0                                              -      High        -              -
q1                                              -      High        20 percent     -
q2                                                 -      High        -              25000 kbps
q3                                              -      High        -              -
q4                                              -      High        -              -
q5                                              -      High        -              -
q6                                              -      High        -              -
q7                                              -      High        -              -
```

# CHAPTER 16 Hierarchical Queuing Configuration

This chapter contains a complete sample of configuring hierarchical queuing.

## Topology

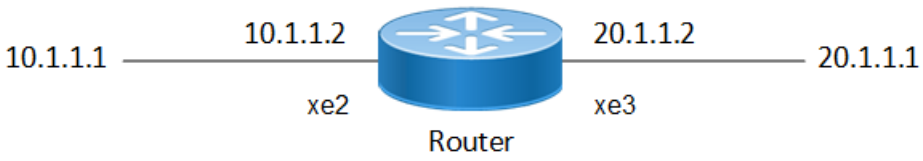



**Figure 16-17: Simple configuration of Hierarchical Queuing**

## Configuring Hierarchical Queuing

Do the following to configure 3-level hierarchical queuing on an interface.

| | |
|---|---|
| `#configure terminal` | Enter configure mode. |
| `(config)#qos enable` | Enable QoS globally. |
| `(config)#qos statistics` | Enable QoS statistics. |
| `(config)#class-map type qos match-any C_QOS1` | Configure class-map C_QOS1 of type qos and enter into class-map mode |
| `(config-cmap-qos)#match cos 0` | Configure match criteria as cos 0 |
| `(config-cmap-qos)#match dscp 0-7` | Configure match criteria as dscp 0-7 |
| `(config-cmap-qos)#exit` | Exit out of cmap mode |
| `(config)#class-map type qos match-any C_QOS2` | Configure class-map C_QOS2 of type qos and enter into class-map mode |
| `(config-cmap-qos)#match cos 1` | Configure match criteria as cos 1 |
| `(config-cmap-qos)#match dscp 8-15` | Configure match criteria as dscp 8-15 |
| `(config-cmap-qos)#exit` | Exit out of cmap mode |
| `(config)#class-map type qos match-any C_QOS3` | Configure class-map C_QOS3 of type qos and enter into class-map mode |
| `(config-cmap-qos)#match cos 2` | Configure match criteria as cos 2 |
| `(config-cmap-qos)#match dscp 16-23` | Configure match criteria as dscp 16-23 |
| `(config-cmap-qos)#exit` | Exit out of cmap mode |
| `(config)#class-map type qos match-any C_QOS4` | Configure class-map C_QOS4 of type qos and enter into class-map mode |
| `(config-cmap-qos)#match cos 3` | Configure match criteria as cos 3 |
| `(config-cmap-qos)#match dscp 24-31` | Configure match criteria as dscp 24-31 |
| `(config-cmap-qos)#exit` | Exit out of cmap mode |
| `(config)#class-map type qos match-any C_QOS5` | Configure class-map C_QOS5 of type qos and enter into class-map mode |
| `(config-cmap-qos)#match cos 4` | Configure match criteria as cos 4 |

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| | |
|---|---|
| (config-cmap-qos)#match dscp 32-39 | Configure match criteria as dscp 32-39 |
| (config-cmap-qos)#exit | Exit out of cmap mode |
| (config)#class-map type qos match-any C_QOS6 | Configure class-map C_QOS6 of type qos and enter into class-map mode |
| (config-cmap-qos)#match cos 5 | Configure match criteria as cos 5 |
| (config-cmap-qos)#match dscp 40-47 | Configure match criteria as dscp 40-47 |
| (config-cmap-qos)#exit | Exit out of cmap mode |
| (config)#class-map type qos match-any C_QOS7 | Configure class-map C_QOS7 of type qos and enter into class-map mode |
| (config-cmap-qos)#match cos 6 | Configure match criteria as cos 6 |
| (config-cmap-qos)#match dscp 48-55 | Configure match criteria as dscp 48-55 |
| (config-cmap-qos)#exit | Exit out of cmap mode |
| (config)#class-map type qos match-any C_QOS8 | Configure class-map C_QOS8 of type qos and enter into class-map mode |
| (config-cmap-qos)#match cos 7 | Configure match criteria as cos 7 |
| (config-cmap-qos)#match dscp 56-63 | Configure match criteria as dscp 56-63 |
| (config-cmap-qos)#exit | Exit out of cmap mode |
| (config)#class-map type queuing match-any cq1 | Configure class-map cq1 of type queuing and enter into class-map mode. |
| (config-cmap-que)#match qos-group 1 | Configure match criteria as qos-group 1 |
| (config-cmap-que)#exit | Exit out of cmap mode. |
| (config)#class-map type queuing match-any cq2 | Configure class-map cq2 of type queuing and enter into class-map mode. |
| (config-cmap-que)#match qos-group 2 | Configure match criteria as qos-group 2 |
| (config-cmap-que)#exit | Exit out of cmap mode. |
| (config)#class-map type queuing match-any cq3 | Configure class-map cq3 of type queuing and enter into class-map mode. |
| (config-cmap-que)#match qos-group 3 | Configure match criteria as qos-group 3 |
| (config-cmap-que)#exit | Exit out of cmap mode. |
| (config)#class-map type queuing match-any cq4 | Configure class-map cq4 of type queuing and enter into class-map mode. |
| (config-cmap-que)#match qos-group 4 | Configure match criteria as qos-group 4 |
| (config-cmap-que)#exit | Exit out of cmap mode. |
| (config)#class-map type queuing match-any cq5 | Configure class-map cq5 of type queuing and enter into class-map mode. |
| (config-cmap-que)#match qos-group 5 | Configure match criteria as qos-group 5 |
| (config-cmap-que)#exit | Exit out of cmap mode. |
| (config)#class-map type queuing match-any cq6 | Configure class-map cq6 of type queuing and enter into class-map mode. |
| (config-cmap-que)#match qos-group 6 | Configure match criteria as qos-group 6 |
| (config-cmap-que)#exit | Exit out of cmap mode. |
| (config)#class-map type queuing match-any cq7 | Configure class-map cq7 of type queuing and enter into class-map mode. |
| (config-cmap-que)#match qos-group 7 | Configure match criteria as qos-group 7 |

| | |
|---|---|
| (config-cmap-que)#exit | Exit out of cmap mode. |
| (config)#class-map type queuing match-any cq8 | Configure class-map cq8 of type queuing and enter into class-map mode. |
| (config-cmap-que)#match qos-group 8 | Configure match criteria as qos-group 8 |
| (config-cmap-que)#exit | Exit out of cmap mode. |
| (config)#policy-map type qos pmap1 | Configure policy-map pmap1 og type qos and enter into policy-map mode. |
| (config-pmap-qos)#class type qos C_QOS1 | Assign class C-QOS1 to pmap1 and enter into policy-class-map mode. |
| (config-pmap-c-qos)#set qos-group 1 | Remark matched traffic to qos-group 1 |
| (config-pmap-c-qos)#exit | Exit out of policy-class-map mode |
| (config-pmap-qos)#class type qos C_QOS2 | Assign class C-QOS2 to pmap1 and enter into policy-class-map mode. |
| (config-pmap-c-qos)#set qos-group 2 | Remark matched traffic to qos-group 2 |
| (config-pmap-c-qos)#exit | Exit out of policy-class-map mode |
| (config-pmap-qos)#class type qos C_QOS3 | Assign class C-QOS3 to pmap1 and enter into policy-class-map mode. |
| (config-pmap-c-qos)#set qos-group 3 | Remark matched traffic to qos-group 3 |
| (config-pmap-c-qos)#exit | Exit out of policy-class-map mode |
| (config-pmap-qos)#class type qos C_QOS4 | Assign class C-QOS4 to pmap1 and enter into policy-class-map mode. |
| (config-pmap-c-qos)#set qos-group 4 | Remark matched traffic to qos-group 4 |
| (config-pmap-c-qos)#exit | Exit out of policy-class-map mode |
| (config-pmap-qos)#class type qos C_QOS5 | Assign class C-QOS5 to pmap1 and enter into policy-class-map mode. |
| (config-pmap-c-qos)#set qos-group 5 | Remark matched traffic to qos-group 5 |
| (config-pmap-c-qos)#exit | Exit out of policy-class-map mode |
| (config-pmap-qos)#class type qos C_QOS6 | Assign class C-QOS6 to pmap1 and enter into policy-class-map mode. |
| (config-pmap-c-qos)#set qos-group 6 | Remark matched traffic to qos-group 6 |
| (config-pmap-c-qos)#exit | Exit out of policy-class-map mode |
| (config-pmap-qos)#class type qos C_QOS7 | Assign class C-QOS7 to pmap1 and enter into policy-class-map mode. |
| (config-pmap-c-qos)#set qos-group 7 | Remark matched traffic to qos-group 7 |
| (config-pmap-c-qos)#exit | Exit out of policy-class-map mode |
| (config-pmap-qos)#class type qos C_QOS8 | Assign class C-QOS8 to pmap1 and enter into policy-class-map mode. |
| (config-pmap-c-qos)#set qos-group 8 | Remark matched traffic to qos-group 8 |
| (config-pmap-c-qos)#exit | Exit out of policy-class-map mode |
| (config-pmap-qos)#exit | Exit out of policy-map mode |
| (config)#policy-map type queuing P1P1 | Configure policy-map of type queuing P1P1 and enter into policy-map mode. |
| (config-pmap-que)#class type queuing cq1 | Assign class cq1 to policy-map P1 and enter into policy-class-map mode. |
| (config-pmap-c-que)#shape average percent 20 | Shape the matched traffic to percent 20 |

| | |
|---|---|
| (config-pmap-c-que)#queue-limit 70 packets | Configure tail-drop on q1 to 70 packets. |
| (config-pmap-c-que)#bandwidth percent 18 | Configure minimum bandwidth to 18 percent on q1. |
| (config-pmap-c-que)#exit | Exit out of policy-class-map mode. |
| (config-pmap-que)#class type queuing cq2 | Assign class cq2 to policy-map P1 and enter into policy-class-map mode. |
| (config-pmap-c-que)#shape average percent 80 | Shape the matched traffic to percent 80 |
| (config-pmap-c-que)#queue-limit 70 packets | Configure tail-drop on q2 to 70 packets. |
| (config-pmap-c-que)#bandwidth percent 75 | Configure minimum bandwidth to 75 percent on q2. |
| (config-pmap-c-que)#exit | Exit out of policy-class-map mode. |
| (config-pmap-que)#exit | Exit out of policy-map mode. |
| (config)#policy-map type queuing P2 | Configure policy-map of type queuing P2 and enter into policy-map mode. |
| (config-pmap-que)#class type queuing cq3 | Assign class cq3 to policy-map P2 and enter into policy-class-map mode. |
| (config-pmap-c-que)#shape average percent 25 | Shape the matched traffic to percent 25 |
| (config-pmap-c-que)#random-detect min-threshold 50 max-threshold 75 kbytes | Configure WRED on q3 to minimum threshold 50 and maximum threshold 75 packets. |
| (config-pmap-c-que)#bandwidth percent 20 | Configure minimum bandwidth to 20 percent on q3. |
| (config-pmap-c-que)#exit | Exit out of policy-class-map mode. |
| (config-pmap-que)#class type queuing cq4 | Assign class cq4 to policy-map P2 and enter into policy-class-map mode. |
| (config-pmap-c-que)#shape average percent 75 | Shape the matched traffic to percent 75 |
| (config-pmap-c-que)#random-detect min-threshold 50 max-threshold 75 kbytes | Configure WRED on q4 to minimum threshold 50 and maximum threshold 75 kbytes. |
| (config-pmap-c-que)#bandwidth percent 65 | Configure minimum bandwidth to 65 percent on q4. |
| (config-pmap-c-que)#exit | Exit out of policy-class-map mode. |
| (config-pmap-que)#exit | Exit out of policy-map mode. |
| (config)#policy-map type queuing P3 | Configure policy-map of type queuing P3 and enter into policy-map mode. |
| (config-pmap-que)#class type queuing cq5 | Assign class cq5 to policy-map P3 and enter into policy-class-map mode. |
| (config-pmap-c-que)#shape average percent 40 | Shape the matched traffic to percent 40 |
| (config-pmap-c-que)#queue-limit 100 packets | Configure Tail-Drop on q5 to 100 packets. |
| (config-pmap-c-que)#bandwidth percent 35 | Configure minimum bandwidth to 35 percent on q5. |
| (config-pmap-c-que)#exit | Exit out of policy-class-map mode. |
| (config-pmap-que)#class type queuing cq6 | Assign class cq6 to policy-map P3 and enter into policy-class-map mode. |
| (config-pmap-c-que)#shape average percent 60 | Shape the matched traffic to percent 60 |
| (config-pmap-c-que)#queue-limit 100 packets | Configure Tail-Drop on q6 to 100 packets. |
| (config-pmap-c-que)#bandwidth percent 55 | Configure minimum bandwidth to 55 percent on q6. |
| (config-pmap-c-que)#exit | Exit out of policy-class-map mode. |
| (config-pmap-que)#exit | Exit out of policy-map mode. |
| (config)#policy-map type queuing P4 | Configure policy-map of type queuing P4 and enter into policy-map mode. |

| | |
|---|---|
| (config-pmap-que)#class type queuing cq7 | Assign class cq7 to policy-map P4 and enter into policy-class-map mode. |
| (config-pmap-c-que)#shape average percent 40 | Shape the matched traffic to percent 40 |
| (config-pmap-c-que)#random-detect min-threshold 80 packets max-threshold 100 packets | Configure WRED on q7 to maximum threshold of 80 packets and maximum threshold of 100 packets.. |
| (config-pmap-c-que)#bandwidth percent 35 | Configure minimum bandwidth to 35 percent on q7. |
| (config-pmap-c-que)#exit | Exit out of policy-class-map mode. |
| (config-pmap-que)#class type queuing cq8 | Assign class cq8 to policy-map P4 and enter into policy-class-map mode. |
| (config-pmap-c-que)#shape average percent 60 | Shape the matched traffic to percent 60 |
| (config-pmap-c-que)#random-detect min-threshold 80 packets max-threshold 100 packets | Configure WRED on q8 to minimum threshold of 80 packets and maximum threshold of 100 packets.. |
| (config-pmap-c-que)#bandwidth percent 55 | Configure minimum bandwidth to 55 percent on q8. |
| (config-pmap-c-que)#exit | Exit out of policy-class-map mode. |
| (config-pmap-que)#exit | Exit out of policy-map mode. |
| (config)#class-map type queuing match-any empty1 | Configure class-map of type queuing empty1 |
| (config-cmap-que)#exit | Exit out of cmap mode |
| (config)#class-map type queuing match-any empty2 | Configure class-map of type queuing empty2 |
| (config-cmap-que)#exit | Exit out of cmap mode |
| (config)#class-map type queuing match-any empty3 | Configure class-map of type queuing empty3 |
| (config-cmap-que)#exit | Exit out of cmap mode |
| (config)#class-map type queuing match-any empty4 | Configure class-map of type queuing empty4 |
| (config-cmap-que)#exit | Exit out of cmap mode |
| (config)#class-map type queuing match-any empty5 | Configure class-map of type queuing empty5 |
| (config-cmap-que)#exit | Exit out of cmap mode |
| (config)#class-map type queuing match-any empty6 | Configure class-map of type queuing empty6 |
| (config-cmap-que)#exit | Exit out of cmap mode |
| (config)#policy-map type queuing P1P2 | Configure policy-map of type queuing P1P2 and enter into policy-map mode. |
| (config-pmap-que)#class type queuing empty1 | Assign class-map of type queuing empty1 to P1P2 and enter into policy-class-map mode. |
| (config-pmap-c-que)#shape average percent 40 | Shape the matched traffic to 40 percent |
| (config-pmap-c-que)#bandwidth percent 30 | Configure minimum bandwidth to 30 percent on empty1. |
| (config-pmap-c-que)#service-policy P1P1 | Assign service-policy P1P1 |
| (config-pmap-c-que)#exit | Exit out of policy-class-map mode. |
| (config-pmap-que)#class type queuing empty2 | Assign class-map of type queuing empty2 to P1P2 and enter into policy-class-map mode. |
| (config-pmap-c-que)#shape average percent 60 | Shape the matched traffic to 60 percent |

| | |
|---|---|
| (config-pmap-c-que)#bandwidth percent 55 | Configure minimum bandwidth to 55 percent on empty2. |
| (config-pmap-c-que)#service-policy P2 | Assign service-policy P2 |
| (config-pmap-c-que)#exit | Exit out of policy-class-map mode. |
| (config-pmap-que)#exit | Exit out of policy-map mode. |
| (config)#policy-map type queuing P3P4 | Configure policy-map of type queuing P3P4 and enter into policy-map mode. |
| (config-pmap-que)#class type queuing empty3 | Assign class-map of type queuing empty3 to P3P4 and enter into policy-class-map mode. |
| (config-pmap-c-que)#shape average percent 40 | Shape the matched traffic to 40 percent |
| (config-pmap-c-que)#bandwidth percent 35 | Configure minimum bandwidth to 35 percent on empty3. |
| (config-pmap-c-que)#service-policy P3 | Assign service-policy P3 |
| (config-pmap-c-que)#exit | Exit out of policy-class-map mode. |
| (config-pmap-que)#class type queuing empty4 | Assign class-map of type queuing empty4 to P3P4 and enter into policy-class-map mode. |
| (config-pmap-c-que)#shape average percent 60 | Shape the matched traffic to 60 percent |
| (config-pmap-c-que)#bandwidth percent 50 | Configure minimum bandwidth to 50 percent on empty4. |
| (config-pmap-c-que)#service-policy P4 | Assign service-policy P4 |
| (config-pmap-c-que)#exit | Exit out of policy-class-map mode. |
| (config-pmap-que)#exit | Exit out of policy-map mode. |
| (config)#policy-map type queuing Pend | Configure policy-map of type queuing Pend and enter into policy-map mode. |
| (config-pmap-que)#class type queuing empty5 | Assign class-map of type queuing empty5 to Pend and enter into policy-class-map mode. |
| (config-pmap-c-que)#shape average 400 mbps | Shape the matched traffic to 400 mbps |
| (config-pmap-c-que)#bandwidth 350 mbps | Configure minimum bandwidth to 350 mbps. |
| (config-pmap-c-que)#service-policy P1P1 | Assign service-policy P1P1 |
| (config-pmap-c-que)#exit | Exit out of policy-class-map mode. |
| (config-pmap-que)#class type queuing empty6 | Assign class-map of type queuing empty6 to Pend and enter into policy-class-map mode. |
| (config-pmap-c-que)#shape average 500 mbps | Shape the matched traffic to 500 mbps |
| (config-pmap-c-que)#bandwidth 450 mbps | Configure minimum bandwidth to 450 mbps. |
| (config-pmap-c-que)#service-policy P3P4 | Assign service-policy P3P4 |
| (config-pmap-c-que)#exit | Exit out of policy-class-map mode. |
| (config-pmap-que)#exit | Exit out of policy-map mode. |
| (config)#interface xe2 | Enter into interface mode |
| (config-if)#service-policy type qos input pmap1 | Assign service-policy of type qos policy-map1. |
| (config-if)#exit | Exit out of intf mode |
| (config)#interface xe3 | Enter into interface mode |
| (config-if)#service-policy type queuing output Pend | Assign service-policy of type queing pend on out direction. |
| (config-if)#exit | Exit out of interface mode. |

Configuring one of the scheduler modes implicitly un-configures other modes, only one scheduler mode can be configured at a time.

| | |
|---|---|
| (config)#set qos wrr uc 1 non-uc 2 | Schedule unicast and multicast traffic in 1:2 |
| (config)#set qos sp | Set strict priority between unicast and multicast traffic, with higher priority to multicast traffic |
| (config)#interface xe49/2 | Enter interface mode |
| (config-if)#exit | Exit interface mode |
| (config)#bridge 1 protocol rstp vlan-bridge | Specify VLAN for bridge 1. |
| (config)#vlan database | Enter the VLAN configuration mode. |
| (config-vlan)#vlan 2-3 bridge 1 state enable | Enable VLAN (2-3) on bridge 1. Specifying the enable state. |
| (config-vlan)#exit | Exit the VLAN configuration mode. |
| (config)#interface vlan1.2 | Enter interface mode. |
| (config-if)# ip address 10.1.1.2/24 | Configure the IP address. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface vlan1.3 | Enter interface mode. |
| (config-if)# ip address 20.1.1.1/24 | Configure the IP address. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface xe2 | Enter interface mode. |
| (config-if)#switchport | Configure xe2 as a Layer 2 port. |
| (config-if)#bridge-group 1 | Associate the interface with bridge group 1. |
| (config-if)#switchport mode trunk | Configure port as a trunk. |
| (config-if)#switchport trunk allowed vlan all | Allow all the VLANs on the xe3 interface. |
| (config-if)#exit | Exit the interface mode. |
| (config)#interface xe3 | Enter interface mode. |
| (config-if)#switchport | Configure xe3 as a Layer 2 port. |
| (config-if)#bridge-group 1 | Associate the interface with bridge group 1. |
| (config-if)#switchport mode trunk | Configure port as a trunk. |
| (config-if)#switchport trunk allowed vlan all | Allow all the VLANs on the xe3 interface. |
| (config-if)#exit | Exit the interface mode. |

# Validation

Enter the commands listed in the sections below to confirm the configurations.

```
#show running-config qos
qos enable
!
set qos wrr uc 1 non-uc 2
qos statistics
!
class-map type qos match-any C_QOS1
 match dscp 0-7
 match cos 0
!
class-map type qos match-any C_QOS2
 match dscp 8-15
```

```
 match cos 1
!
class-map type qos match-any C_QOS3
 match dscp 16-23
 match cos 2
!
class-map type qos match-any C_QOS4
 match dscp 24-31
 match cos 3
!
class-map type qos match-any C_QOS5
 match dscp 32-39
 match cos 4
!
class-map type qos match-any C_QOS6
 match dscp 40-47
 match cos 5
!
class-map type qos match-any C_QOS7
 match dscp 48-55
 match cos 6
!
class-map type qos match-any C_QOS8
 match dscp 56-63
 match cos 7
!
class-map type queuing match-any cq1
 match qos-group 1
!
class-map type queuing match-any cq2
 match qos-group 2
!
class-map type queuing match-any cq3
 match qos-group 3
!
class-map type queuing match-any cq4
 match qos-group 4
!
class-map type queuing match-any cq5
!
class-map type queuing match-any cq6
 match qos-group 6
!
class-map type queuing match-any cq7
 match qos-group 7
!
class-map type queuing match-any cq8
 match qos-group 8
!
class-map type queuing match-any empty1
```

```
!
class-map type queuing match-any empty2
!
class-map type queuing match-any empty3
!
class-map type queuing match-any empty4
!
class-map type queuing match-any empty5
!
class-map type queuing match-any empty6
!
policy-map type qos pmap1
 class type qos C_QOS1
  set qos-group 1
  exit
 class type qos C_QOS2
  set qos-group 2
  exit
 class type qos C_QOS3
  set qos-group 3
  exit
 class type qos C_QOS4
  set qos-group 4
  exit
 class type qos C_QOS5
  set qos-group 5
  exit
 class type qos C_QOS6
  set qos-group 6
  exit
 class type qos C_QOS7
  set qos-group 7
  exit
 class type qos C_QOS8
  set qos-group 8
  exit
!
policy-map type queuing P1P1
 class type queuing cq1
  shape average percent 20
  wrr-queue weight 1
  queue-limit 70 packets
  bandwidth percent 18
  exit
 class type queuing cq2
  shape average percent 80
  wrr-queue weight 1
  queue-limit 70 packets
  bandwidth percent 75
  exit
```

```
!
policy-map type queuing P2
 class type queuing cq3
  shape average percent 25
  wrr-queue weight 1
  random-detect min-threshold 50 max-threshold 75 kbytes
  bandwidth percent 20
  exit
 class type queuing cq4
  shape average percent 75
  wrr-queue weight 1
  random-detect min-threshold 50 max-threshold 75 kbytes
  bandwidth percent 65
  exit
!
policy-map type queuing P3
 class type queuing cq5
  shape average percent 40
  wrr-queue weight 1
  queue-limit 100 packets
  bandwidth percent 35
  exit
 class type queuing cq6
  shape average percent 60
  wrr-queue weight 1
  queue-limit 100 packets
  bandwidth percent 55
  exit
!
policy-map type queuing P4
 class type queuing cq7
  shape average percent 40
  wrr-queue weight 1
  random-detect min-threshold 80 max-threshold 100 packets
  bandwidth percent 35
  exit
 class type queuing cq8
  shape average percent 60
  wrr-queue weight 1
  random-detect min-threshold 80 max-threshold 100 packets
  bandwidth percent 55
  exit
!
!
policy-map type queuing P3P4
 class type queuing empty3
  shape average percent 40
  wrr-queue weight 1
  bandwidth percent 35
  service-policy P3
```

```
  exit
 class type queuing empty4
  shape average percent 60
  wrr-queue weight 1
  bandwidth percent 50
  service-policy P4
  exit
!
policy-map type queuing P1P2
 class type queuing empty1
  shape average percent 40
  wrr-queue weight 1
  bandwidth percent 30
  service-policy P1P1
  exit
 class type queuing empty2
  shape average percent 60
  wrr-queue weight 1
  bandwidth percent 55
  service-policy P2
  exit
!
policy-map type queuing Pend
 class type queuing empty5
  shape average 400 mbps
  wrr-queue weight 1
  bandwidth 350 mbps
  service-policy P1P1
  exit
 class type queuing empty6
  shape average 500 mbps
  wrr-queue weight 1
  bandwidth 450 mbps
  service-policy P3P4
  exit
!
!
interface xe2
 service-policy type qos input pmap1
!
interface xe3
 service-policy type queuing output Pend
!



#sh class-map

  Type qos class-maps
  ===================
```

```
    class-map type qos match-any C_QOS1
       match cos 0
       match dscp 0-7

    class-map type qos match-any C_QOS2
       match cos 1
       match dscp 8-15

    class-map type qos match-any C_QOS3
       match cos 2
       match dscp 16-23

    class-map type qos match-any C_QOS4
       match cos 3
       match dscp 24-31

    class-map type qos match-any C_QOS5
       match cos 4
       match dscp 32-39

    class-map type qos match-any C_QOS6
       match cos 5
       match dscp 40-47

    class-map type qos match-any C_QOS7
       match cos 6
       match dscp 48-55

    class-map type qos match-any C_QOS8
       match cos 7
       match dscp 56-63

    class-map type qos match-any class-default


Type queuing class-maps
=======================
    class-map type queuing match-any cq1
       match qos-group 1

    class-map type queuing match-any cq2
       match qos-group 2

    class-map type queuing match-any cq3
       match qos-group 3

    class-map type queuing match-any cq4
       match qos-group 4

    class-map type queuing match-any cq5
```

```
      class-map type queuing match-any cq6
         match qos-group 6

      class-map type queuing match-any cq7
         match qos-group 7

      class-map type queuing match-any cq8
         match qos-group 8

      class-map type queuing match-any empty1

      class-map type queuing match-any empty2

      class-map type queuing match-any empty3

      class-map type queuing match-any empty4

      class-map type queuing match-any empty5

      class-map type queuing match-any empty6

      class-map match-any q0

      class-map match-any q1

      class-map match-any q2

      class-map match-any q3

      class-map match-any q4

      class-map match-any q5

      class-map match-any q6

      class-map match-any q7


  Type Vlan-Queuing class-maps
  ============================

#show policy-map

Type qos policy-maps
====================

policy-map type qos pmap1
 class type qos C_QOS1
  set qos-group 1
```

```
  exit
 class type qos C_QOS2
  set qos-group 2
  exit
 class type qos C_QOS3
  set qos-group 3
  exit
 class type qos C_QOS4
  set qos-group 4
  exit
 class type qos C_QOS5
  set qos-group 5
  exit
 class type qos C_QOS6
  set qos-group 6
  exit
 class type qos C_QOS7
  set qos-group 7
  exit
 class type qos C_QOS8
  set qos-group 8
  exit


Type queuing policy-maps
========================

policy-map type queuing P1P1
 class type queuing cq1
  shape average percent 20
  wrr-queue weight 1
  queue-limit 70 packets
  bandwidth percent 18
  exit
 class type queuing cq2
  shape average percent 80
  wrr-queue weight 1
  queue-limit 70 packets
  bandwidth percent 75
  exit

policy-map type queuing P1P2
 class type queuing empty1
  shape average percent 40
  wrr-queue weight 1
  bandwidth percent 30
  service-policy P1P1
  exit
 class type queuing empty2
  shape average percent 60
```

```
  wrr-queue weight 1
  bandwidth percent 55
  service-policy P2
  exit

policy-map type queuing P2
 class type queuing cq3
  shape average percent 25
  wrr-queue weight 1
  random-detect min-threshold 50 max-threshold 75 kbytes
  bandwidth percent 20
  exit
 class type queuing cq4
  shape average percent 75
  wrr-queue weight 1
  random-detect min-threshold 50 max-threshold 75 kbytes
  bandwidth percent 65
  exit

policy-map type queuing P3
 class type queuing cq5
  shape average percent 40
  wrr-queue weight 1
  queue-limit 100 packets
  bandwidth percent 35
  exit
 class type queuing cq6
  shape average percent 60
  wrr-queue weight 1
  queue-limit 100 packets
  bandwidth percent 55
  exit

policy-map type queuing P3P4
 class type queuing empty3
  shape average percent 40
  wrr-queue weight 1
  bandwidth percent 35
  service-policy P3
  exit
 class type queuing empty4
  shape average percent 60
  wrr-queue weight 1
  bandwidth percent 50
  service-policy P4
  exit

policy-map type queuing P4
 class type queuing cq7
  shape average percent 40
```

```
  wrr-queue weight 1
  random-detect min-threshold 80 max-threshold 100 packets
  bandwidth percent 35
  exit
 class type queuing cq8
  shape average percent 60
  wrr-queue weight 1
  random-detect min-threshold 80 max-threshold 100 packets
  bandwidth percent 55
  exit

policy-map type queuing Pend
 class type queuing empty5
  shape average 400 mbps
  wrr-queue weight 1
  bandwidth 350 mbps
  service-policy P1P1
  exit
 class type queuing empty6
  shape average 500 mbps
  wrr-queue weight 1
  bandwidth 450 mbps
  service-policy P3P4
  exit

policy-map type queuing default default-out-policy
 class type queuing default q0
  priority level 1
  exit
 class type queuing default q1
  priority level 1
  exit
 class type queuing default q2
  priority level 1
  exit
 class type queuing default q3
  priority level 1
  exit
 class type queuing default q4
  priority level 1
  exit
 class type queuing default q5
  priority level 1
  exit
 class type queuing default q6
  priority level 1
  exit
 class type queuing default q7
  priority level 1
  exit
```

```
#show policy-map interface xe2

Interface xe2
Global statistics status : enabled

Service-policy (qos) input     : pmap1
--------------------------------
Class-map (qos): C_QOS1 (match any)
 match dscp 0-7
 match cos 0
 set qos-group 1
      matched      : 2 packets, 128 bytes
      transmitted  : 2 packets, 128 bytes

Class-map (qos): C_QOS2 (match any)
 match dscp 8-15
 match cos 1
 set qos-group 2
      matched      : 23751790 packets, 1520114560 bytes
      transmitted  : 23751790 packets, 1520114560 bytes

Class-map (qos): C_QOS3 (match any)
 match dscp 16-23
 match cos 2
 set qos-group 3
      matched      : 5412521 packets, 346401344 bytes
      transmitted  : 5412521 packets, 346401344 bytes

Class-map (qos): C_QOS4 (match any)
 match dscp 24-31
 match cos 3
 set qos-group 4
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes

Class-map (qos): C_QOS5 (match any)
 match dscp 32-39
 match cos 4
 set qos-group 5
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes

Class-map (qos): C_QOS6 (match any)
 match dscp 40-47
 match cos 5
 set qos-group 6
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes
```

```
Class-map (qos): C_QOS7 (match any)
 match dscp 48-55
 match cos 6
 set qos-group 7
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes

Class-map (qos): C_QOS8 (match any)
 match dscp 56-63
 match cos 7
 set qos-group 8
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes


Service-policy (queuing) output: default-out-policy
-----------------------------------
Class-map (queuing): q0
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q1
 priority level 1
      output       : 1 packets, 64 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q2
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q3
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q4
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q5
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q6
 priority level 1
```

```
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q7
 priority level 1
      output       : 2058 packets, 131912 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 4 packets, 272 bytes
      dropped      : 0 packets, 0 bytes

Wred Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets


#show policy-map interface xe3

Interface xe3
```

```
Global statistics status : enabled

Service-policy (queuing) output: Pend
-----------------------------------
Class-map (queuing): empty5
 shape average 400 mbps
 wrr-queue weight 1
 bandwidth 350 mbps

     Service-policy (queuing) output: P1P1
     -----------------------------------
     Class-map (queuing): cq1
      match qos-group 1
      shape percent 20
 wrr-queue weight 1
      queue-limit 70 packets
      bandwidth percent 18
           output       : 1 packets, 64 bytes
           dropped      : 0 packets, 0 bytes

     Class-map (queuing): cq2
      match qos-group 2
      shape percent 80
 wrr-queue weight 1
      queue-limit 70 packets
      bandwidth percent 75
           output       : 10290336 packets, 658581504 bytes
           dropped      : 13382099 packets, 856454336 bytes

Class-map (queuing): empty6
 shape average 500 mbps
 wrr-queue weight 1
 bandwidth 450 mbps

     Service-policy (queuing) output: P3P4
     -----------------------------------
     Class-map (queuing): empty3
      shape percent 40
 wrr-queue weight 1
      bandwidth percent 35

          Service-policy (queuing) output: P3
          -----------------------------------
          Class-map (queuing): cq5
           shape percent 40
 wrr-queue weight 1
           queue-limit 100 packets
           bandwidth percent 35
                output       : 0 packets, 0 bytes
                dropped      : 0 packets, 0 bytes
```

```
          Class-map (queuing): cq6
           match qos-group 6
           shape percent 60
 wrr-queue weight 1
           queue-limit 100 packets
           bandwidth percent 55
                output       : 0 packets, 0 bytes
                dropped      : 0 packets, 0 bytes

     Class-map (queuing): empty4
      shape percent 60
 wrr-queue weight 1
      bandwidth percent 50

          Service-policy (queuing) output: P4
          -----------------------------------
          Class-map (queuing): cq7
           match qos-group 7
           shape percent 40
 wrr-queue weight 1
           random-detect min-threshold 80 max-threshold 100 packets
bytes
kbytes
percent
           bandwidth percent 35
                output       : 0 packets, 0 bytes
                dropped      : 0 packets, 0 bytes

          Class-map (queuing): cq8
           match qos-group 8
           shape percent 60
 wrr-queue weight 1
           random-detect min-threshold 80 max-threshold 100 packets
bytes
kbytes
percent
           bandwidth percent 55
                output       : 0 packets, 0 bytes
                dropped      : 0 packets, 0 bytes

Service-policy (queuing) output: default-out-policy
-----------------------------------
Class-map (queuing): q0
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q1
 priority level 1
```

```
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q2
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q3
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q4
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q5
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q6
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q7
 priority level 1
      output       : 2011 packets, 128964 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
```

```
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 11 packets, 748 bytes
      dropped      : 0 packets, 0 bytes

Wred Drop Statistics :
----------------------
 green  : 13382099 packets
 yellow : 0 packets
 red    : 0 packets


#show queuing interface xe2

Egress Queuing for Ethernet xe2 [System]
------------------------------------------------------------------------------
L0              L1              L2              Group  PrioLevel   Shape
  Bandwidth
------------------------------------------------------------------------------
q0                                              -      High        -
  -
q1                                              -      High        -
  -
q2                                              -      High        -
  -
q3                                              -      High        -
  -
q4                                              -      High        -
  -
q5                                              -      High        -
  -
q6                                              -      High        -
  -
q7                                              -      High        -


#show queuing interface xe3

Egress Queuing for Ethernet xe3 [System]
------------------------------------------------------------------------------
```

```
L0              L1              L2              Group  PrioLevel   Shape
  Bandwidth
------------------------------------------------------------------------------
empty5                                          -      -           400 mbps
  350 mbps
                cq1                             1      -           20 percent
  18 percent
                cq2                             2      -           80 percent
  75 percent
empty6                                          -      -           500 mbps
  450 mbps
                empty3                          -      -           40 percent
  35 percent
                                cq5             -      -           40 percent
  35 percent
                                cq6             6      -           60 percent
  55 percent
                empty4                          -      -           60 percent
  50 percent
                                cq7             7      -           40 percent
  35 percent
                                cq8             8      -           60 percent
  55 percent


(config)#set qos wrr uc 1 non-uc 127
(config)#exit

#show policy-map interface xe2

Interface xe2
Global statistics status : enabled

Service-policy (qos) input     : pmap1
---------------------------------
Class-map (qos): C_QOS1 (match any)
 match dscp 0-7
 match cos 0
 set qos-group 1
      matched      : 2 packets, 128 bytes
      transmitted  : 2 packets, 128 bytes

Class-map (qos): C_QOS2 (match any)
 match dscp 8-15
 match cos 1
 set qos-group 2
      matched      : 24126931 packets, 1544123584 bytes
      transmitted  : 24126931 packets, 1544123584 bytes

Class-map (qos): C_QOS3 (match any)
```

```
 match dscp 16-23
 match cos 2
 set qos-group 3
      matched      : 5412521 packets, 346401344 bytes
      transmitted  : 5412521 packets, 346401344 bytes

Class-map (qos): C_QOS4 (match any)
 match dscp 24-31
 match cos 3
 set qos-group 4
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes

Class-map (qos): C_QOS5 (match any)
 match dscp 32-39
 match cos 4
 set qos-group 5
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes

Class-map (qos): C_QOS6 (match any)
 match dscp 40-47
 match cos 5
 set qos-group 6
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes

Class-map (qos): C_QOS7 (match any)
 match dscp 48-55
 match cos 6
 set qos-group 7
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes

Class-map (qos): C_QOS8 (match any)
 match dscp 56-63
 match cos 7
 set qos-group 8
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes


Service-policy (queuing) output: default-out-policy
-----------------------------------
Class-map (queuing): q0
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q1
```

```
 priority level 1
      output       : 1 packets, 64 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q2
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q3
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q4
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q5
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q6
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q7
 priority level 1
      output       : 2245 packets, 143880 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
```

```
Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 4 packets, 272 bytes
      dropped      : 0 packets, 0 bytes

Wred Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets


#show policy-map interface xe3

Interface xe3
Global statistics status : enabled

Service-policy (queuing) output: Pend
-----------------------------------
Class-map (queuing): empty5
 shape average 400 mbps
 wrr-queue weight 1
 bandwidth 350 mbps

     Service-policy (queuing) output: P1P1
     ----------------------------------
     Class-map (queuing): cq1
      match qos-group 1
      shape percent 20
 wrr-queue weight 1
      queue-limit 70 packets
      bandwidth percent 18
           output       : 1 packets, 64 bytes
           dropped      : 0 packets, 0 bytes

     Class-map (queuing): cq2
      match qos-group 2
      shape percent 80
 wrr-queue weight 1
```

```
      queue-limit 70 packets
      bandwidth percent 75
           output       : 10761532 packets, 688738048 bytes
           dropped      : 13382100 packets, 856454400 bytes

Class-map (queuing): empty6
 shape average 500 mbps
 wrr-queue weight 1
 bandwidth 450 mbps

     Service-policy (queuing) output: P3P4
     ----------------------------------
     Class-map (queuing): empty3
      shape percent 40
 wrr-queue weight 1
      bandwidth percent 35

          Service-policy (queuing) output: P3
          -----------------------------------
          Class-map (queuing): cq5
           shape percent 40
 wrr-queue weight 1
           queue-limit 100 packets
           bandwidth percent 35
                output       : 0 packets, 0 bytes
                dropped      : 0 packets, 0 bytes

          Class-map (queuing): cq6
           match qos-group 6
           shape percent 60
 wrr-queue weight 1
           queue-limit 100 packets
           bandwidth percent 55
                output       : 0 packets, 0 bytes
                dropped      : 0 packets, 0 bytes

     Class-map (queuing): empty4
      shape percent 60
 wrr-queue weight 1
      bandwidth percent 50

          Service-policy (queuing) output: P4
          -----------------------------------
          Class-map (queuing): cq7
           match qos-group 7
           shape percent 40
 wrr-queue weight 1
           random-detect min-threshold 80 max-threshold 100 packets
bytes
kbytes
```

```
percent
           bandwidth percent 35
                output       : 0 packets, 0 bytes
                dropped      : 0 packets, 0 bytes

          Class-map (queuing): cq8
           match qos-group 8
           shape percent 60
 wrr-queue weight 1
           random-detect min-threshold 80 max-threshold 100 packets
bytes
kbytes
percent
           bandwidth percent 55
                output       : 0 packets, 0 bytes
                dropped      : 0 packets, 0 bytes

Service-policy (queuing) output: default-out-policy
-----------------------------------
Class-map (queuing): q0
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q1
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q2
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q3
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q4
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q5
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q6
```

```
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q7
 priority level 1
      output       : 2246 packets, 144004 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 12 packets, 816 bytes
      dropped      : 0 packets, 0 bytes

Wred Drop Statistics :
----------------------
 green  : 13382099 packets
 yellow : 0 packets
 red    : 0 packets


(config)#set qos wrr uc 1 non-uc 2
(config)#exit
```

```
#show policy-map interface xe2

Interface xe2
Global statistics status : enabled

Service-policy (qos) input     : pmap1
--------------------------------
Class-map (qos): C_QOS1 (match any)
 match dscp 0-7
 match cos 0
 set qos-group 1
      matched      : 2 packets, 128 bytes
      transmitted  : 2 packets, 128 bytes

Class-map (qos): C_QOS2 (match any)
 match dscp 8-15
 match cos 1
 set qos-group 2
      matched      : 24459636 packets, 1565416704 bytes
      transmitted  : 24459636 packets, 1565416704 bytes

Class-map (qos): C_QOS3 (match any)
 match dscp 16-23
 match cos 2
 set qos-group 3
      matched      : 5412521 packets, 346401344 bytes
      transmitted  : 5412521 packets, 346401344 bytes

Class-map (qos): C_QOS4 (match any)
 match dscp 24-31
 match cos 3
 set qos-group 4
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes

Class-map (qos): C_QOS5 (match any)
 match dscp 32-39
 match cos 4
 set qos-group 5
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes

Class-map (qos): C_QOS6 (match any)
 match dscp 40-47
 match cos 5
 set qos-group 6
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes
```

```
Class-map (qos): C_QOS7 (match any)
 match dscp 48-55
 match cos 6
 set qos-group 7
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes

Class-map (qos): C_QOS8 (match any)
 match dscp 56-63
 match cos 7
 set qos-group 8
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes


Service-policy (queuing) output: default-out-policy
-----------------------------------
Class-map (queuing): q0
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q1
 priority level 1
      output       : 1 packets, 64 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q2
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q3
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q4
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q5
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q6
 priority level 1
      output       : 0 packets, 0 bytes
```

```
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q7
 priority level 1
      output       : 2412 packets, 154568 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 4 packets, 272 bytes
      dropped      : 0 packets, 0 bytes

Wred Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets


#show policy-map interface xe3

Interface xe3
Global statistics status : enabled
```

```
Service-policy (queuing) output: Pend
-----------------------------------
Class-map (queuing): empty5
 shape average 400 mbps
 wrr-queue weight 1
 bandwidth 350 mbps

     Service-policy (queuing) output: P1P1
     -----------------------------------
     Class-map (queuing): cq1
      match qos-group 1
      shape percent 20
 wrr-queue weight 1
      queue-limit 70 packets
      bandwidth percent 18
           output       : 1 packets, 64 bytes
           dropped      : 0 packets, 0 bytes

     Class-map (queuing): cq2
      match qos-group 2
      shape percent 80
 wrr-queue weight 1
      queue-limit 70 packets
      bandwidth percent 75
           output       : 10871860 packets, 695799040 bytes
           dropped      : 13598654 packets, 870313856 bytes

Class-map (queuing): empty6
 shape average 500 mbps
 wrr-queue weight 1
 bandwidth 450 mbps

     Service-policy (queuing) output: P3P4
     -----------------------------------
     Class-map (queuing): empty3
      shape percent 40
 wrr-queue weight 1
      bandwidth percent 35

          Service-policy (queuing) output: P3
          -----------------------------------
          Class-map (queuing): cq5
           shape percent 40
 wrr-queue weight 1
           queue-limit 100 packets
           bandwidth percent 35
                output       : 0 packets, 0 bytes
                dropped      : 0 packets, 0 bytes
```

```
          Class-map (queuing): cq6
           match qos-group 6
           shape percent 60
 wrr-queue weight 1
           queue-limit 100 packets
           bandwidth percent 55
                output       : 0 packets, 0 bytes
                dropped      : 0 packets, 0 bytes

     Class-map (queuing): empty4
      shape percent 60
 wrr-queue weight 1
      bandwidth percent 50

          Service-policy (queuing) output: P4
          -----------------------------------
          Class-map (queuing): cq7
           match qos-group 7
           shape percent 40
 wrr-queue weight 1
           random-detect min-threshold 80 max-threshold 100 packets
bytes
kbytes
percent
           bandwidth percent 35
                output       : 0 packets, 0 bytes
                dropped      : 0 packets, 0 bytes

          Class-map (queuing): cq8
           match qos-group 8
           shape percent 60
 wrr-queue weight 1
           random-detect min-threshold 80 max-threshold 100 packets
bytes
kbytes
percent
           bandwidth percent 55
                output       : 0 packets, 0 bytes
                dropped      : 0 packets, 0 bytes

Service-policy (queuing) output: default-out-policy
-----------------------------------
Class-map (queuing): q0
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q1
 priority level 1
      output       : 0 packets, 0 bytes
```

```
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q2
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q3
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q4
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q5
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q6
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q7
 priority level 1
      output       : 2410 packets, 154500 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
```

```
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 13 packets, 884 bytes
      dropped      : 0 packets, 0 bytes

Wred Drop Statistics :
----------------------
 green  : 13598643 packets
 yellow : 0 packets
 red    : 0 packets


(config)#set qos sp
(config)#exit


#show policy-map interface xe2

Interface xe2
Global statistics status : enabled

Service-policy (qos) input     : pmap1
--------------------------------
Class-map (qos): C_QOS1 (match any)
 match dscp 0-7
 match cos 0
 set qos-group 1
      matched      : 2 packets, 128 bytes
      transmitted  : 2 packets, 128 bytes

Class-map (qos): C_QOS2 (match any)
 match dscp 8-15
 match cos 1
 set qos-group 2
      matched      : 24622849 packets, 1575862336 bytes
      transmitted  : 24622849 packets, 1575862336 bytes

Class-map (qos): C_QOS3 (match any)
 match dscp 16-23
 match cos 2
 set qos-group 3
```

```
      matched      : 5412521 packets, 346401344 bytes
      transmitted  : 5412521 packets, 346401344 bytes

Class-map (qos): C_QOS4 (match any)
 match dscp 24-31
 match cos 3
 set qos-group 4
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes

Class-map (qos): C_QOS5 (match any)
 match dscp 32-39
 match cos 4
 set qos-group 5
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes

Class-map (qos): C_QOS6 (match any)
 match dscp 40-47
 match cos 5
 set qos-group 6
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes

Class-map (qos): C_QOS7 (match any)
 match dscp 48-55
 match cos 6
 set qos-group 7
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes

Class-map (qos): C_QOS8 (match any)
 match dscp 56-63
 match cos 7
 set qos-group 8
      matched      : 0 packets, 0 bytes
      transmitted  : 0 packets, 0 bytes


Service-policy (queuing) output: default-out-policy
-----------------------------------
Class-map (queuing): q0
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q1
 priority level 1
      output       : 1 packets, 64 bytes
      dropped      : 0 packets, 0 bytes
```

```
Class-map (queuing): q2
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q3
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q4
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q5
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q6
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q7
 priority level 1
      output       : 2493 packets, 159752 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
```

```
Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 4 packets, 272 bytes
      dropped      : 0 packets, 0 bytes

Wred Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets


#show policy-map interface xe3

Interface xe3
Global statistics status : enabled

Service-policy (queuing) output: Pend
-----------------------------------
Class-map (queuing): empty5
 shape average 400 mbps
 wrr-queue weight 1
 bandwidth 350 mbps

     Service-policy (queuing) output: P1P1
     -----------------------------------
     Class-map (queuing): cq1
      match qos-group 1
      shape percent 20
 wrr-queue weight 1
      queue-limit 70 packets
      bandwidth percent 18
           output       : 1 packets, 64 bytes
           dropped      : 0 packets, 0 bytes

     Class-map (queuing): cq2
      match qos-group 2
      shape percent 80
 wrr-queue weight 1
      queue-limit 70 packets
      bandwidth percent 75
           output       : 10871860 packets, 695799040 bytes
```

```
           dropped      : 13743831 packets, 879605184 bytes

Class-map (queuing): empty6
 shape average 500 mbps
 wrr-queue weight 1
 bandwidth 450 mbps

     Service-policy (queuing) output: P3P4
     ----------------------------------
     Class-map (queuing): empty3
      shape percent 40
 wrr-queue weight 1
      bandwidth percent 35

          Service-policy (queuing) output: P3
          -----------------------------------
          Class-map (queuing): cq5
           shape percent 40
 wrr-queue weight 1
           queue-limit 100 packets
           bandwidth percent 35
                output       : 0 packets, 0 bytes
                dropped      : 0 packets, 0 bytes

          Class-map (queuing): cq6
           match qos-group 6
           shape percent 60
 wrr-queue weight 1
           queue-limit 100 packets
           bandwidth percent 55
                output       : 0 packets, 0 bytes
                dropped      : 0 packets, 0 bytes

     Class-map (queuing): empty4
      shape percent 60
 wrr-queue weight 1
      bandwidth percent 50

          Service-policy (queuing) output: P4
          -----------------------------------
          Class-map (queuing): cq7
           match qos-group 7
           shape percent 40
 wrr-queue weight 1
           random-detect min-threshold 80 max-threshold 100 packets
bytes
kbytes
percent
           bandwidth percent 35
                output       : 0 packets, 0 bytes
```

```
                dropped      : 0 packets, 0 bytes

           Class-map (queuing): cq8
            match qos-group 8
            shape percent 60
 wrr-queue weight 1
            random-detect min-threshold 80 max-threshold 100 packets
bytes
kbytes
percent
            bandwidth percent 55
                 output       : 0 packets, 0 bytes
                 dropped      : 0 packets, 0 bytes

Service-policy (queuing) output: default-out-policy
-----------------------------------
Class-map (queuing): q0
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q1
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q2
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q3
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q4
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q5
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): q6
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
```

```
Class-map (queuing): q7
 priority level 1
      output       : 2488 packets, 159492 bytes
      dropped      : 3 packets, 192 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q7
      output       : 13 packets, 884 bytes
      dropped      : 0 packets, 0 bytes

Wred Drop Statistics :
----------------------
 green  : 13743818 packets
 yellow : 0 packets
 red    : 0 packets
```

# CHAPTER 17 VXLAN Quality of Service Configuration

This chapter contains the configurations for VXLAN Quality of Service (QoS) .

## Overview

VXLAN enables multiple tenants to operate in a data center. Each tenant is assigned a priority group to prioritize their traffic. Cloud carriers want to use quality of service to differentiate different applications.

Data center networks are being increasingly used by telecommunications operators as well as by enterprises. Currently these networks are organized as one large Layer 2 network in a single building. In some cases such a network is extended geographically using Virtual Local Area Network (VLAN) technologies as an even larger Layer 2 network connecting the virtual machines (VM), each with its own MAC address.

Multiple tenants might want their own isolated network domain. In a data center hosting multiple tenants, each tenant may independently assign MAC addresses and VLAN IDs and this might lead to duplication.

Cloud carriers wish to categorize the traffic based on the application such as voice, video, etc. Based on the type of the application different traffic classes may be identified and different priority levels can be assigned to each. To do so, quality of service marking is needed in VXLAN.

This chapter shows how to mark packet headers with the VXLAN tunnel end point (VTEP) when the frames are introduced by the virtual machines. The (re)marking /setting of QoS field DSCP/TOS in the VXLAN IP header is done with the two modes which are set globally.

## Topology

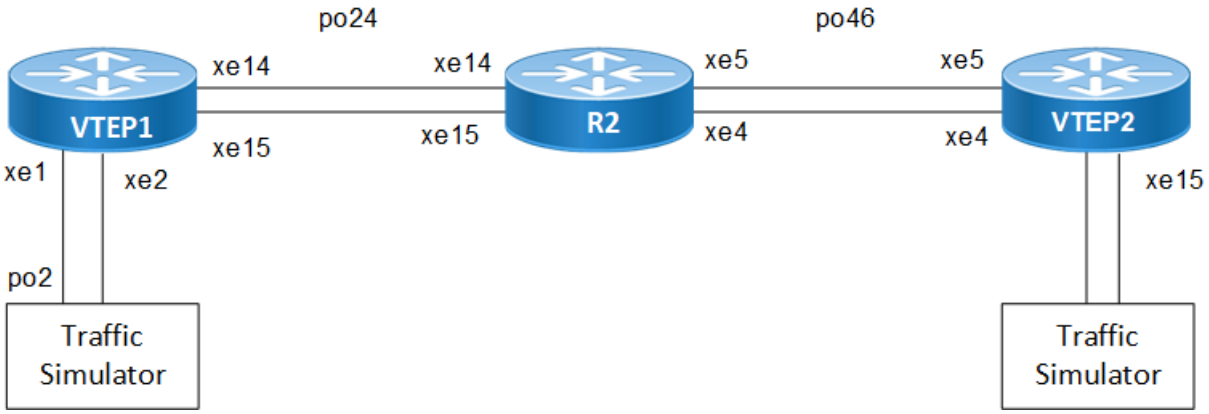



**Figure 17-18: VXLAN QoS**

## COS-DSCP

### RTR1/VTEP1

| | |
|---|---|
| `#configure terminal` | Enter Configure mode. |
| `(config)#mac vrf vrf1` | Create mac routing/forwarding instance with vrf1 name and enter into vrf mode |

| | |
|---|---|
| (config-vrf)#rd 1.1.1.1:11 | Assign RD value |
| (config-vrf)#route-target both 10.10.10.10:100 | Assign route-target value for import/export |
| (config-vrf)#exit | Exit from vrf mode |
| (config)#qos enable | Enable qos |
| (config)#qos profile cos-to-queue COS-QUE | Create qos profile for mapping traffic towards tunnel from access-if. |
| (config-ingress-cos-map)#cos 2 queue 3 | Configure particular COS value to the queue value for configured profile. |
| (config-ingress-cos-map)#exit | Exit from qos profile config mode |
| (config)#qos profile queue-color-to-dscp QUE-DSCP | Create qos profile for attaching in vxlan tunnel egress. |
| (config-egress-dscp-map)#queue 3 dscp 16 | Configure particular queue value to the dscp value for configured profile. |
| (config-egress-dscp-encap-map)#exit | Exit from qos profile config mode |
| (config)#interface po2 | Create a port channel po2 |
| (config-if)#switchport | Configure port as switchport |
| (config-if)#load-interval 30 | Set load-interval |
| (config-if)#interface po24 | Create a port channel po24 |
| (config-if)#load-interval 30 | Configure port as switchport |
| (config-if)#ip address 24.1.1.1/30 | Set load-interval |
| (config-if)#interface lo | Enter in to loopback interface |
| (config-if)#ip address 1.1.1.1/32 secondary | Configure ip address |
| (config-if)#interface xe1 | Enter in to interface mode |
| (config-if)#channel-group 2 mode active | Map to channel-group |
| (config-if)#interface xe2 | Enter in to interface mode |
| (config-if)#channel-group 2 mode active | Map to channel-group |
| (config-if)#interface xe14 | Enter in to interface mode |
| (config-if)#channel-group 24 mode ac-tive | Map to channel-group |
| (config-if)#interface xe15 | Enter in to interface mode |
| (config-if)#channel-group 24 mode ac-tive | Map to channel-group |
| (config-if)#router ospf 1 | Create ospf instance |
| (config-router)#ospf router-id 1.1.1.1 | Configure ospf router-id |
| (config-router)#network 1.1.1.1/32 area 0.0.0.0 | Configure loopback network address in to ospf |
| (config-router)#network 24.1.1.0/30 area 0.0.0.0 | Configure network address in to ospf |
| (config-router)#router bgp 100 | Enter into Router BGP mode |
| (config-router)#neighbor 6.6.6.6 re-mote-as 100 | Specify a neighbor router with peer ip address and remote-as defined |
| (config-router)#neighbor 6.6.6.6 up-date-source lo | Specify the neighbor to use loopback address as source |
| (config-router)#address-family l2vpn evpn | Enter into l2vpn evpn address-family |
| (config-router-af)#neighbor 6.6.6.6 activate | Activate the neighbor to address-family |

| | |
|---|---|
| (config-router)#nvo vxlan vtep-ip-global 1.1.1.1 | Configure Source vtep-ip-global configuration |
| (config)#nvo vxlan tunnel qos-map-mode cos-dscp egress QUE-DSCP | Configure the mapping qos profile in to vxlan tunnel egress |
| (config)#nvo vxlan id 1 in-gress-replication inner-vid-disabled | Create vnid 1 and disable inner-vid |
| (config-nvo)#vxlan host-reachability-protocol evpn-bgp vrf1 | Assign vrf for evpn-bgp to carry EVPN route |
| (config-nvo)#nvo vxlan access-if port-vlan po2 1001 | Create vxlan access-if with vlan 1001 |
| (config-nvo-acc-if)#no shutdown | No shut the vxlan access-if |
| (config-nvo-acc-if)#map vnid 1 | Map vnid to the vxlan access-if |
| (config-nvo-acc-if)#map qos-profile cos-to-queue COS-QUE | Map qos profile for vxlan access-if ingress traffic from CE |
| (config-nvo-acc-if)#exit | Exit from VxLAN access-interface mode and enter into configuration mode. |
| (config)#commit | Commit the candidate configuration to the running configuration |

**R2**

| | |
|---|---|
| #configure terminal | Enter Configure mode. |
| (config)#interface po24 | Create port channel |
| (config-if)#load-interval 30 | Set load-interval |
| (config-if)#ip address 24.1.1.2/30 | Assign ip address |
| (config-if)#interface po46 | Create port channel |
| (config-if)#load-interval 30 | Set load-interval |
| (config-if)#ip address 46.1.1.1/30 | Assign ip address |
| (config-if)#interface lo | Enter in to loopback interface |
| (config-if)#ip address 4.4.4.4/32 sec-ondary | Assign secondary ip address |
| (config-if)#interface xe4 | Enter into interface mode |
| (config-if)#channel-group 46 mode active | Map port channel to the interface |
| (config-if)#interface xe5 | Enter into interface mode |
| (config-if)#channel-group 46 mode active | Map port channel to the interface |
| (config-if)#interface xe14 | Enter into interface mode |
| (config-if)#channel-group 24 mode active | Map port channel to the interface |
| (config-if)#interface xe15 | Enter into interface mode |
| (config-if)#channel-group 24 mode active | Map port channel to the interface |
| (config-if)#router ospf 1 | Create ospf instance |
| (config-router)#ospf router-id 4.4.4.4 | Configure ospf router-id |
| (config-router)#network 4.4.4.4/32 area 0.0.0.0 | Configure ospf network address with respective area |
| (config-router)#network 24.1.1.0/30 area 0.0.0.0 | Configure ospf network address with respective area |

| | |
|---|---|
| (config-router)#network 46.1.1.0/30 area 0.0.0.0 | Configure ospf network address with respective area |
| (config-router)#exit | Exit from router mode. |
| (config)#commit | Commit the candidate configuration to the running configuration |

**RTR3/VTEP2**

| | |
|---|---|
| #configure terminal | Enter Configuration mode |
| (config)#mac vrf vrf1 | Create mac routing/forwarding instance with vrf1 name and enter into vrf mode |
| (config-vrf)#rd 6.6.6.6:11 | Assign RD value |
| (config-vrf)#route-target both 10.10.10.10:100 | Assign route-target value for import/export |
| (config-vrf)#exit | Exit from vrf mode |
| (config)#qos enable | Enable QOS |
| (config)#qos statistics | Enable QOS statistics |
| (config)#qos profile queue-color-to-cos QUE-COS | Create qos profile for mapping incoming traffic from tunnel to access-if. |
| (config-egress-cos-map)#queue 4 cos 5 | Configure particular queue value to the cos value for configured profile. |
| (config-egress-cos-map)#qos profile dscp-to-queue DSCP-QUE | Create qos profile for attaching in vxlan tunnel ingress. |
| (config-ingress-dscp-map)#dscp 16 queue 4 | Configure particular dscp value to the queue value for configured profile. |
| (config-egress-dscp-map)#interface po46 | Create port channel |
| (config-if)#load-interval 30 | Set load interval |
| (config-if)#ip address 46.1.1.2/30 | Assign ip address |
| (config-if)#interface lo | Enter into loopback interface |
| (config-if)#ip address 6.6.6.6/32 secondary | Assign secondary ip address |
| (config-if)#interface xe4 | Enter into interface mode |
| (config-if)#channel-group 46 mode active | Map channel group into the interface |
| (config-if)#interface xe5 | Enter into interface mode |
| (config-if)#channel-group 46 mode active | Map channel group into the interface |
| (config-if)#interface xe15 | Enter into interface mode |
| (config-if)#switchport | Make interface as L2 port |
| (config-if)#load-interval 30 | Set load interval |
| (config-if)#router ospf 1 | Create ospf instance |
| (config-router)#ospf router-id 6.6.6.6 | Configure ospf router-id |
| (config-router)#network 6.6.6.6/32 area 0.0.0.0 | Configure ospf network address with respective area |
| (config-router)#network 46.1.1.0/30 area 0.0.0.0 | Configure ospf network address with respective area |
| (config-router)#router bgp 100 | Enter into Router BGP mode |

| | |
|---|---|
| (config-router)#neighbor 1.1.1.1 re-mote-as 100 | Specify a neighbor router with peer ip address and remote-as defined |
| (config-router)#neighbor 1.1.1.1 up-date-source lo | Specify the neighbor to use loopback address as source |
| (config-router)#address-family l2vpn evpn | Enter into l2vpn evpn address-family |
| (config-router-af)#neighbor 1.1.1.1 activate | Activate the neighbor to address-family |
| (config)#nvo vxlan vtep-ip-global 6.6.6.6 | Configure Source vtep-ip-global configuration |
| (config)#nvo vxlan tunnel qos-map-mode cos-dscp ingress DSCP-QUE | Configure the mapping qos profile in to vxlan tunnel ingress |
| (config)#nvo vxlan id 1 in-gress-replication inner-vid-disabled | Create vnid 1 and disable inner-vid |
| (config-nvo)#vxlan host-reachability-protocol evpn-bgp vrf1 | Assign vrf for evpn-bgp to carry EVPN route |
| (config-nvo)#nvo vxlan access-if port-vlan xe15 1000 | Create vxlan access-if with vlan 1000 |
| (config-nvo-acc-if)#no shutdown | No shut the vxlan access-if |
| (config-nvo-acc-if)#map vnid 1 | Map vnid to the vxlan access-if |
| (config-nvo-acc-if)#map qos-profile queue-color-to-cos QUE-COS | Map qos profile for vxlan access-if egress traffic to CE |
| (config-nvo-acc-if)#exit | Exit from VxLAN access-interface mode and enter into configuration mode |
| (config)#commit | Commit the candidate configuration to the running configuration |

## Validation

As per the QoS configuration, when L2 traffic with cos value 2 sent to VTEP1 access-if, the packets forwarded to queue 3 and packets in queue 3 are mapped with overlay dscp value 16 while egress out of tunnel. At VTEP2, when packets with overlay dscp value 16 ingresses at tunnel, it is forwarded to queue 4 and packets of queue 4 are remarked with cos value 5.

### RTR1/VTEP1

```
VTEP1#sh run nvo vxlan
!
nvo vxlan enable
!
nvo vxlan vtep-ip-global 1.1.1.1
!
nvo vxlan tunnel qos-map-mode cos-dscp egress QUE-DSCP
!
nvo vxlan id 1 ingress-replication inner-vid-disabled
 vxlan host-reachability-protocol evpn-bgp vrf1
!
nvo vxlan access-if port-vlan po2 1001
 map vnid 1
 map qos-profile cos-to-queue COS-QUE
!
VTEP1#show run qos
qos enable
```

```
!
qos profile cos-to-queue COS-QUE
 cos 2 dei all queue 3
!
qos profile queue-color-to-dscp QUE-DSCP
 queue 3 color all dscp 16
!

VTEP1#show interface xe14 count queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
+--------------------+--------+-----------------+-------------------+-----------------
+-------------------+
|   Queue/Class-map  | Q-Size |     Tx pkts     |     Tx bytes      |  Dropped pkts   |
Dropped bytes   |
+--------------------+--------+-----------------+-------------------+-----------------
+-------------------+
q0                (E) 12517376 0                 0                   0                 0
q1                (E) 12517376 0                 0                   0                 0
q2                (E) 12517376 0                 0                   0                 0
q3                (E) 12517376 205284588         188040683524        0                 0
q4                (E) 12517376 0                 0                   0                 0
q5                (E) 12517376 0                 0                   0                 0
q6                (E) 12517376 0                 0                   0                 0
q7                (E) 12517376 7518              1007412             0                 0

VTEP1#show interface xe15 count queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
+--------------------+--------+-----------------+-------------------+-----------------
+-------------------+
|   Queue/Class-map  | Q-Size |     Tx pkts     |     Tx bytes      |  Dropped pkts   |
Dropped bytes   |
+--------------------+--------+-----------------+-------------------+-----------------
+-------------------+
q0                (E) 12517376 0                 0                   0                 0
q1                (E) 12517376 0                 0                   0                 0
q2                (E) 12517376 0                 0                   0                 0
q3                (E) 12517376 205624494         188352040168        0                 0
q4                (E) 12517376 0                 0                   0                 0
q5                (E) 12517376 0                 0                   0                 0
q6                (E) 12517376 0                 0                   0                 0
q7                (E) 12517376 9006              1136741             0                 0

VTEP1#show nvo vxlan
VXLAN Information
================
   Codes: NW - Network Port
           AC - Access Port
          (u) - Untagged

VNID     VNI-Name     VNI-Type Type Interface ESI                           VLAN DF-Status
Src-Addr         Dst-Addr
```

```
_____________________________________________________________________________________________
_____________________________________
1        ----         L2       NW   ----      ----                          ---- ----
1.1.1.1          6.6.6.6
1       ----        AC   po2      --- Single Homed port ---    1001 ----     ----
----

Total number of entries are 3

VTEP1#show nvo vxlan mac-table
=============================================================================================
============================================================
                                                                VXLAN MAC Entries
=============================================================================================
============================================================
VNID      Interface  VlanId Inner-VlanId Mac-Addr       VTEP-Ip/ESI
Type                 Status              AccessPortDesc
_____________________________________________________________________________________________
_____________________________________________________________

1         po2        1001   ----         0000.2000.9991 1.1.1.1
Dynamic Local        -------             -------

Total number of entries are : 1

VTEP1#show nvo vxlan tunnel
VXLAN Network tunnel Entries
 Source           Destination      Status          Up/Down        Update
=============================================================================
1.1.1.1          6.6.6.6          Installed       00:11:29        00:11:29

Total number of entries are 2

VTEP1#show qos-profile COS-QUE
profile name: COS-QUE
profile type: cos-to-queue
profile attached to 1 instances
configured mapping:
 cos 2 dei all queue 3
Detailed mapping:
 ---------------+----------------- | ---------------+-----------------
      INPUT     |     OUTPUT       |      INPUT     |     OUTPUT
 ---------------+----------------- | ---------------+-----------------
   COS  |  DEI  | Queue |  Color   |   COS  |  DEI  | Queue |  Color
 -------+-------+-------+--------- | -------+-------+-------+---------
  0       0       0       green    |  0       1       0       yellow
  1       0       1       green    |  1       1       1       yellow
  2       0       3       green    |  2       1       3       yellow
  3       0       3       green    |  3       1       3       yellow
  4       0       4       green    |  4       1       4       yellow
  5       0       5       green    |  5       1       5       yellow
  6       0       6       green    |  6       1       6       yellow
```

```
  7       0       7       green    |  7       1       7       yellow

VTEP1#show qos-profile QUE-DSCP
profile name: QUE-DSCP
profile type: queue-color-to-dscp
profile attached to 1 instances
configured mapping:
 queue 3 color all dscp 16
Detailed mapping:
 ----------------+-------- | ----------------+-------- | ----------------+--------
      INPUT      | OUTPUT  |      INPUT      | OUTPUT  |      INPUT      | OUTPUT
 ----------------+-------- | ----------------+-------- | ----------------+--------
  Queue | Color  | DSCP    |  Queue | Color  | DSCP    |  Queue | Color  | DSCP
 -------+--------+-------- | -------+--------+-------- | -------+--------+--------
  0       green    0       |  0       yellow   0       |  0       red      0
  1       green    10      |  1       yellow   12      |  1       red      14
  2       green    18      |  2       yellow   20      |  2       red      22
  3       green    16      |  3       yellow   16      |  3       red      16
  4       green    34      |  4       yellow   36      |  4       red      38
  5       green    40      |  5       yellow   40      |  5       red      40
  6       green    48      |  6       yellow   48      |  6       red      48
  7       green    56      |  7       yellow   56      |  7       red      56
```

**RTR2/VTEP2**

```
VTEP2#show run nvo vxlan
!
nvo vxlan enable
!
nvo vxlan vtep-ip-global 6.6.6.6
!
nvo vxlan tunnel qos-map-mode cos-dscp ingress DSCP-QUE
!
nvo vxlan id 1 ingress-replication inner-vid-disabled
 vxlan host-reachability-protocol evpn-bgp vrf1
!
nvo vxlan access-if port-vlan xe15 1000
 map vnid 1
 map qos-profile queue-color-to-cos QUE-COS
!
!
VTEP2#show run qos
qos enable
qos statistics
!
qos profile queue-color-to-cos QUE-COS
 queue 4 color all cos 5
!
qos profile dscp-to-queue DSCP-QUE
```

```
 dscp 16 queue 4
!
VTEP2#show nvo vxlan mac-table

================================================================================================
============================================================
                                                              VXLAN MAC Entries
================================================================================================
============================================================
VNID      Interface  VlanId Inner-VlanId Mac-Addr       VTEP-Ip/ESI
Type                 Status              AccessPortDesc
------------------------------------------------------------------------------------------------
------------------------------------------------------------

1         ----       ----   ----         0000.2000.9991 1.1.1.1
Dynamic Remote       -------             -------

Total number of entries are : 1

VTEP2#show nvo vxlan tunnel
VXLAN Network tunnel Entries
 Source           Destination      Status          Up/Down        Update
================================================================================
6.6.6.6          1.1.1.1          Installed       00:09:39        00:09:39

Total number of entries are 2
VTEP2#show nvo vxlan
VXLAN Information
=================
   Codes: NW - Network Port
          AC - Access Port
         (u) - Untagged

VNID    VNI-Name    VNI-Type Type Interface ESI                            VLAN DF-Status
Src-Addr         Dst-Addr
------------------------------------------------------------------------------------------------
----------------------------------------
1       ----        L2       NW   ----     ----                           ---- ----
6.6.6.6          1.1.1.1
1       ----        AC   xe15     --- Single Homed port ---    1000 ----     ----
----

Total number of entries are 3

VTEP2#show interface xe15 count queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
+--------------------+--------+-----------------+------------------+----------------
+------------------+
|   Queue/Class-map  | Q-Size |     Tx pkts     |     Tx bytes     |  Dropped pkts   |
Dropped bytes   |
+--------------------+--------+-----------------+------------------+----------------
+------------------+
q0                (E) 12517376 0                 0                  0                0
```

```
q1                (E) 12517376 0                 0                  0                  0
q2                (E) 12517376 0                 0                  0                  0
q3                (E) 12517376 0                 0                  0                  0
q4                (E) 12517376 37895872          36455829826        0                  0
q5                (E) 12517376 0                 0                  0                  0
q6                (E) 12517376 0                 0                  0                  0
q7                (E) 12517376 0                 0                  0                  0

VTEP2#show qos-profile QUE-COS
profile name: QUE-COS
profile type: queue-color-to-cos
profile attached to 1 instances
configured mapping:
 queue 4 color all cos 5
Detailed mapping:
 ----------------+-------- | ----------------+-------- | ----------------+--------
      INPUT      | OUTPUT  |      INPUT      | OUTPUT  |      INPUT      | OUTPUT
 ----------------+-------- | ----------------+-------- | ----------------+--------
  Queue | Color  | COS     |  Queue | Color  | COS     |  Queue | Color  | COS
 -------+--------+-------- | -------+--------+-------- | -------+--------+--------
  0       green    0       |  0       yellow   0       |  0       red      0
  1       green    1       |  1       yellow   1       |  1       red      1
  2       green    2       |  2       yellow   2       |  2       red      2
  3       green    3       |  3       yellow   3       |  3       red      3
  4       green    5       |  4       yellow   5       |  4       red      5
  5       green    5       |  5       yellow   5       |  5       red      5
  6       green    6       |  6       yellow   6       |  6       red      6
  7       green    7       |  7       yellow   7       |  7       red      7

VTEP2#show qos-profile DSCP-QUE
profile name: DSCP-QUE
profile type: dscp-to-queue
profile attached to 1 instances
configured mapping:
 dscp 16 queue 4
Detailed mapping:
 Ingress map for dscp to queue-color
 -------+----------------- | -------+----------------- | -------+----------------- | --
-----+-----------------
  INPUT |     OUTPUT       |  INPUT |     OUTPUT       |  INPUT |     OUTPUT       |
INPUT |     OUTPUT
 -------+----------------- | -------+----------------- | -------+----------------- | --
-----+-----------------
  DSCP  | Queue | Color    |  DSCP  | Queue | Color    |  DSCP  | Queue | Color    |  DSCP
| Queue | Color
 -------+-------+--------- | -------+-------+--------- | -------+-------+--------- | --
-----+-------+---------
  0       0       green    |  16      4       green    |  32      4       green    |  48
6       green
  1       0       green    |  17      2       green    |  33      4       green    |  49
6       green
```

```
  2       0       green    |  18      2       green    |  34      4       green    |  50
6       green
  3       0       green    |  19      2       green    |  35      4       green    |  51
6       green
  4       0       green    |  20      2       yellow   |  36      4       yellow   |  52
6       green
  5       0       green    |  21      2       green    |  37      4       green    |  53
6       green
  6       0       green    |  22      2       red      |  38      4       red      |  54
6       green
  7       0       green    |  23      2       green    |  39      4       green    |  55
6       green
  8       1       green    |  24      3       green    |  40      5       green    |  56
7       green
  9       1       green    |  25      3       green    |  41      5       green    |  57
7       green
  10      1       green    |  26      3       green    |  42      5       green    |  58
7       green
  11      1       green    |  27      3       green    |  43      5       green    |  59
7       green
  12      1       yellow   |  28      3       yellow   |  44      5       green    |  60
7       green
  13      1       green    |  29      3       green    |  45      5       green    |  61
7       green
  14      1       red      |  30      3       red      |  46      5       green    |  62
7       green
  15      1       green    |  31      3       green    |  47      5       green    |  63
7       green
```

# CHAPTER 18 FP Rules Queuing Configuration

This chapter contains basic information about cpu-queue properties and complete sample configuration for cpu-queue properties.

DUT has many CPU queues for management/classification of control traffic and provides rate limiters for control plane protection. Different types of CPU port bound packets are queued in different cpu-queues each with different properties like rate, queue-limit, monitoring status and drop status.

## Topology




**Figure 18-19: Simple configuration of CPU Queuing**

## Default Values

```
R1#show cpu-queue details
* - Can not configure the parameter
Cpu queue       Rate In PPS              Lossy Status            Monitor Status
Name      Configured  Default     Configured  Default     Configured  Default
========= ==========  =======     ==========  ==========  ==========
==========
sflow          -       32000          -       *lossy          -        monitor
bgp            -       1500           -        lossless       -        monitor
vrrp           -       500            -        lossless       -        monitor
rip            -       500            -        lossless       -        monitor
ospf           -       2000           -        lossless       -        monitor
dhcp           -       100            -        lossy          -        no-
monitor
nd             -       6000           -        lossless       -        monitor
pim            -       4000           -       *lossy          -       *no-
monitor
arp            -       6000           -        lossless       -        monitor
igmp           -       4000           -       *lossy          -       *no-
monitor
bpdu           -       10000          -        lossless       -        monitor
ccm            -       500            -        lossy          -        no-
monitor
bfd            -       2000           -        lossy          -        no-
monitor
ptp            -       1000           -        lossy          -        no-
monitor
isis           -       500            -        lossless       -        monitor
trill-isis     -       1000           -        lossless       -        monitor
acl            -       200            -       *lossy          -       *no-
monitor
vxlan          -       500            -        lossy          -        monitor
```

Note: Enable feature before validating cpu-queue for that protocol.

Monitor option will generate operational log, if it reaches above 90%. Log generation will stop, when it goes below 90%.

1. 2001 Jan 07 22:29:03.345 : R1 : HSL : NOTIF : [CPU_RATE_HIGH_4]: Average CPU queue rate for bpdu is 90% (540 pkts/sec).
2. 2001 Jan 07 22:29:08.346 : R1 : HSL : NOTIF : [CPU_QUEUE_RECOVERED_4]: CPU queue rate for bpdu is back to normal. Current average rate is 89%.

Lossless option will drop the traffic at ingress interface. We can use "show interface counters indiscard-stats" to verify the drop. Packets will be incremented in IBP Discards column.

Lossy option will drop the traffic at cpu. We can use “show interface cpu counters queue-stats`” to verify the drop.

“disable l3-protocols-cpu vxlan” command is used, when sending traffic to vxlan interface. In Vxlan, arp and nd traffic will go to vxlan queue. Remaining traffics are considered as data traffic.

## Configuring CPU Queuing Lossless

Do the following to configure CPU queuing on an interface.

| | |
|---|---|
| `#configure terminal` | |
| `(config)#bridge 1 protocol rstp` | Configure Bridge 1 |
| `(config)#int xe52/2` | |
| `(config)#switchport` | Configure interface as L2 |
| `(config-cmap-qos)#bridge-group 1` | Configure bridge 1 in interface |
| `(config-cmap-qos)#int xe52/3` | |
| `(config-cmap-qos)#switchport` | Configure interface as L2 |
| `(config)#bridge-group 1` | Configure bridge 1 in interface |
| `(config-cmap-qos)#exit` | |
| `(config)#cpu-queue bpdu rate 600 lossless no-monitor` | Configure bpdu cpu-queue with rate of 600 pps and lossless and no-monitor option |

## Validation

Enter the commands listed in the sections below to confirm the configurations.

```
R1(config)#do show running-config | inc cpu
cpu-queue bpdu rate 600 lossless no-monitor
R1(config)#
R1(config)#do show cpu-queue details
* - Can not configure the parameter
Cpu queue       Rate In PPS             Lossy Status            Monitor Status
Name      Configured  Default     Configured  Default     Configured  Default
========= ==========  =======     ==========  ==========  ==========
===========
sflow         -       32000           -       *lossy          -        monitor
bgp           -       1500            -        lossless       -        monitor
```

```
vrrp          -       500             -       lossless       -        monitor
rip           -       500             -       lossless       -        monitor
ospf          -       2000            -       lossless       -        monitor
dhcp          -       100             -       lossy          -        no-
monitor
nd            -       6000            -       lossless       -        monitor
pim           -       4000            -      *lossy          -       *no-
monitor
arp           -       6000            -       lossless       -        monitor
igmp          -       4000            -      *lossy          -       *no-
monitor
bpdu      600         10000       lossless    lossless   no-monitor   monitor
ccm           -       500             -       lossy          -        no-
monitor
bfd           -       2000            -       lossy          -        no-
monitor
ptp           -       1000            -       lossy          -        no-
monitor
isis          -       500             -       lossless       -        monitor
trill-isis    -       1000            -       lossless       -        monitor
acl           -       200             -      *lossy          -       *no-
monitor
vxlan         -       500             -       lossy          -        monitor
R1(config)#do clear interface cpu counters
R1(config)#do clear interface counters

R1(config)#do show interface counters rate
+-------------------+-------------+------------+-------------+------------
+
|     Interface     |    Rx bps   |    Rx pps  |    Tx bps   |    Tx pps
|
+-------------------+-------------+------------+-------------+------------
+
 po1                436           0            2980          5
 po2                768714        1372         769045        1373
 xe52/1             0             0            44            0
 xe52/2             0             0            263           0
 xe52/3             669424827     99971        263           0
 xe53/1             33            0            788           1
 xe53/2             33            0            719           1
 xe53/3             336           0            702           1
 xe53/4             33            0            769           1
 xe54/1             192176        343          192014        342
 xe54/2             192166        343          192292        343
 xe54/3             192150        343          192348        343
 xe54/4             192204        343          192390        343
R1(config)#do show interface cpu counters rate
Load interval: 30 second
+-------------------+-------------+------------+-------------+------------
+
|    CPU Queue(%)   |    Rx bps   |    Rx pps  |    Tx bps   |    Tx pps
|
+-------------------+-------------+------------+-------------+------------
+
 hw-bfd       ( N/A) -             -            101679        1374
 bpdu         (100%) -             -            436856        600
 ospf         (  0%) -             -            84            0
 bgp          (  0%) -             -            44            0
R1(config)#do show interface cpu counters rate
```

```
Load interval: 30 second
+-------------------+-------------+-------------+-------------+-------------
+
|    CPU Queue(%)   |    Rx bps    |    Rx pps   |    Tx bps    |    Tx pps
|
+-------------------+-------------+-------------+-------------+-------------
+
 hw-bfd        ( N/A) -              -             101574         1372
 bpdu          ( 99%) -              -             433465         599
 ospf          (  0%) -              -             39             0
 bgp           (  0%) -              -             44             0

R1(config)#do show interface cpu counters queue-sta
E - Egress, I - Ingress, Q-Size is in bytes
+--------------------+--------+----------------+------------------+---------
--------+-------------------+
|   Queue/Class-map  | Q-Size |     Tx pkts     |     Tx bytes      |  Dropped
pkts   |   Dropped bytes   |
+--------------------+--------+----------------+------------------+---------
--------+-------------------+
hw-bfd           (E) 0       130582           9663068           0
0
bpdu            (E) 2706080  57086            41576707          0
0
arp              (E) 0       2                136               0
0
ospf             (E) 0       35               4658              0
0
bgp              (E) 0       95               7030              0
0


R1(config)#do show interface counters indiscard-stats
+------------+------------------+--------------+--------------------+---------
-----+------------------+--------------+--------------------+
|  Interface  | Port Block Drops | Vlan Discards | ACL/QOS Drops | Policy
Discards | EGR Port Unavail | IBP Discards |   Total Discards   |
+-------------+------------------+---------------+--------------------+---------
-----+------------------+--------------+--------------------+
 xe52/3       0                  0               0              0
0                  13080579       13080579

Configuring cpu-queue with lossy
============================
```

## Configuring CPU Queuing Lossy

Do the following to configure CPU queuing on an interface.

| | |
|---|---|
| `#configure terminal` | |
| `R1(config)#cpu-queue  bpdu rate 500 lossy no-monitor` | Configure bpdu cpu-queue with rate of 500 pps and lossy and no-monitor option |
| `R1(config-if)#exit` | |

## Validation

Enter the commands listed in the sections below to confirm the configurations.

```
R1(config)#do clear interface cpu counters
R1(config)#do clear interface  counters
R1(config)#do show running-config | inc cpu
cpu-queue bpdu rate 500 lossy no-monitor
disable l3-protocols-cpu vxlan
R1(config)#do show cpu-queue details
* - Can not configure the parameter
Cpu queue       Rate In PPS             Lossy Status            Monitor Status
Name      Configured  Default     Configured  Default     Configured  Default
========= ==========  =======     ==========  ==========  ==========
==========
sflow          -       32000           -       *lossy          -        monitor
bgp            -       1500            -        lossless       -        monitor
vrrp           -       500             -        lossless       -        monitor
rip            -       500             -        lossless       -        monitor
ospf           -       2000            -        lossless       -        monitor
dhcp           -       100             -        lossy          -        no-
monitor
nd             -       6000            -        lossless       -        monitor
pim            -       4000            -       *lossy          -       *no-
monitor
arp            -       6000            -        lossless       -        monitor
igmp           -       4000            -       *lossy          -       *no-
monitor
bpdu      500          10000       lossy        lossless   no-monitor   monitor
ccm            -       500             -        lossy          -        no-
monitor
bfd            -       2000            -        lossy          -        no-
monitor
ptp            -       1000            -        lossy          -        no-
monitor
isis           -       500             -        lossless       -        monitor
trill-isis     -       1000            -        lossless       -        monitor
acl            -       200             -       *lossy          -       *no-
monitor
vxlan          -       500             -        lossy          -        monitor
R1(config)#do show interface counters rate
+-------------------+-------------+-------------+-------------+-------------
+
|     Interface     |    Rx bps    |    Rx pps   |    Tx bps    |    Tx pps
|
+-------------------+-------------+-------------+-------------+-------------
+
 po1                780            0             2974           5
 po2                769353         1373          769260         1373
 xe52/1             0              0             11             0
 xe52/2             0              0             248            0
 xe52/3             669564071      100000        248            0
 xe53/1             98             0             871            1
 xe53/2             98             0             692            1
 xe53/3             485            0             699            1
 xe53/4             98             0             710            1
 xe54/1             192647         343           192322         343
```

```
 xe54/2              191965         342           192280         343
 xe54/3              192466         343           192278         343
 xe54/4              192295         343           192416         343
R1(config)#do show interface cpu counters rate
Load interval: 30 second
+------------------+-------------+------------+-------------+------------
+
|    CPU Queue(%)   |    Rx bps    |    Rx pps   |    Tx bps    |    Tx pps
|
+------------------+-------------+------------+-------------+------------
+
 hw-bfd       ( N/A) -              -             101505         1371
 bpdu         ( 99%) -              -             345547         499
 ospf         (  0%) -              -             74             0
 bgp          (  0%) -              -             44             0
R1(config)#do show interface cpu counters rate
Load interval: 30 second
+------------------+-------------+------------+-------------+------------
+
|    CPU Queue(%)   |    Rx bps    |    Rx pps   |    Tx bps    |    Tx pps
|
+------------------+-------------+------------+-------------+------------
+
 hw-bfd       ( N/A) -              -             101505         1371
 bpdu         ( 99%) -              -             345547         499
 ospf         (  0%) -              -             74             0
 bgp          (  0%) -              -             44             0
R1(config)#do show cpu-queue details
cpu-queue bpdu rate 500 lossy no-monitor
disable l3-protocols-cpu vxlan
R1(config)#
R1(config)#
R1(config)#do show interface cpu counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
+--------------------+--------+-----------------+-------------------+---------
--------+--------------------+
|   Queue/Class-map  | Q-Size |     Tx pkts     |     Tx bytes      |  Dropped
pkts   |   Dropped bytes   |
+--------------------+--------+-----------------+-------------------+---------
--------+--------------------+
hw-bfd           (E) 0       78216           5787984           0
0
bpdu            (E) 978848   39290           27124511          7818876
6550244016
arp              (E) 0       2               136               0
0
ospf             (E) 0       21              3070              0
0
bgp              (E) 0       55              4070              0
0

R1(config)#do show interface counters indiscard-stats
+-------------+------------------+---------------+--------------+------------
-----+------------------+-------------+--------------------+
|  Interface  | Port Block Drops | Vlan Discards | ACL/QOS Drops | Policy
Discards | EGR Port Unavail | IBP Discards |   Total Discards   |
+-------------+------------------+---------------+--------------+------------
-----+------------------+-------------+--------------------+
 xe53/3       4                 0              0              0
4                  0              4
```

```
 xe54/1          3                   0                   0                   0
3                   0                   3
 xe54/2          2                   0                   0                   0
2                   0                   2
 xe54/3          1                   0                   0                   0
1                   0                   1
 xe54/4          3                   0                   0                   0
3                   0                   3
```

# CHAPTER 19 Rate Limiting BUM Traffic

To prevent the CPU from getting flooded with Broadcast, Unknown Unicast, and Multicast (BUM) traffic, rate limiting can be applied at the ingress interface. This configuration is called “storm control” and is independent of the QoS feature, and can be configured directly on the interface in the ingress direction.

## Configuring per port rate limiting for BUM traffic

BUM rate limiting can be configured on the interface via following command:

```
storm-control (errdisable|((broadcast|multicast|dlf) (level LEVEL | <0-4294967294>
(kbps|mbps|gbps|fps) burst-size <32-128000>)))
```

The `broadcast` option is for broadcast traffic, `multicast` option is for multicast traffic and `dlf` (Destination Lookup Failure) option is for unknown unicast traffic.

There are two ways to configure the rate limiting information. One is in percentage and the other is in absolute values. Use the level option to configure in percentage format where the link speed is used for rate calculation. Percentage value can be configured with up to four fractional digits in order to support kbps level rate limiting on 100 gbps ports, and the Absolute configuration option uses the input rate in kbps, mbps, fps, or gbps.

Burst-size is an optional parameter, if storm control is not configured with burst-size, default value is calculated as 5ms of configured rate to limit the traffic. Minimum of 32 Kbps burst will be allocated if the calculated value is below 32 Kbps.

An example of BUM rate limiting is shown below:

```
(config)#interface xe1
(config-if)#switchport
(config-if)#storm-control dlf 2 mbps
(config-if)#exit
```

In the configuration above, unknown unicast traffic received on `xe1` will be rate limited to 1.98 mbps. Burst-size is calculated as 32 Kbps.

Note:

- Minimum granularity for storm-control is 64kbps.
- Burst-range in XGS is 32-128000 Kbps.
- Storm Discard notification is sent in case of packet discards but not based on configuration.
- The maximum supported speed is 134 gbps (level 33) for storm-control on 400G interfaces.

## Storm Detection Time

Rate-limit setting should take place immediately after detecting storm. With existing burst size, rate limit is happening after few seconds, if burst size should be changed to a lower value so that rate-limiting happens immediately on the switch. Also, user have a provision to change burst size through CLI.

An example of BUM rate limiting with Burst-size configuration is shown below:

```
(config)#interface xe1
(config-if)#switchport
(config-if)#storm-control broadcast 600 kbps burst-size 15
(config-if)#exit
```

In the configuration above, broadcast traffic received on xe1 will be rate limited to 576 kbps and Burst-size is configured as 40 Kbps. If traffic sent at 700 kbps. Time taken to detect the storm should be 0.32 Seconds.

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Note: By default ARP/ND packet marked for drop by storm-control configuration will not get uplifted to CPU. Use `nvo vxlan disable-arp-storm-control-for-cpu` CLI to uplift the ARP/ND packet to CPU even if packet is marked for DROP by storm control.

## Storm Control Notifications

When storm control occurs in switch, there is no direct way for the user to identify the storm apart from discard counters with "show storm-control" CLI. So SNMP trap and syslog notifications are generated for the user to know about the storm control.

If storm-control occurs, based on the rate-limit discard counters, a Syslog notification and SNMP trap is generated. As the rate-limit packet discards stops, another syslog notification and SNMP trap is generated that storm packet discards are stopped.

## Displaying BUM rate limit information

Use the following command to verify BUM rate limit configuration:

```
show storm-control (INTERFACE-NAME|)
```

```
show storm-control
*The hardware applicable value is displayed
Port          BcastLevel(burst)               McastLevel(burst)               DlfLevel(burst)               Discards
xe1         576.000 kbps(40 Kbps)           100.0000%(0 Kbps)               1.984 mbps(32 Kbps)             125411

2021 Sep 23 19:51:09.639 : OcNOS : HSL : NOTIF : [IF_STORM_DISCARDS_4]: Storm control discards started on interface xe1 total
discards 364173

2021 Sep 23 19:52:45.740 : OcNOS : HSL : NOTIF : [IF_STORM_DISCARDS_4]: Storm control discards stopped on interface xe1 total
discards 1272806
```

# CHAPTER 20 Switch Packet Buffer Tuning

## Overview

The Switch packet buffer tuning, is a system aimed at enhancing network switch performance by avoiding congestion and packet drops. It refers to how a switch allocates packet buffer size based on traffic priority classes referred as Priority Groups (PG) instead of physical ports. Buffers temporarily store packets during congestion. Each PG competes for shared memory in the switch buffer pool.

In Data Center Bridging (DCB) or QoS (Quality of Service) implementations, traffic is grouped based on priority. Each group corresponds to a certain class of service, for example, storage traffic, control traffic, bulk data, best-effort, etc. Tuning the packet buffer size at the PG level ensures that each class of traffic gets the right amount of buffer space to avoid congestion and packet drops.

The section explains the configuration of packet buffers and CLIs introduced to implement the functionalities.

### Feature Characteristics

OcNOS can be customized to respond to Priority-based Flow Control (PFC) traffic to manage when to pause frames to prevent packet loss.

**Custom Device Responses and Ease of Configuration:** Switch Packet Buffer Tuning is indeed designed to allow for custom device responses to Priority-based Flow Control (PFC) pause storms. This feature grants users the ability to control precisely when the switch transmits pause frames to upstream devices. Furthermore, it simplifies configuration by enabling the global adjustment of buffer limits. Pausing the frames temporarily halt the traffic transmission with the link partner which effectively prevents the packet loss due to congestion.

**Priority Group (PG) Configuration:** Enables to configure each Priority Group (PG) port with a specific limit on the amount of shared memory it can receive. Priority groups are essential for classifying ingress packets based on their input priority.

**PFC XOFF Threshold and XON Offsets:** PGs can be configured using PFC XOFF threshold and XON offsets. XOFF threshold is an absolute value while XON limit is an offset from the XOFF limit.When the shared occupancy or receive buffer of an ingress PG reaches its configured PFC XOFF limit, the PG triggers the transmission of a PFC pause frame to its egress peer. This action signals the peer to stop sending packets, providing the device with the necessary time to alleviate traffic congestion. The primary purpose is to ensure that, during congestion at an egress port, the ingress port generates PFC frames based on these user-defined thresholds.

XOFF threshold default value is different for each platform, as follows:

- Tomahawk3 (TH3) platforms — 2 KB
- Tomahawk4 (TH4) platforms — 57409 KB
- Tomahawk 5  (TH5) platforms — 81659 KB
- Trident3 (TD3) platforms — 2 KB
- Trident 4 (TD4) platforms — 65489 KB

**Queue-Specific Buffer Limits with Dynamic Threshold (Alpha Value):** Beyond PG configuration, Switch Packet Buffer Tuning also enables users to adjust the limit of buffers that each individual queue can consume from the buffer shared pool. This fine-grained control is managed by a dynamic threshold setting, often referred to as the alpha value. Users can configure this dynamic threshold for different queues, thereby regulating their access to the shared buffer.

The implementation of Switch Packet Buffer Tuning is intended for LTSW chipsets (Tomahawk4 (TH4) platforms, Tomahawk 5  (TH5) platforms, TD4) and DC chipsets (Tomahawk3 (TH3) platforms, TD3).

**Limitation:**

Configuring XOFF threshold imposes static limit of PG queue size which take precedence over dynamic threshold. Hence, users can configure either XOFF threshold or dynamic threshold at a time.

Performing add, delete, or update operations on PG profiles will cause a system-wide traffic interruption, resulting in configured session flaps.

QoS buffer configuration using flow-control buffer commands are only applicable to ports or priorities only when flow control is enabled. The flow control buffer configurations are optional. If the configurations are not done, defaults are used.

## Benefits

Enables user to:

Customize device responses to PFC pause storms.

Avoid packet loss by pausing the traffic transmission using the PFC.

Globally adjust the limits of the buffers, leading to an ease of configuration.

# Prerequisites

To adjust the PG queue size using dynamic threshold, standard traffic forwarding is sufficient. However, for modifying XON or XOFF thresholds, the interface must have PFC enabled.

## Topology

The following topology shows PFC threshold values on priority group interfaces xe1 of Rotuer 1.

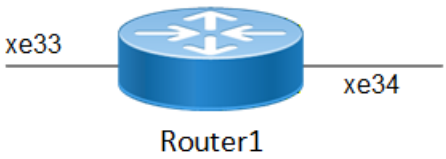



**Figure 20-20: PFC**

## Configuration using Single Router

The following procedure shows tje QoS profile mapping to ingress traffic to Priority Groups (PGs) and sets the XON/ XOFF thresholds for the desired lossless priority.

1. Assign QoS profiles mapping to priority group 3 and set dynamic threshold.

```
OcNOS(config)#qos profile ingress-pg-map PG_XOFF_TEST
OcNOS(config-ingress-pg-queue-map)#priority-group 3 dynamic-threshold 3
OcNOS(config-ingress-pg-queue-map)#commit
OcNOS(config)#int xe33
OcNOS(config-if)#qos map-profile ingress-pg-map PG_XOFF_TEST
OcNOS(config)#commit
```

   Refer to PG_XOFF_TEST section for validation.

2. Configure XON and XOFF thresholds for the priority group 3.

```
OcNOS(config)#qos profile ingress-pg-map PG_XOFF_TEST
OcNOS(config-ingress-pg-queue-map)#priority-group 3 xon-threshold 4000 xoff-threshold 2000
OcNOS(config-ingress-pg-queue-map)#commit
```

Refer to PG_XOFF_TEST section for validation.

3. Assign QoS profiles mapping to priority group 1 and set dynamic threshold.

```
OcNOS(config)#qos profile ingress-pg-map PG_LOSSLESS
OcNOS(config-ingress-pg-queue-map)#priority-group 1 dynamic-threshold 3
OcNOS(config-ingress-pg-queue-map)#commit
OcNOS(config-ingress-pg-queue-map)#
OcNOS(config)#
OcNOS(config)#int xe33
OcNOS(config-if)#qos map-profile ingress-pg-map PG_LOSSLESS
OcNOS(config-if)#comm
```

Refer to PG_LOSSLESS section for validation.

4. Configure XON and XOFF thresholds for the priority group 1.

```
OcNOS(config)#qos profile ingress-pg-map PG_LOSSLESS
OcNOS(config-ingress-pg-queue-map)#priority-group 1 xon-threshold 6000 xoff-threshold 3000
OcNOS(config-ingress-pg-queue-map)#commit
OcNOS(config-ingress-pg-queue-map)#
OcNOS(config)#
```

# Validation

## PG_XOFF_TEST

Verify the ingress (I) and egress (E) queue statistics, including queue size for interface `xe33 pg-3`.

```
OcNOS#sh int cou que
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+-------------+
 xe33               q7                   (E) 0              25               1600               0                0
 xe33               pg-q3                (I) 1259840        NA               NA                 NA               NA
 xe34               q3                   (E) 1272032        5087446          651193088          0                0
 xe34               q7                   (E) 0              26               1664               0                0
```

Look for the configured Priority Group `pg-3` (I) on `xe33` and the corresponding egress queue `q3` (E) on `xe34`. Ingress PG queue size (`pg-3` on `xe33`) is non-zero. This shows the ingress buffer is holding traffic before the PFC is triggered.

```
OcNOS#sh int cou que
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+-------------+
 xe33               q7                   (E) 0              29               1856               0                0
 xe33               pg-q3                (I) 1268984        NA               NA                 NA               NA
 xe34               q3                   (E) 1284224        5878738          752478464          0                0
```

```
 xe34              q7                   (E) 0              30               1920               0                  0
```

```
OcNOS#sh int cou que
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+-----------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface    |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+-----------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 xe33              q7                   (E) 0              31               1984               0                  0
 xe33              pg-q3                (I) 1262888        NA               NA                 NA                 NA
 xe34              q3                   (E) 1256792        6104794          781413632          0                  0
 xe34              q7                   (E) 0              31               1984               0                  0
```

Verify the number of PFC pause frames sent and received on **xe33 - pg3** interface and priority.

```
OcNOS#sh priority-flow-control statistics all
interface         pri   pause sent     pause received
=======================================================
xe33              0     0              0
xe33              1     0              0
xe33              2     0              0
xe33              3     231708         0
xe33              4     0              0
xe33              5     0              0
xe33              6     0              0
xe33              7     0              0
xe34              0     0              0
xe34              1     0              0
xe34              2     0              0
xe34              3     0              0
xe34              4     0              0
xe34              5     0              0
xe34              6     0              0
xe34              7     0              0
OcNOS#sh priority-flow-control statistics all
interface         pri   pause sent     pause received
=======================================================
xe33              0     0              0
xe33              1     0              0
xe33              2     0              0
xe33              3     236432         0
xe33              4     0              0
xe33              5     0              0
xe33              6     0              0
xe33              7     0              0
xe34              0     0              0
xe34              1     0              0
xe34              2     0              0
xe34              3     0              0
xe34              4     0              0
xe34              5     0              0
```

```
xe34              6     0              0
xe34              7     0              0
OcNOS#sh priority-flow-control statistics all
interface         pri   pause sent     pause received
=======================================================
xe33              0     0              0
xe33              1     0              0
xe33              2     0              0
xe33              3     238000         0
xe33              4     0              0
xe33              5     0              0
xe33              6     0              0
xe33              7     0              0
xe34              0     0              0
xe34              1     0              0
xe34              2     0              0
xe34              3     0              0
xe34              4     0              0
xe34              5     0              0
xe34              6     0              0
xe34              7     0              0
```

The PFC pause frame increases on the ingress interface `xe33` on `pg-3` when congestion is detected. This indicates that the switch is signaling the sender to stop sending traffic for this priority.

```
OcNOS#sh int cou que
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+-----------------+--------------------+-----------------+----------------+------------------+----------------+-------------+
|    Interface    |   Queue/Class-map  |      Q-Size     |     Tx pkts    |     Tx bytes     | Dropped pkts   |   Dropped bytes   |
+-----------------+--------------------+-----------------+----------------+------------------+----------------+-------------+
 xe33             q7                   (E) 0             47               3008               0                0
 xe33             pg-q3                (I) 1251712       NA               NA                 NA               NA
 xe34             q3                   (E) 1265936       9271354          1186733312         0                0
 xe34             q7                   (E) 0             47               3008               0                0
```

```
OcNOS#sh qos-profile ingress-pg-map interface xe33
profile name: PG_XOFF_TEST
 mapping:
  priority-group 0  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 1  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 2  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 3  xon-threshold 48  xoff-threshold 32   dynamic-threshold 3
  priority-group 4  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 5  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 6  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 7  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8

OcNOS#
```

Verify the XON and XOFF threshold value on interface `xe33`.

```
OcNOS#sh qos-profile ingress-pg-map interface xe33
```

```
profile name: PG_XOFF_TEST
 mapping:
  priority-group 0  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 1  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 2  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 3  xon-threshold 4000  xoff-threshold 2000   dynamic-threshold 3
  priority-group 4  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 5  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 6  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 7  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
OcNOS#
```

### PG_LOSSLESS

Verify the ingress (I) and egress (E) queue statistics, including queue size for interface `xe33 pg-3`.

```
OcNOS#sh int cou que
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
```

| Interface | Queue/Class-map | Q-Size | Tx pkts | Tx bytes | Dropped pkts | Dropped bytes |
|---|---|---|---|---|---|---|
| cd30 | mc-q3 | (E) 0 | 1 | 82 | 0 | 0 |
| xe33 | q7 | (E) 0 | 77 | 4928 | 0 | 0 |
| **xe33** | **pg-q3** | **(I) 1283970** | **NA** | **NA** | **NA** | **NA** |
| **xe34** | **q3** | **(E) 1283208** | **15150338** | **1939243264** | **0** | **0** |
| xe34 | q7 | (E) 0 | 77 | 4928 | 0 | 0 |

Look for the configured Priority Group `pg-3` (I) on `xe33` and the corresponding egress queue `q3` (E) on `xe34`. Ingress PG queue size (`pg-3` on `xe33`) is non-zero. This shows the ingress buffer is holding traffic before the PFC is triggered.

```
OcNOS#sh int cou que
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
```

| Interface | Queue/Class-map | Q-Size | Tx pkts | Tx bytes | Dropped pkts | Dropped bytes |
|---|---|---|---|---|---|---|
| cd30 | mc-q3 | (E) 0 | 1 | 82 | 0 | 0 |
| xe33 | q7 | (E) 0 | 78 | 4992 | 0 | 0 |
| **xe33** | **pg-q3** | **(I) 1283970** | **NA** | **NA** | **NA** | **NA** |
| **xe34** | **q3** | **(E) 1284224** | **15376274** | **1968163072** | **0** | **0** |
| xe34 | q7 | (E) 0 | 78 | 4992 | 0 | 0 |

```
OcNOS#sh int cou que
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
```

| Interface | Queue/Class-map | Q-Size | Tx pkts | Tx bytes | Dropped pkts | Dropped bytes |
|---|---|---|---|---|---|---|
| cpu | nd | (E) 0 | 1 | 86 | 0 | 0 |
| cd30 | mc-q3 | (E) 0 | 1 | 82 | 0 | 0 |
| xe33 | q7 | (E) 0 | 84 | 5376 | 0 | 0 |
| xe33 | mc-q0 | (E) 0 | 1 | 82 | 0 | 0 |
| **xe33** | **pg-q3** | **(I) 1283970** | **NA** | **NA** | **NA** | **NA** |
| **xe34** | **q3** | **(E) 1281176** | **16618658** | **2127188224** | **0** | **0** |

```
xe34            q7                (E) 0           85              5440            0               0

OcNOS#sh priority-flow-control statistics all
interface         pri   pause sent     pause received
=======================================================
xe33              0     0               0
xe33              1     0               0
xe33              2     0               0
xe33              3     773228          0
xe33              4     0               0
xe33              5     0               0
xe33              6     0               0
xe33              7     0               0
xe34              0     0               0
xe34              1     0               0
xe34              2     0               0
xe34              3     0               0
xe34              4     0               0
xe34              5     0               0
xe34              6     0               0
xe34              7     0               0
OcNOS#sh priority-flow-control statistics all
interface         pri   pause sent     pause received
=======================================================
xe33              0     0               0
xe33              1     0               0
xe33              2     0               0
xe33              3     792031          0
xe33              4     0               0
xe33              5     0               0
xe33              6     0               0
xe33              7     0               0
xe34              0     0               0
xe34              1     0               0
xe34              2     0               0
xe34              3     0               0
xe34              4     0               0
xe34              5     0               0
xe34              6     0               0
xe34              7     0               0
OcNOS#sh priority-flow-control statistics all
interface         pri   pause sent     pause received
=======================================================
xe33              0     0               0
xe33              1     0               0
xe33              2     0               0
xe33              3     829642          0
xe33              4     0               0
xe33              5     0               0
xe33              6     0               0
xe33              7     0               0
```

```
xe34              0     0              0
xe34              1     0              0
xe34              2     0              0
xe34              3     0              0
xe34              4     0              0
xe34              5     0              0
xe34              6     0              0
xe34              7     0              0
OcNOS#sh priority-flow-control statistics all
interface         pri   pause sent     pause received
=======================================================
xe33              0     0              0
xe33              1     0              0
xe33              2     0              0
xe33              3     848500         0
xe33              4     0              0
xe33              5     0              0
xe33              6     0              0
xe33              7     0              0
xe34              0     0              0
xe34              1     0              0
xe34              2     0              0
xe34              3     0              0
xe34              4     0              0
xe34              5     0              0
xe34              6     0              0
xe34              7     0              0
OcNOS#sh int cou rate mbps
+-------------------+--------------+-------------+--------------+-------------+
|     Interface     |    Rx mbps   |    Rx pps   |    Tx mbps   |    Tx pps   |
+-------------------+--------------+-------------+--------------+-------------+
 xe33                 102.61         100208        8.55           16701
 xe34                 0.00           0             102.61         100208
OcNOS#sh int cou d
Interface xe33
  Rx EGR Port Unavail: 3615

OcNOS#sh int cou indiscard-stats
+------------+-----------------+--------------+--------------+----------------+-----------------+-------------+------
--------------+
|  Interface  | Port Block Drops | Vlan Discards | ACL/QOS Drops | Policy Discards | EGR Port Unavail | IBP Discards |   Total
Discards   |
+------------+-----------------+--------------+--------------+----------------+-----------------+-------------+------
--------------+
 xe33         0                0              0              0                3615              0             3615

OcNOS#
```

Repeatedly execute the following show command during congestion. Focus on the Q-Size for the interface `xe33`

```
OcNOS#sh int cou rate mbps
+-------------------+--------------+-------------+--------------+-------------+
|     Interface     |    Rx mbps   |    Rx pps   |    Tx mbps   |    Tx pps   |
+-------------------+--------------+-------------+--------------+-------------+
 xe33                 847.74         827867        0.00           0
```

```
 xe34                  0.00            0              98.02           95724
OcNOS#sh int cou rate mbps
+--------------------+--------------+-------------+--------------+-------------+
|     Interface      |    Rx mbps   |    Rx pps   |    Tx mbps   |    Tx pps   |
+--------------------+--------------+-------------+--------------+-------------+
 xe33                  727.41          710363         0.14            281
 xe34                  0.00            0              102.44          100034
OcNOS#sh int cou rate mbps
+--------------------+--------------+-------------+--------------+-------------+
|     Interface      |    Rx mbps   |    Rx pps   |    Tx mbps   |    Tx pps   |
+--------------------+--------------+-------------+--------------+-------------+
 xe33                  372.03          363306         0.43            845
 xe34                  0.00            0              98.20           95903
OcNOS#sh int cou rate mbps
+--------------------+--------------+-------------+--------------+-------------+
|     Interface      |    Rx mbps   |    Rx pps   |    Tx mbps   |    Tx pps   |
+--------------------+--------------+-------------+--------------+-------------+
 xe33                  165.98          162089         0.64            1242
 xe34                  0.00            0              100.30          97945
OcNOS#sh int cou rate mbps
+--------------------+--------------+-------------+--------------+-------------+
|     Interface      |    Rx mbps   |    Rx pps   |    Tx mbps   |    Tx pps   |
+--------------------+--------------+-------------+--------------+-------------+
 xe33                  103.23          100808         0.71            1387
 xe34                  0.00            0              102.52          100118
OcNOS#sh int cou que
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+-----------------+--------------------+------------------+----------------+------------------+----------------+------
------------+
|   Interface     |  Queue/Class-map   |     Q-Size       |    Tx pkts     |     Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+-----------------+--------------------+------------------+----------------+------------------+----------------+------
------------+
 cpu               nd                   (E) 0              8                688                0                0
 cd30              mc-q3                (E) 0              3                246                0                0
 cd32              mc-q3                (E) 0              3                246                0                0
 xe33              q7                   (E) 0              56               3652               0                0
 xe33              mc-q0                (E) 0              2                164                0                0
 xe33              pg-q1                (I) 1262634        NA               NA                 NA               NA
 xe34              q1                   (E) 1281430        8638672          1105750016         35525383         4547249024
 xe34              q7                   (E) 0              56               3652               0                0

OcNOS#sh int cou que
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+-----------------+--------------------+------------------+----------------+------------------+----------------+-------
------------+
|   Interface     |  Queue/Class-map   |     Q-Size       |    Tx pkts     |     Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+-----------------+--------------------+------------------+----------------+------------------+----------------+------
------------+
 cpu               nd                   (E) 0              8                688                0                0
 cd30              mc-q3                (E) 0              3                246                0                0
 cd32              mc-q3                (E) 0              3                246                0                0
 xe33              q7                   (E) 0              58               3780               0                0
 xe33              mc-q0                (E) 0              2                164                0                0
 xe33              pg-q1                (I) 1264412        NA               NA                 NA               NA
 xe34              q1                   (E) 1263142        9093064          1163912192         35525383         4547249024
```

```
 xe34            q7                (E) 0            58              3780              0                 0

OcNOS#sh priority-flow-control statistics all
interface         pri   pause sent     pause received
=======================================================
xe33              0     0               0
xe33              1     78713           0
xe33              2     0               0
xe33              3     0               0
xe33              4     0               0
xe33              5     0               0
xe33              6     0               0
xe33              7     0               0
xe34              0     0               0
xe34              1     0               0
xe34              2     0               0
xe34              3     0               0
xe34              4     0               0
xe34              5     0               0
xe34              6     0               0
xe34              7     0               0
OcNOS#sh priority-flow-control statistics all
interface         pri   pause sent     pause received
=======================================================
xe33              0     0               0
xe33              1     81841           0
xe33              2     0               0
xe33              3     0               0
xe33              4     0               0
xe33              5     0               0
xe33              6     0               0
xe33              7     0               0
xe34              0     0               0
xe34              1     0               0
xe34              2     0               0
xe34              3     0               0
xe34              4     0               0
xe34              5     0               0
xe34              6     0               0
xe34              7     0               0
OcNOS#sh priority-flow-control statistics all
interface         pri   pause sent     pause received
=======================================================
xe33              0     0               0
xe33              1     86533           0
xe33              2     0               0
xe33              3     0               0
xe33              4     0               0
xe33              5     0               0
xe33              6     0               0
xe33              7     0               0
```

```
xe34                0      0                0
xe34                1      0                0
xe34                2      0                0
xe34                3      0                0
xe34                4      0                0
xe34                5      0                0
xe34                6      0                0
xe34                7      0                0
OcNOS#sh int cou que
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+-----------------+--------------------+------------------+----------------+------------------+-----------------+-------------+
|    Interface    |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    |  Dropped pkts   |   Dropped bytes   |
+-----------------+--------------------+------------------+----------------+------------------+-----------------+-------------+
 cpu               nd                   (E) 0              8                688                0                 0
 cd30              mc-q3                (E) 0              3                246                0                 0
 cd32              mc-q3                (E) 0              3                246                0                 0
 xe33              q7                   (E) 0              70               4548               0                 0
 xe33              mc-q0                (E) 0              2                164                0                 0
 xe33              pg-q1                (I) 1265682        NA               NA                 NA                NA
 xe34              q1                 (E) 1278382        11468368         1467951104         35525383          4547249024
 xe34              q7                   (E) 0              70               4548               0                 0
```

```
OcNOS#sh qos-profile ingress-pg-map interface xe33
profile name: PG_LOSSLESS
 mapping:
  priority-group 0  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 1  xon-threshold 48  xoff-threshold 32   dynamic-threshold 3
  priority-group 2  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 3  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 4  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 5  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 6  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 7  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
```

Verify the XON and XOFF threshold value on interface `xe33`.

```
OcNOS#sh qos-profile ingress-pg-map interface xe33
profile name: PG_LOSSLESS
 mapping:
  priority-group 0  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 1  xon-threshold 6000  xoff-threshold 3000   dynamic-threshold 3
  priority-group 2  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 3  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 4  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 5  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 6  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8
  priority-group 7  xon-threshold 48  xoff-threshold 32   dynamic-threshold 8

OcNOS#sh int cou que
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
```

```
+-----------------+--------------------+-----------------+----------------+------------------+----------------+-------------+
|    Interface    |   Queue/Class-map  |     Q-Size      |    Tx pkts     |     Tx bytes     | Dropped pkts   |   Dropped bytes   |
+-----------------+--------------------+-----------------+----------------+------------------+----------------+-------------+
 cpu               nd                   (E) 0             8                688                0                0
 cd30              mc-q3                (E) 0             3                246                0                0
 cd32              mc-q3                (E) 0             3                246                0                0
 xe33              q7                   (E) 0             83               5380               0                0
 xe33              mc-q0                (E) 0             2                164                0                0
 xe33              pg-q1                (I) 1283970       NA               NA                 NA               NA
 xe34              q1                  (E) 1287526       14074725         1801564800         35525383         4547249024
 xe34              q7                   (E) 0             84               5444               0                0
```

```
OcNOS#sh int cou que
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+-----------------+--------------------+-----------------+----------------+------------------+----------------+-------------+
|    Interface    |   Queue/Class-map  |     Q-Size      |    Tx pkts     |     Tx bytes     | Dropped pkts   |   Dropped bytes   |
+-----------------+--------------------+-----------------+----------------+------------------+----------------+-------------+
 cpu               nd                   (E) 0             8                688                0                0
 cd30              mc-q3                (E) 0             3                246                0                0
 cd32              mc-q3                (E) 0             3                246                0                0
 xe33              q7                   (E) 0             86               5572               0                0
 xe33              mc-q0                (E) 0             2                164                0                0
 xe33              pg-q1                (I) 1283970       NA               NA                 NA               NA
 xe34              q1                  (E) 1287526       14527797         1859558016         35525383         4547249024
 xe34              q7                   (E) 0             86               5572               0                0
```

```
OcNOS#sh priority-flow-control statistics all
interface         pri   pause sent     pause received
=======================================================
xe33              0     0              0
xe33              1     412811         0
xe33              2     0              0
xe33              3     0              0
xe33              4     0              0
xe33              5     0              0
xe33              6     0              0
xe33              7     0              0
xe34              0     0              0
xe34              1     0              0
xe34              2     0              0
xe34              3     0              0
xe34              4     0              0
xe34              5     0              0
xe34              6     0              0
xe34              7     0              0
OcNOS#sh priority-flow-control statistics all
interface         pri   pause sent     pause received
=======================================================
xe33              0     0              0
xe33              1     450417         0
xe33              2     0              0
xe33              3     0              0
xe33              4     0              0
```

```
xe33              5     0              0
xe33              6     0              0
xe33              7     0              0
xe34              0     0              0
xe34              1     0              0
xe34              2     0              0
xe34              3     0              0
xe34              4     0              0
xe34              5     0              0
xe34              6     0              0
xe34              7     0              0
OcNOS#sh int cou rate mbps
+------------------+-------------+-------------+-------------+-------------+
|     Interface    |    Rx mbps  |    Rx pps   |    Tx mbps  |    Tx pps   |
+------------------+-------------+-------------+-------------+-------------+
 xe33                110.91        108309        8.13          15882
 xe34                0.00          0             102.65        100247
OcNOS#sh int cou d
Interface xe33
  Rx Port Block Drops: 12737520
  Rx EGR Port Unavail: 12741164
  Rx IBP Discards: 394956

Interface xe34
  Rx Port Block Drops: 1
  Rx EGR Port Unavail: 1
  Tx Unicast Queue Drops: 35525383

OcNOS#sh int cou d
Interface xe33
  Rx Port Block Drops: 12737520
  Rx EGR Port Unavail: 12741164
  Rx IBP Discards: 413773

Interface xe34
  Rx Port Block Drops: 1
  Rx EGR Port Unavail: 1
  Tx Unicast Queue Drops: 35525383

OcNOS#sh int cou d
Interface xe33
  Rx Port Block Drops: 12737520
  Rx EGR Port Unavail: 12741164
  Rx IBP Discards: 441995

Interface xe34
  Rx Port Block Drops: 1
  Rx EGR Port Unavail: 1
  Tx Unicast Queue Drops: 35525383
```

```
OcNOS#sh int cou indiscard-stats
+-------------+-----------------+--------------+---------------+-----------------+-----------------+-------------+-------------
--------------+
|  Interface  | Port Block Drops | Vlan Discards | ACL/QOS Drops | Policy Discards | EGR Port Unavail | IBP Discards |   Total
Discards    |
+-------------+-----------------+--------------+---------------+-----------------+-----------------+-------------+-------------
--------------+
 xe33          12737520          0              0               0                 12741164          620799         13361988
 xe34          1                 0              0               0                 1                 0              1

OcNOS#sh int cou indiscard-stats
+-------------+-----------------+--------------+---------------+-----------------+-----------------+-------------+-------------
--------------+
|  Interface  | Port Block Drops | Vlan Discards | ACL/QOS Drops | Policy Discards | EGR Port Unavail | IBP Discards |   Total
Discards    |
+-------------+-----------------+--------------+---------------+-----------------+-----------------+-------------+-------------
--------------+
 xe33          12737520          0              0               0                 12741164          649055         13390244
 xe34          1                 0              0               0                 1                 0              1
OcNOS#
```

This procedure outlines the steps to configure the switch packet buffer tuning settings, primarily focusing on Quality of Service (QoS) and Priority Flow Control (PFC) configurations.

Execute the following steps to configure the QoS profiles and policy maps globally on Spine and Leaf nodes.

1. Define QoS profiles mapping of packet priorities to priority groups (PGs) and set congestion thresholds (XON/ XOFF) for PFC enabled PGs.

```
#configure terminal
(config)#qos enable
(config)#qos statistics
(config)#qos profile ingress-pg-map default
(config-ingress-pg-queue-map)#priority-group 0 dynamic-threshold 5
(config-ingress-pg-queue-map)#priority-group 1 xon-offset 1200 xoff-threshold
2400
config-ingress-pg-queue-map)#exit
(config)#qos profile ingress-pg-map pg2
(config-ingress-pg-queue-map)#priority-group 0 xon-offset 200 dynamic-threshold 1
(config-ingress-pg-queue-map)#priority-group 3 xon-offset 1000 xoff-threshold
2000
(config-ingress-pg-queue-map)#priority-group 5 xon-offset 2000 dynamic-threshold
9
(config-ingress-pg-queue-map)#exit
```

2. Configure QoS class maps (c1, c2, c3) and policy maps.

```
(config)#class-map type qos match-all c1
(config-cmap-qos)#match precedence routine
(config-cmap-qos)#exit
(config)#class-map type qos match-all c2
(config-cmap-qos)#match precedence flashoverride
(config-cmap-qos)#exit
(config)#class-map type qos match-all c3
(config-cmap-qos)#match dscp af11
(config-cmap-qos)#exit
(config)#policy-map type qos p1
(config-pmap-qos)#class type qos c1
(config-pmap-c-qos)#police cir 100 mbps pir 500 mbps
(config-pmap-c-qos)#exit
(config-pmap-qos)# class type qos c2
```

```
(config-pmap-c-qos)# police cir 500 mbps pir 1 gbps
(config-pmap-c-qos)# exit
(config-pmap-qos)#class type qos c3
(config-pmap-c-qos)#police cir 2 gbps pir 5 gbps
(config-pmap-c-qos)#exit
(config-pmap-qos)#exit
```

3. Apply the custom ingress PG map and configure PFC settings on relevant interfaces.

```
(config)#interface ethernet3/1
(config-if)#load-interval 30
(config-if)#ip address 101.1.2.2/24
(config-if)#ipv6 address 1102::2/64
(config-if)#lmtu 9216
(config-if)#qos map-profile ingress-pg-map pg2
(config-if)#ipv6 router ospf area 0.0.0.0 instance-id 0
```

4. Set PFC mode and enable it for specific priorities (0-7) on interfaces like `ethernet1/1`, `ethernet2/1`, `ethernet30/1`, `ethernet32/1`, and `ethernet64/1`.

```
(config)#interface ethernet1/1
(config-if)#priority-flow-control mode on
(config-if)#priority-flow-control advertise-local-config
(config-if)#priority-flow-control enable priority 0 1 2 3 4 5 6 7
(config-if)#load-interval 30
(config-if)#ip address 104.1.1.2/24
(config-if)#ipv6 address 1401::2/64
(config-if)#mtu 9216
(config-if)#ipv6 router ospf area 0.0.0.0 instance-id 0

(config)#interface ethernet2/1
(config-if)#priority-flow-control mode on
(config-if)#priority-flow-control advertise-local-config
(config-if)#priority-flow-control enable priority 0 1 2 3 4 5 6 7
(config-if)#load-interval 30
(config-if)#ip address 101.1.1.2/24
(config-if)#ipv6 address 1101::2/64
(config-if)#mtu 9216
(config-if)#ipv6 router ospf area 0.0.0.0 instance-id 0

(config)#interface ethernet3/1
(config-if)#load-interval 30
(config-if)#ip address 101.1.2.2/24
(config-if)#ipv6 address 1102::2/64
(config-if)#mtu 9216
(config-if)#qos map-profile ingress-pg-map pg2
(config-if)#ipv6 router ospf area 0.0.0.0 instance-id 0

(config)#interface ethernet30/1
(config-if)#priority-flow-control mode on
(config-if)#priority-flow-control advertise-local-config
(config-if)#priority-flow-control enable priority 0 1 2 3 4 5 6 7
(config-if)#load-interval 30
```

```
(config-if)#ip address 102.1.2.2/24
(config-if)#ipv6 address 1202::2/64
(config-if)#mtu 9216
(config-if)#ipv6 router ospf area 0.0.0.0 instance-id 0

(config)#interface ethernet31/1
(config-if)#load-interval 30
(config-if)#ip address 103.1.1.2/24
(config-if)#ipv6 address 1301::2/64
(config-if)#mtu 9216
(config-if)#ipv6 router ospf area 0.0.0.0 instance-id 0

(config)#interface ethernet32/1
(config-if)#priority-flow-control mode on
(config-if)#priority-flow-control advertise-local-config
(config-if)#priority-flow-control enable priority 0 1 2 3 4 5 6 7
(config-if)#load-interval 30
(config-if)#ip address 103.1.2.2/24
(config-if)#ipv6 address 1302::2/64
(config-if)#mtu 9216
(config-if)#ipv6 router ospf area 0.0.0.0 instance-id 0
```

5. Configure queuing policy map (Q1) with rate shaping and Explicit Congestion Notification (ECN) threshold to queues q0, q1 and q4.

```
(config)#policy-map type queuing default Q1
(config-pmap-que-def)#class type queuing default q0
(config-pmap-c-que-def)#shape 100 mbps
(config-pmap-c-que-def)#priority
(config-pmap-c-que-def)#random-detect green min-threshold 400 max-threshold 500
yellow min-threshold 200 max-threshold 300 red min-threshold 50 max-threshold 100
packets ecn
(config-pmap-queuing-class)#exit
(config-pmap-que-def)#class type queuing default q1
(config-pmap-c-que-def)#shape 2 gbps
(config-pmap-c-que-def)#priority
(config-pmap-c-que-def)#random-detect green min-threshold 500 max-threshold 600
yellow min-threshold 300 max-threshold 400 red min-threshold 100 max-threshold 200
packets ecn
(config-pmap-c-que-def)#exit
(config-pmap-que-def)#class type queuing default q4
(config-pmap-c-que-def)#shape 500 mbps
(config-pmap-c-que-def)#priority
(config-pmap-c-que-def)#random-detect green min-threshold 550 max-threshold 600
yellow min-threshold 400 max-threshold 500 red min-threshold 300 max-threshold 400
packets ecn
(config-pmap-c-que-def)#exit
```

6. Configure Interior Gateway Protocol (IGP - OSPF) and External Gateway Protocol (EGP - BGP) to establish an eBGP-based spine-leaf fabric.

```
(config)#router ospf 100
(config-router)#ospf router-id 100.1.1.1
(config-router)#network 100.1.1.1/32 area 0.0.0.0
(config-router)#network 101.1.1.0/24 area 0.0.0.0
```

```
(config-router)#network 101.1.2.0/24 area 0.0.0.0
(config-router)#network 102.1.1.0/24 area 0.0.0.0
(config-router)#network 102.1.2.0/24 area 0.0.0.0
(config-router)#network 103.1.1.0/24 area 0.0.0.0
(config-router)#network 103.1.2.0/24 area 0.0.0.0
(config-router)#network 104.1.1.0/24 area 0.0.0.0

(config)#router ipv6 ospf
(config-router)#router-id 100.1.1.1

(config)#router bgp 64001
(config-router)#bgp unnumbered-mode
(config-router)#neighbor ethernet31/1 remote-as external
(config-router)#neighbor ethernet31/1 as-origination-interval 1
(config-router)#neighbor ethernet31/1 advertisement-interval 0
(config-router)#neighbor ethernet31/1 fall-over bfd
(config-router)#neighbor ethernet1/1 remote-as external
(config-router)#neighbor ethernet1/1 as-origination-interval 1
(config-router)#neighbor ethernet1/1 advertisement-interval 0
(config-router)#neighbor ethernet1/1 fall-over bfd
(config-router)#neighbor ethernet32/1 remote-as external
(config-router)#neighbor ethernet32/1 as-origination-interval 1
(config-router)#neighbor ethernet32/1 advertisement-interval 0
(config-router)#neighbor ethernet32/1 fall-over bfd
(config-router)#neighbor ethernet64/1 remote-as external
(config-router)#neighbor ethernet64/1 as-origination-interval 1
(config-router)#neighbor ethernet64/1 advertisement-interval 0
(config-router)#neighbor ethernet64/1 fall-over bfd
(config-router)#neighbor ethernet3/1 remote-as external
(config-router)#neighbor ethernet3/1 as-origination-interval 1
(config-router)#neighbor ethernet3/1 advertisement-interval 0
(config-router)#neighbor ethernet3/1 fall-over bfd
(config-router)#neighbor ethernet2/1 remote-as external
(config-router)#neighbor ethernet2/1 as-origination-interval 1
(config-router)#neighbor ethernet2/1 advertisement-interval 0
(config-router)#neighbor ethernet2/1 fall-over bfd
(config-router)#neighbor ethernet30/1 remote-as external
 (config-router)#neighbor ethernet30/1 as-origination-interval 1
 (config-router)#neighbor ethernet30/1 advertisement-interval 0
 (config-router)#neighbor ethernet30/1 fall-over bfd
 (config-router)#exit-unnumbered-mode

 (config-router)#address-family ipv4 unicast
 (config-router-af)#network 100.1.1.1/32
 (config-router-af)#max-paths ebgp 10
 (config-router-af)#redistribute connected

 (config-router)#bgp v4-unnumbered-mode
 (config-router-v4-unnum)#neighbor ethernet31/1 activate
 (config-router-v4-unnum)#neighbor ethernet1/1 activate
```

```
(config-router-v4-unnum)#neighbor ethernet32/1 activate
(config-router-v4-unnum)#neighbor ethernet64/1 activate
(config-router-v4-unnum)#neighbor ethernet3/1 activate
(config-router-v4-unnum)#neighbor ethernet2/1 activate
(config-router-v4-unnum)#neighbor ethernet30/1 activate
(config-router-v4-unnum)#exit-v4-unnumbered-mode

(config-router-af)#exit-address-family
(config-router)#exit
```

7. Apply queuing service policies with rate shaping on leaf interfaces, ensuring proper rate limiting and buffer allocation on the egress side.

```
(config)#interface cd1/1
(config-if)#description Connected-cd1/1-7040
(config-if)# priority-flow-control mode auto
(config-if)#load-interval 30
(config-if)#ip address 201.1.1.1/24
(config-if)#ipv6 address 2101::1/64
(config-if)#mtu 9216
(config-if)#service-policy type queuing output ETS1-SP2
(config-if)#shape rate 350 mbps burst 1000
(config-if)# ipv6 router ospf area 0.0.0.0 instance-id 0
(config-if)# lldp-agent
                              (config-if)# exit
```

### Sample Configuration

Spine1

```
feature netconf-ssh vrf management
feature netconf-tls vrf management
service password-encryption
!
logging console 7
logging monitor 4
!
!
snmp-server enable traps link linkDown
snmp-server enable traps link linkUp
snmp-server enable traps ospf
snmp-server enable traps bgp
banner motd "NODE IS USING BY ARPITHA.PLEASE REFINE FROM USING IT"
!
bgp extended-asn-cap
!
load-balance rtag7
load-balance rtag7 macro-flow
load-balance rtag7 l2 dest-mac src-mac vlan
load-balance rtag7 ipv4 dest-ipv4 src-ipv4 destl4-port srcl4-port protocol-id rocev2-
dest-qpairs
```

```
load-balance rtag7 ipv6 dest-ipv6 src-ipv6 destl4-port srcl4-port rocev2-dest-qpairs
next-hdr
!
bfd interval 100 minrx 100 multiplier 3
!
qos enable
qos statistics
qos profile ingress-pg-map default
 priority-group 0 dynamic-threshold 5
 priority-group 1 xon-offset 1200 xoff-threshold 2400
qos profile ingress-pg-map pg2
 priority-group 0 xon-offset 200 dynamic-threshold 1
 priority-group 3 xon-offset 1000 xoff-threshold 2000
 priority-group 5 xon-offset 2000 dynamic-threshold 9
!
hostname Spine1-TH5-7001
port ethernet30 breakout 1X100g serdes 25g
port ethernet32 breakout 1X100g serdes 25g
port ethernet64 breakout 1X100g serdes 25g
port ethernet31 breakout 1X100g serdes 25g
port ethernet2 breakout 1X100g serdes 25g
port ethernet3 breakout 1X100g serdes 25g
port ethernet1 breakout 1X100g serdes 25g
ip domain-lookup vrf management
ip name-server vrf management 10.12.3.23
bridge 1 protocol rstp vlan-bridge
tfo Disable
errdisable cause stp-bpdu-guard
data-center-bridging enable bridge 1
priority-flow-control enable bridge 1
dynamic-load-balance enable
dynamic-load-balance mode fixed
feature ssh vrf management
feature dns relay
ip dns relay
ipv6 dns relay
feature ntp vrf management
lldp run
lldp tlv-select basic-mgmt port-description
lldp tlv-select basic-mgmt system-name
lldp tlv-select basic-mgmt system-capabilities
lldp tlv-select basic-mgmt system-description
lldp tlv-select basic-mgmt management-address
set lldp msg-tx-hold 1
set lldp timer msg-tx-interval 5
lldp notification-interval 1000
fault-management enable
maximum-paths 64
!
class-map type qos match-all c1
 match precedence routine
```

```
!
class-map type qos match-all c2
 match precedence flashoverride
!
class-map type qos match-all c3
 match dscp af11
!
policy-map type qos p1
 class type qos c1
  police cir 100 mbps pir 500 mbps
  exit
 class type qos c2
  police cir 500 mbps pir 1 gbps
  exit
 class type qos c3
  police cir 2 gbps pir 5 gbps
  exit
!
policy-map type queuing default ETS
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default Q1
 class type queuing default q0
  shape 100 mbps
  priority
  random-detect green min-threshold 400 max-threshold 500 yellow min-threshold 200 max-
threshold 300 red min-threshold 50 max-threshold 100 packets ecn
  exit
```

```
 class type queuing default q1
  shape 2 gbps
  priority
  random-detect green min-threshold 500 max-threshold 600 yellow min-threshold 300 max-
threshold 400 red min-threshold 100 max-threshold 200 packets ecn
  exit
 class type queuing default q4
  shape 500 mbps
  priority
  random-detect green min-threshold 550 max-threshold 600 yellow min-threshold 400 max-
threshold 500 red min-threshold 300 max-threshold 400 packets ecn
  exit
!
policy-map type queuing default default-out-policy
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
vlan database
 vlan-reservation 4001-4094
 vlan 2-10 bridge 1 state enable
!
ip vrf management
!
interface eth0
 ip vrf forwarding management
 ip address dhcp
!
interface ethernet1/1
 description Connected-ce1-7042
```

```
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 104.1.1.2/24
 ipv6 address 1401::2/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface ethernet2/1
 description Connected-cd2/1-7043
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 101.1.1.2/24
 ipv6 address 1101::2/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface ethernet3/1
 description Connected-cd3/1-7043
 load-interval 30
 ip address 101.1.2.2/24
 ipv6 address 1102::2/64
 mtu 9216
 qos map-profile ingress-pg-map pg2
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface ethernet4
!
interface ethernet5


!
interface ethernet29
!
interface ethernet30/1
 description Connected-Ethernet30/1-800G-7018
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 102.1.2.2/24
 ipv6 address 1202::2/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface ethernet31/1
 description Connected-cd0/1-7013
```

```
 load-interval 30
 ip address 103.1.1.2/24
 ipv6 address 1301::2/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface ethernet32/1
 description Connected-cd10/1-7013
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 103.1.2.2/24
 ipv6 address 1302::2/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
!
interface ethernet63
!
interface ethernet64/1
 description Connected-Ethernet0/1-800G-7018
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 102.1.1.2/24
 ipv6 address 1201::2/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface lo
 ip address 127.0.0.1/8
 ip address 100.1.1.1/32 secondary
 ipv6 address ::1/128
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface lo.management
 ip vrf forwarding management
 ip address 127.0.0.1/8
 ipv6 address ::1/128
!
interface mgmt1
!
interface mgmt2
!
 exit
!
router ospf 100
 ospf router-id 100.1.1.1
```

```
 network 100.1.1.1/32 area 0.0.0.0
 network 101.1.1.0/24 area 0.0.0.0
 network 101.1.2.0/24 area 0.0.0.0
 network 102.1.1.0/24 area 0.0.0.0
 network 102.1.2.0/24 area 0.0.0.0
 network 103.1.1.0/24 area 0.0.0.0
 network 103.1.2.0/24 area 0.0.0.0
 network 104.1.1.0/24 area 0.0.0.0
!
router ipv6 ospf
 router-id 100.1.1.1
!
router bgp 64001
 !
 bgp unnumbered-mode
 neighbor ethernet31/1 remote-as external
 neighbor ethernet31/1 as-origination-interval 1
 neighbor ethernet31/1 advertisement-interval 0
 neighbor ethernet31/1 fall-over bfd
 neighbor ethernet1/1 remote-as external
 neighbor ethernet1/1 as-origination-interval 1
 neighbor ethernet1/1 advertisement-interval 0
 neighbor ethernet1/1 fall-over bfd
 neighbor ethernet32/1 remote-as external
 neighbor ethernet32/1 as-origination-interval 1
 neighbor ethernet32/1 advertisement-interval 0
 neighbor ethernet32/1 fall-over bfd
 neighbor ethernet64/1 remote-as external
 neighbor ethernet64/1 as-origination-interval 1
 neighbor ethernet64/1 advertisement-interval 0
 neighbor ethernet64/1 fall-over bfd
 neighbor ethernet3/1 remote-as external
 neighbor ethernet3/1 as-origination-interval 1
 neighbor ethernet3/1 advertisement-interval 0
 neighbor ethernet3/1 fall-over bfd
 neighbor ethernet2/1 remote-as external
 neighbor ethernet2/1 as-origination-interval 1
 neighbor ethernet2/1 advertisement-interval 0
 neighbor ethernet2/1 fall-over bfd
 neighbor ethernet30/1 remote-as external
 neighbor ethernet30/1 as-origination-interval 1
 neighbor ethernet30/1 advertisement-interval 0
 neighbor ethernet30/1 fall-over bfd
 exit-unnumbered-mode
 !
 address-family ipv4 unicast
 network 100.1.1.1/32
 max-paths ebgp 10
 redistribute connected
 !
```

```
 bgp v4-unnumbered-mode
 neighbor ethernet31/1 activate
 neighbor ethernet1/1 activate
 neighbor ethernet32/1 activate
 neighbor ethernet64/1 activate
 neighbor ethernet3/1 activate
 neighbor ethernet2/1 activate
 neighbor ethernet30/1 activate
 exit-v4-unnumbered-mode
 !
 exit-address-family
 !
 exit
!
line console 0
 exec-timeout 0 0
line vty 0 16
 exec-timeout 0 0
!
!
end
```

### Leaf 1

```
feature netconf-ssh vrf management
feature netconf-tls vrf management
service password-encryption
!
logging console 7
logging monitor 4
logging logfile device_debug_log 2
!
!
snmp-server enable traps link linkDown
snmp-server enable traps link linkUp
snmp-server enable traps ospf
snmp-server enable traps bgp
banner motd "NODE IS USING BY ARPITHA.PLEASE REFINE FROM USING IT"
!
bgp extended-asn-cap
!
load-balance rtag7
load-balance rtag7 macro-flow
load-balance rtag7 l2 dest-mac src-mac vlan
load-balance rtag7 ipv4 dest-ipv4 src-ipv4 destl4-port srcl4-port protocol-id rocev2-
dest-qpairs
load-balance rtag7 ipv6 dest-ipv6 src-ipv6 destl4-port srcl4-port rocev2-dest-qpairs
next-hdr
!
bfd interval 100 minrx 100 multiplier 3
```

```
!
qos enable
qos statistics
qos profile ingress-pg-map default
 priority-group 0 dynamic-threshold 5
 priority-group 1 xon-offset 1200 xoff-threshold 2400
qos profile ingress-pg-map pg2
 priority-group 0 xon-offset 200 dynamic-threshold 1
 priority-group 3 xon-offset 1000 xoff-threshold 2000
 priority-group 5 xon-offset 2000 dynamic-threshold 9
!
hostname Leaf1-TH4-7043
port cd3 breakout 1X100g serdes 25g
port cd4 breakout 1X100g serdes 25g
port cd2 breakout 1X100g serdes 25g
port cd1 breakout 1X100g serdes 25g
ip domain-lookup vrf management
ip name-server vrf management 10.12.3.23
bridge 1 protocol rstp vlan-bridge
tfo Disable
errdisable cause stp-bpdu-guard
data-center-bridging enable bridge 1
priority-flow-control enable bridge 1
dynamic-load-balance enable
dynamic-load-balance mode fixed
feature ssh vrf management
feature dns relay
ip dns relay
ipv6 dns relay
feature ntp vrf management
feature rsyslog
lldp run
lldp tlv-select basic-mgmt port-description
lldp tlv-select basic-mgmt system-name
lldp tlv-select basic-mgmt system-capabilities
lldp tlv-select basic-mgmt system-description
lldp tlv-select basic-mgmt management-address
lldp tlv-select ieee-8021-org-specific data-center-bridging
set lldp msg-tx-hold 1
set lldp timer msg-tx-interval 5
set lldp tx-fast-init 1
lldp notification-interval 5
fault-management enable
maximum-paths 64
!
policy-map type queuing default ETS
 class type queuing default q0
  priority
  exit
 class type queuing default q1
```

```
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS1
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS1-SP1
 class type queuing default q0
  priority
```

```
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 300 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS1-SP2
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 200 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
```

```
!
policy-map type queuing default ETS2
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS2-SP1
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 250 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
```

```
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS2-SP2
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 150 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS3
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
```

```
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS4
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default default-out-policy
 class type queuing default q0
  priority
  dynamic-threshold 5
  bandwidth 500 mbps
  exit
 class type queuing default q1
  priority
  bandwidth 170 mbps
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 200 mbps
  exit
```

```
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
vlan database
 vlan-reservation 4001-4094
 vlan 2-10 bridge 1 state enable
!
ip vrf management
!
interface sa10
 switchport
 bridge-group 1
 switchport mode trunk
 switchport trunk allowed vlan all
!
interface cd1/1
 description Connected-cd1/1-7040
 priority-flow-control mode auto
 load-interval 30
 ip address 201.1.1.1/24
 ipv6 address 2101::1/64
 mtu 9216
 service-policy type queuing output ETS1-SP2
 shape rate 350 mbps burst 1000
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface cd2/1
 description Connected-Ethernet2/1-800G-7001
 priority-flow-control mode auto
 load-interval 30
 ip address 101.1.1.1/24
 ipv6 address 1101::1/64
 mtu 9216
 service-policy type queuing output ETS1-SP1
 shape rate 500 mbps burst 1000
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
```

```
!
interface cd3/1
 description Connected-Ethernet3/1-800G-7001
 load-interval 30
 ip address 101.1.2.1/24
 ipv6 address 1102::1/64
 mtu 9216
 service-policy type queuing output ETS2-SP1
 shape rate 410 mbps burst 1000
 qos map-profile ingress-pg-map pg2
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface cd4/1
 description Connected-cd1/4-7040
 priority-flow-control mode auto
 load-interval 30
 ip address 201.1.2.1/24
 ipv6 address 2102::1/64
 mtu 9216
 service-policy type queuing output ETS2-SP2
 shape rate 250 mbps burst 1000
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface cd5
!
interface cd6
 description Connected-Spirent-99.15-1/97
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 10.1.2.1/24
 ipv6 address 1002::1/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface cd7
!
interface cd30
!
interface cd31
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 lldp-agent
  exit
```

```
!
interface cd32
!
interface cd64
!
interface eth0
 ip vrf forwarding management
 ip address dhcp
!
interface lo
 ip address 127.0.0.1/8
 ip address 1.1.1.1/32 secondary
 ipv6 address ::1/128
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface lo.management
 ip vrf forwarding management
 ip address 127.0.0.1/8
 ipv6 address ::1/128
!
interface xe65
 description Connected-Spirent-99.10-6/1
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 10.1.1.1/24
 ipv6 address 1001::1/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface xe66
!
 exit
!
router ospf 100
 ospf router-id 1.1.1.1
 network 1.1.1.1/32 area 0.0.0.0
 network 101.1.1.0/24 area 0.0.0.0
 network 101.1.2.0/24 area 0.0.0.0
 network 201.1.1.0/24 area 0.0.0.0
 network 201.1.2.0/24 area 0.0.0.0
!
router ipv6 ospf
 router-id 1.1.1.1
!
router bgp 65001
 bgp router-id 1.1.1.1
```

```
 !
 bgp unnumbered-mode
 neighbor cd1/1 remote-as external
 neighbor cd1/1 as-origination-interval 1
 neighbor cd1/1 advertisement-interval 0
 neighbor cd1/1 fall-over bfd
 neighbor cd4/1 remote-as external
 neighbor cd4/1 as-origination-interval 1
 neighbor cd4/1 advertisement-interval 0
 neighbor cd4/1 fall-over bfd
 neighbor cd2/1 remote-as external
 neighbor cd2/1 as-origination-interval 1
 neighbor cd2/1 advertisement-interval 0
 neighbor cd2/1 fall-over bfd
 neighbor cd3/1 remote-as external
 neighbor cd3/1 as-origination-interval 1
 neighbor cd3/1 advertisement-interval 0
 neighbor cd3/1 fall-over bfd
 exit-unnumbered-mode
 !
 address-family ipv4 unicast
 network 1.1.1.1/32
 max-paths ebgp 10
 redistribute connected
 !
 bgp v4-unnumbered-mode
 neighbor cd1/1 activate
 neighbor cd4/1 activate
 neighbor cd2/1 activate
 neighbor cd3/1 activate
 exit-v4-unnumbered-mode
 !
 exit-address-family
 !
 exit
!
line console 0
 exec-timeout 0 0
line vty 0 16
 exec-timeout 0 0
!
!
end

!
```

### Leaf 2

```
feature netconf-ssh vrf management
```

```
feature netconf-tls vrf management
service password-encryption
!
logging console 7
logging monitor 4
logging logfile device_debug_log 2
!
!
snmp-server enable traps link linkDown
snmp-server enable traps link linkUp
snmp-server enable traps ospf
snmp-server enable traps bgp
banner motd "NODE IS USING BY ARPITHA. PLEASE DND UNTILL I INFORM IN GROUP"
!
bgp extended-asn-cap
!
load-balance rtag7
load-balance rtag7 macro-flow
load-balance rtag7 l2 dest-mac src-mac vlan
load-balance rtag7 ipv4 dest-ipv4 src-ipv4 destl4-port srcl4-port protocol-id rocev2-
dest-qpairs
load-balance rtag7 ipv6 dest-ipv6 src-ipv6 destl4-port srcl4-port rocev2-dest-qpairs
next-hdr
!
bfd interval 100 minrx 100 multiplier 3
!
qos enable
qos statistics
qos profile ingress-pg-map default
 priority-group 0 dynamic-threshold 5
 priority-group 1 xon-offset 1200 xoff-threshold 2400
qos profile ingress-pg-map pg2
 priority-group 0 xon-offset 200 dynamic-threshold 1
 priority-group 3 xon-offset 1000 xoff-threshold 2000
 priority-group 5 xon-offset 2000 dynamic-threshold 9
!
hostname Leaf2-TH5-7018
port ethernet32 breakout 1X100g serdes 25g
port ethernet6 breakout 1X400g serdes 50g
port ethernet8 breakout 1X100g serdes 25g
port ethernet33 breakout 1X100g serdes 25g
port ethernet3 breakout 1X100g serdes 25g
port ethernet30 breakout 1X100g serdes 25g
port ethernet29 breakout 1X100g serdes 25g
port ethernet0 breakout 1X100g serdes 25g
ip domain-lookup vrf management
ip name-server vrf management 10.12.3.23
bridge 1 protocol rstp vlan-bridge
tfo Disable
errdisable cause stp-bpdu-guard
data-center-bridging enable bridge 1
```

```
priority-flow-control enable bridge 1
dynamic-load-balance enable
dynamic-load-balance mode fixed
feature ssh vrf management
feature dns relay
ip dns relay
ipv6 dns relay
feature ntp vrf management
feature rsyslog
logging remote server 10.16.100.20 5 port 1514 vrf management
lldp run
lldp tlv-select basic-mgmt port-description
lldp tlv-select basic-mgmt system-name
lldp tlv-select basic-mgmt system-capabilities
lldp tlv-select basic-mgmt system-description
lldp tlv-select basic-mgmt management-address
lldp tlv-select ieee-8021-org-specific data-center-bridging
set lldp msg-tx-hold 1
set lldp timer msg-tx-interval 5
lldp notification-interval 1000
fault-management enable
maximum-paths 64
!
class-map type qos match-all c1
 match precedence routine
!
class-map type qos match-all c2
 match precedence flashoverride
!
class-map type qos match-all c3
 match dscp af11
!
policy-map type qos p1
 class type qos c1
  police cir 100 mbps pir 500 mbps
  exit
 class type qos c2
  police cir 500 mbps pir 1 gbps
  exit
 class type qos c3
  police cir 2 gbps pir 5 gbps
  exit
!
policy-map type queuing default ETS
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
```

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```
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS1
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS1-SP1
 class type queuing default q0
  priority
  exit
 class type queuing default q1
```

```
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 300 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS1-SP2
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 200 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS2
```

```
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS2-SP1
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 250 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
```

```
  exit
!
policy-map type queuing default ETS2-SP2
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 150 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS3
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
```

```
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS4
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default Q1
 class type queuing default q0
  shape 100 mbps
  priority
  random-detect green min-threshold 400 max-threshold 500 yellow min-threshold 200 max-
threshold 300 red min-threshold 50 max-threshold 100 packets ecn
  exit
 class type queuing default q1
  shape 2 gbps
  priority
  random-detect green min-threshold 500 max-threshold 600 yellow min-threshold 300 max-
threshold 400 red min-threshold 100 max-threshold 200 packets ecn
  exit
 class type queuing default q4
  shape 500 mbps
  priority
  random-detect green min-threshold 550 max-threshold 600 yellow min-threshold 400 max-
threshold 500 red min-threshold 300 max-threshold 400 packets ecn
  exit
!
```

```
policy-map type queuing default default-out-policy
 class type queuing default q0
  priority
  bandwidth 1 gbps
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  bandwidth 50 mbps
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
vlan database
 vlan-reservation 4001-4094
 vlan 2-10 bridge 1 state enable
!
ip vrf management
!
interface eth0
 ip vrf forwarding management
 ip address dhcp
!
interface ethernet0/1
 description Connected-Ethernet64/1-800G-7001
 priority-flow-control mode auto
 load-interval 30
 ip address 102.1.1.1/24
 ipv6 address 1201::1/64
 mtu 9216
 service-policy type queuing output ETS1-SP1
 shape rate 1500 mbps burst 1000
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
```

```
!
interface ethernet1
!
interface ethernet2
!
interface ethernet3/1
 description Connected-Spirent-99.20-10/1
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 20.1.1.1/24
 ipv6 address 2001::1/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface ethernet4
!
interface ethernet5
!
interface ethernet6/1
 description Connected-Spirent-99.15-1/105
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 20.1.2.1/24
 ipv6 address 2002::1/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface ethernet7
!
interface ethernet8/1
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 lldp-agent
  exit
!
interface ethernet9
!
interface ethernet29/1
!
interface ethernet30/1
 description Connected-Ethernet30/1-800G-7001
```

```
 load-interval 30
 ip address 102.1.2.1/24
 ipv6 address 1202::1/64
 mtu 9216
 service-policy type queuing output ETS2-SP1
 shape rate 1340 mbps burst 1000
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface ethernet31
!
interface ethernet32/1
 description Connected-cd30/1-7040
 priority-flow-control mode auto
 load-interval 30
 ip address 202.1.1.1/24
 ipv6 address 2201::1/64
 mtu 9216
 service-policy type queuing output ETS1-SP2
 shape rate 1110 mbps burst 1000
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface ethernet33/1
 description Connected-cd29/1-7040
 priority-flow-control mode auto
 load-interval 30
 ip address 202.1.2.1/24
 ipv6 address 2202::1/64
 mtu 9216
 service-policy type queuing output ETS2-SP2
 shape rate 1210 mbps burst 1000
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface ethernet34
!
interface lo
 ip address 127.0.0.1/8
 ip address 2.2.2.2/32 secondary
 ipv6 address ::1/128
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface lo.management
 ip vrf forwarding management
 ip address 127.0.0.1/8
 ipv6 address ::1/128
!
interface mgmt64
```

```
!
interface mgmt65
!
 exit
!
router ospf 100
 ospf router-id 2.2.2.2
 network 2.2.2.2/32 area 0.0.0.0
 network 20.1.1.0/24 area 0.0.0.0
 network 102.1.1.0/24 area 0.0.0.0
 network 102.1.2.0/24 area 0.0.0.0
 network 202.1.1.0/24 area 0.0.0.0
 network 202.1.2.0/24 area 0.0.0.0
!
router ipv6 ospf
 router-id 2.2.2.2
!
router bgp 65002
 bgp router-id 2.2.2.2
 !
 bgp unnumbered-mode
 neighbor ethernet33/1 remote-as external
 neighbor ethernet33/1 as-origination-interval 1
 neighbor ethernet33/1 advertisement-interval 0
 neighbor ethernet33/1 fall-over bfd
 neighbor ethernet32/1 remote-as external
 neighbor ethernet32/1 as-origination-interval 1
 neighbor ethernet32/1 advertisement-interval 0
 neighbor ethernet32/1 fall-over bfd
 neighbor ethernet0/1 remote-as external
 neighbor ethernet0/1 as-origination-interval 1
 neighbor ethernet0/1 advertisement-interval 0
 neighbor ethernet0/1 fall-over bfd
 neighbor ethernet30/1 remote-as external
 neighbor ethernet30/1 as-origination-interval 1
 neighbor ethernet30/1 advertisement-interval 0
 neighbor ethernet30/1 fall-over bfd
 exit-unnumbered-mode
 !
 address-family ipv4 unicast
 network 2.2.2.2/32
 max-paths ebgp 10
 redistribute connected
 !
 bgp v4-unnumbered-mode
 neighbor ethernet33/1 activate
 neighbor ethernet32/1 activate
 neighbor ethernet0/1 activate
 neighbor ethernet30/1 activate
 exit-v4-unnumbered-mode
```

```
 !
 exit-address-family
 !
 exit
!
line console 0
 exec-timeout 0 0
line vty 0 16
 exec-timeout 0 0
!
!
end
```

### Spine 2

```
feature netconf-ssh vrf management
feature netconf-tls vrf management
service password-encryption
!
logging console 7
logging monitor 4
logging level all 2
!
!
snmp-server enable traps link linkDown
snmp-server enable traps link linkUp
snmp-server enable traps ospf
snmp-server enable traps bgp
banner motd "NODE IS USING BY ARPITHA.PLEASE REFINE FROM USING IT"
!
bgp extended-asn-cap
!
load-balance rtag7
load-balance rtag7 macro-flow
load-balance rtag7 l2 dest-mac src-mac vlan
load-balance rtag7 ipv4 dest-ipv4 src-ipv4 destl4-port srcl4-port protocol-id rocev2-
dest-qpairs
load-balance rtag7 ipv6 dest-ipv6 src-ipv6 destl4-port srcl4-port rocev2-dest-qpairs
next-hdr
!
bfd interval 100 minrx 100 multiplier 3
!
qos enable
qos statistics
qos profile ingress-pg-map default
 priority-group 0 dynamic-threshold 5
 priority-group 1 xon-offset 1200 xoff-threshold 2400
qos profile ingress-pg-map pg2
 priority-group 0 xon-offset 200 dynamic-threshold 1
```

```
 priority-group 3 xon-offset 1000 xoff-threshold 2000
 priority-group 5 xon-offset 2000 dynamic-threshold 9
!
hostname Spine2-TR4-7040
port cd30 breakout 1X100g serdes 25g
port cd4 breakout 1X100g serdes 25g
port cd7 breakout 1X100g serdes 25g
port cd32 breakout 1X100g serdes 25g
port cd29 breakout 1X100g serdes 25g
port cd3 breakout 1X100g serdes 25g
port cd1 breakout 1X100g serdes 25g
port cd27 breakout 1X100g serdes 25g
ip domain-lookup vrf management
ip name-server vrf management 10.12.3.23
bridge 1 protocol rstp vlan-bridge
tfo Disable
errdisable cause stp-bpdu-guard
data-center-bridging enable bridge 1
priority-flow-control enable bridge 1
dynamic-load-balance enable
dynamic-load-balance mode fixed
feature ssh vrf management
feature dns relay
ip dns relay
ipv6 dns relay
feature ntp vrf management
feature rsyslog
logging remote server 10.16.100.20 5 port 1514 vrf management
lldp run
lldp tlv-select basic-mgmt port-description
lldp tlv-select basic-mgmt system-name
lldp tlv-select basic-mgmt system-capabilities
lldp tlv-select basic-mgmt system-description
lldp tlv-select basic-mgmt management-address
lldp tlv-select ieee-8021-org-specific data-center-bridging
set lldp msg-tx-hold 1
set lldp timer msg-tx-interval 5
set lldp tx-fast-init 1
lldp notification-interval 5
fault-management enable
maximum-paths 64
!
class-map type qos match-all c1
 match precedence routine
!
class-map type qos match-all c2
 match precedence flashoverride
!
class-map type qos match-all c3
 match dscp af11
```

```
!
policy-map type qos p1
 class type qos c1
  police cir 100 mbps pir 500 mbps
  exit
 class type qos c2
  police cir 500 mbps pir 1 gbps
  exit
 class type qos c3
  police cir 2 gbps pir 5 gbps
  exit
!
policy-map type queuing default ETS
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default Q1
 class type queuing default q0
  shape 100 mbps
  priority
  random-detect green min-threshold 400 max-threshold 500 yellow min-threshold 200 max-
threshold 300 red min-threshold 50 max-threshold 100 packets ecn
  exit
 class type queuing default q1
  shape 2 gbps
  priority
  random-detect green min-threshold 500 max-threshold 600 yellow min-threshold 300 max-
threshold 400 red min-threshold 100 max-threshold 200 packets ecn
  exit
```

```
 class type queuing default q4
  shape 500 mbps
  priority
  random-detect green min-threshold 550 max-threshold 600 yellow min-threshold 400 max-
threshold 500 red min-threshold 300 max-threshold 400 packets ecn
  exit
!
policy-map type queuing default default-out-policy
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
vlan database
 vlan-reservation 4001-4094
 vlan 2-10 bridge 1 state enable
!
ip vrf management
!
interface cd1/1
 description Connected-cd1/1-7043
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 201.1.1.2/24
 ipv6 address 2101::2/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
```

```
!
interface cd2
!
interface cd3/1
 description Connected-ce5-7042
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 204.1.1.2/24
 ipv6 address 2401::2/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface cd4/1
 description Connected-cd4/1-7043
 load-interval 30
 ip address 201.1.2.2/24
 ipv6 address 2102::2/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface cd5
!
interface cd6
!
interface cd7/1
 description Connected-cd5/1-7013
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 203.1.2.2/24
 ipv6 address 2302::2/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface cd8
!
interface cd27/1
 switchport
 bridge-group 1
 switchport mode trunk
 switchport trunk allowed vlan all
 load-interval 30
 mtu 9216
```

```
!
interface cd28
!
interface cd29/1
 description Connected-Ethernet33/1-800G-7018
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 202.1.2.2/24
 ipv6 address 2202::2/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface cd30/1
 description Connected-Ethernet32/1-800G-7018
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 202.1.1.2/24
 ipv6 address 2201::2/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface cd31
!
interface cd32/1
 description Connected-cd2/1-7013
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 203.1.1.2/24
 ipv6 address 2301::2/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface eth0
 ip vrf forwarding management
 ip address dhcp
!
interface lo
 ip address 127.0.0.1/8
```

```
 ip address 200.1.1.1/32 secondary
 ipv6 address ::1/128
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface lo.management
 ip vrf forwarding management
 ip address 127.0.0.1/8
 ipv6 address ::1/128
!
interface xe33
 switchport
 bridge-group 1
 switchport mode trunk
 switchport trunk allowed vlan all
 load-interval 30
 mtu 9216
!
interface xe34
 ip address 95.1.1.1/24
 ip address 94.1.1.1/24 secondary
!
 exit
!
router ospf 100
 ospf router-id 200.1.1.1
 network 200.1.1.1/32 area 0.0.0.0
 network 201.1.1.0/24 area 0.0.0.0
 network 201.1.2.0/24 area 0.0.0.0
 network 202.1.1.0/24 area 0.0.0.0
 network 202.1.2.0/24 area 0.0.0.0
 network 203.1.1.0/24 area 0.0.0.0
 network 203.1.2.0/24 area 0.0.0.0
 network 204.1.1.0/24 area 0.0.0.0
!
router ipv6 ospf
 router-id 200.1.1.1
!
router bgp 64001
 bgp router-id 200.1.1.1
 !
 bgp unnumbered-mode
 neighbor cd32/1 remote-as external
 neighbor cd32/1 as-origination-interval 1
 neighbor cd32/1 advertisement-interval 0
 neighbor cd32/1 fall-over bfd
 neighbor cd29/1 remote-as external
 neighbor cd29/1 as-origination-interval 1
 neighbor cd29/1 advertisement-interval 0
 neighbor cd29/1 fall-over bfd
 neighbor cd30/1 remote-as external
```

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```
 neighbor cd30/1 as-origination-interval 1
 neighbor cd30/1 advertisement-interval 0
 neighbor cd30/1 fall-over bfd
 neighbor cd3/1 remote-as external
 neighbor cd3/1 as-origination-interval 1
 neighbor cd3/1 advertisement-interval 0
 neighbor cd3/1 fall-over bfd
 neighbor cd7/1 remote-as external
 neighbor cd7/1 as-origination-interval 1
 neighbor cd7/1 advertisement-interval 0
 neighbor cd7/1 fall-over bfd
 neighbor cd1/1 remote-as external
 neighbor cd1/1 as-origination-interval 1
 neighbor cd1/1 advertisement-interval 0
 neighbor cd1/1 fall-over bfd
 neighbor cd4/1 remote-as external
 neighbor cd4/1 as-origination-interval 1
 neighbor cd4/1 advertisement-interval 0
 neighbor cd4/1 fall-over bfd
 exit-unnumbered-mode
 !
 address-family ipv4 unicast
 network 200.1.1.1/32
 max-paths ebgp 10
 redistribute connected
 !
 bgp v4-unnumbered-mode
 neighbor cd32/1 activate
 neighbor cd29/1 activate
 neighbor cd30/1 activate
 neighbor cd3/1 activate
 neighbor cd7/1 activate
 neighbor cd1/1 activate
 neighbor cd4/1 activate
 exit-v4-unnumbered-mode
 !
 exit-address-family
 !
 exit
!
line console 0
 exec-timeout 0 0
line vty 0 16
 exec-timeout 0 0
!
!
end

!
```

Leaf 3

```
feature netconf-ssh vrf management
feature netconf-tls vrf management
service password-encryption
!
logging console 7
logging monitor 4
!
snmp-server enable traps link linkDown
snmp-server enable traps link linkUp
snmp-server enable traps ospf
snmp-server enable traps bgp
banner motd "NODE IS USING BY ARPITHA.PLEASE REFINE FROM USING IT"
!
bgp extended-asn-cap
!
load-balance rtag7
load-balance rtag7 macro-flow
load-balance rtag7 l2 dest-mac src-mac vlan
load-balance rtag7 ipv4 dest-ipv4 src-ipv4 destl4-port srcl4-port protocol-id rocev2-
dest-qpairs
load-balance rtag7 ipv6 dest-ipv6 src-ipv6 destl4-port srcl4-port rocev2-dest-qpairs
next-hdr
!
bfd interval 100 minrx 100 multiplier 3
!
qos enable
qos statistics
qos profile ingress-pg-map default
 priority-group 0 dynamic-threshold 5
 priority-group 1 xon-offset 1200 xoff-threshold 2400
qos profile ingress-pg-map pg2
 priority-group 0 xon-offset 200 dynamic-threshold 1
 priority-group 3 xon-offset 1000 xoff-threshold 2000
 priority-group 5 xon-offset 2000 dynamic-threshold 9
!
hostname Leaf3-TR4-7013
port cd5 breakout 1X100g serdes 25g
port cd8 breakout 1X100g serdes 25g
port cd9 breakout 1X100g serdes 25g
port cd10 breakout 1X100g serdes 25g
port cd3 breakout 1X100g serdes 25g
port cd4 breakout 1X100g serdes 25g
port cd2 breakout 1X100g serdes 25g
port cd1 breakout 1X100g serdes 25g
port cd0 breakout 1X100g serdes 25g
ip domain-lookup vrf management
ip name-server vrf management 10.12.3.23
bridge 1 protocol rstp vlan-bridge
tfo Disable
```

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```
errdisable cause stp-bpdu-guard
data-center-bridging enable bridge 1
priority-flow-control enable bridge 1
feature ssh vrf management
feature dns relay
ip dns relay
ipv6 dns relay
feature ntp vrf management
lldp run
lldp tlv-select basic-mgmt port-description
lldp tlv-select basic-mgmt system-name
lldp tlv-select basic-mgmt system-capabilities
lldp tlv-select basic-mgmt system-description
lldp tlv-select basic-mgmt management-address
lldp tlv-select ieee-8021-org-specific data-center-bridging
set lldp msg-tx-hold 1
set lldp timer msg-tx-interval 5
set lldp tx-fast-init 1
lldp notification-interval 5
fault-management enable
maximum-paths 64
!
policy-map type queuing default ETS
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS1-SP1
 class type queuing default q0
```

```
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 300 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS1-SP2
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 200 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
```

```
  exit
!
policy-map type queuing default ETS2-SP1
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 350 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS2-SP2
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 250 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
```

```
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default default-out-policy
 class type queuing default q0
  priority
  bandwidth 375 mbps
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  bandwidth 200 mbps
  exit
 class type queuing default q3
  priority
  bandwidth 150 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
vlan database
 vlan-reservation 4001-4094
 vlan 2-10 bridge 1 state enable
!
ip vrf management
!
interface cd0/1
 description Connected-Ethernet31/1-7001
 priority-flow-control mode auto
 load-interval 30
 ip address 103.1.1.1/24
 ipv6 address 1301::1/64
 mtu 9216
 service-policy type queuing output ETS1-SP1
 shape rate 800 mbps burst 1000
```

```
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface cd1/1
!
interface cd2/1
 description Connected-cd32/1-7040
 priority-flow-control mode auto
 load-interval 30
 ip address 203.1.1.1/24
 ipv6 address 2301::1/64
 mtu 9216
 service-policy type queuing output ETS1-SP2
 shape rate 500 mbps burst 1000
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface cd3/1
!
interface cd4/1
 description Connected-Spine2-cd27/1
 switchport
 bridge-group 1
 switchport mode trunk
 switchport trunk allowed vlan add 3
 load-interval 30
 mtu 9216
!
interface cd5/1
 description Connected-cd7/1-7040
 priority-flow-control mode auto
 load-interval 30
 ip address 203.1.2.1/24
 ipv6 address 2302::1/64
 mtu 9216
 service-policy type queuing output ETS2-SP2
 shape rate 650 mbps burst 1000
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface cd6
 description Connected-Spirent-99.15-1/113
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 30.1.2.1/24
```

```
 ipv6 address 3002::1/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface cd7
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 lldp-agent
  exit
!
interface cd8/1
!
interface cd9/1
!
interface cd10/1
 description Connected-7001-Ethernet32/1-800G
 priority-flow-control mode auto
 load-interval 30
 ip address 103.1.2.1/24
 ipv6 address 1302::1/64
 mtu 9216
 service-policy type queuing output ETS2-SP1
 shape rate 650 mbps burst 1000
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface cd11
!
interface eth0
 ip vrf forwarding management
 ip address dhcp
!
interface lo
 ip address 127.0.0.1/8
 ipv6 address ::1/128
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface lo.management
 ip vrf forwarding management
 ip address 127.0.0.1/8
 ipv6 address ::1/128
!
interface vlan1.3
 ip address 30.1.1.1/24
 ipv6 address 3001::1/64
 mtu 9216
```

```
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface xe0
!
interface xe1
!
 exit
!
router ospf 100
 ospf router-id 3.3.3.3
 network 3.3.3.3/32 area 0.0.0.0
 network 30.1.1.0/24 area 0.0.0.0
 network 103.1.1.0/24 area 0.0.0.0
 network 103.1.2.0/24 area 0.0.0.0
 network 203.1.1.0/24 area 0.0.0.0
 network 203.1.2.0/24 area 0.0.0.0
!
router ipv6 ospf
 router-id 3.3.3.3
!
router bgp 65003
 bgp router-id 3.3.3.3
 !
 bgp unnumbered-mode
 neighbor cd0/1 remote-as external
 neighbor cd0/1 as-origination-interval 1
 neighbor cd0/1 advertisement-interval 0
 neighbor cd0/1 fall-over bfd
 neighbor cd10/1 remote-as external
 neighbor cd10/1 as-origination-interval 1
 neighbor cd10/1 advertisement-interval 0
 neighbor cd10/1 fall-over bfd
 neighbor cd2/1 remote-as external
 neighbor cd2/1 as-origination-interval 1
 neighbor cd2/1 advertisement-interval 0
 neighbor cd2/1 fall-over bfd
 neighbor cd5/1 remote-as external
 neighbor cd5/1 as-origination-interval 1
 neighbor cd5/1 advertisement-interval 0
 neighbor cd5/1 fall-over bfd
 exit-unnumbered-mode
 !
 address-family ipv4 unicast
 network 3.3.3.3/32
 max-paths ebgp 10
 redistribute connected
 !
 bgp v4-unnumbered-mode
 neighbor cd0/1 activate
 neighbor cd10/1 activate
```

```
 neighbor cd2/1 activate
 neighbor cd5/1 activate
 exit-v4-unnumbered-mode
 !
 exit-address-family
 !
 exit
!
line console 0
 exec-timeout 0 0
line vty 0 16
 exec-timeout 0 0
!
!
end

!
```

### Leaf 4

```
feature netconf-ssh vrf management
feature netconf-tls vrf management
service password-encryption
!
logging console 7
logging monitor 4
logging logfile device_debug_log 2
logging level nsm 4
logging level rip 5
logging level ripng 5
logging level ospf 5
!
snmp-server enable traps link linkDown
snmp-server enable traps link linkUp
snmp-server enable traps ospf
snmp-server enable traps bgp
banner motd "NODE IS USING BY ARPITHA.PLEASE REFINE FROM USING IT"
!
bgp extended-asn-cap
!
load-balance rtag7
load-balance rtag7 macro-flow
load-balance rtag7 l2 dest-mac src-mac vlan
load-balance rtag7 ipv4 dest-ipv4 src-ipv4 destl4-port srcl4-port protocol-id
load-balance rtag7 ipv6 dest-ipv6 src-ipv6 destl4-port srcl4-port next-hdr
hardware-profile filter ingress-ipv6 disable
hardware-profile filter bfd-group enable
!
bfd interval 100 minrx 100 multiplier 3
!
```

```
qos enable
qos statistics
qos profile ingress-pg-map default
 priority-group 0 dynamic-threshold 5
 priority-group 1 xon-offset 1200 xoff-threshold 2400
qos profile ingress-pg-map pg2
 priority-group 0 xon-offset 200 dynamic-threshold 1
 priority-group 3 xon-offset 1000 xoff-threshold 2000
 priority-group 5 xon-offset 2000 dynamic-threshold 9
!
hostname Leaf4-TR3-7042
ip domain-lookup vrf management
ip name-server vrf management 10.12.3.23
bridge 1 protocol rstp vlan-bridge
tfo Disable
errdisable cause stp-bpdu-guard
data-center-bridging enable bridge 1
priority-flow-control enable bridge 1
dynamic-load-balance enable
dynamic-load-balance mode fixed
feature ssh vrf management
feature dns relay
ip dns relay
ipv6 dns relay
feature ntp vrf management
feature rsyslog
logging remote server 10.16.100.20 5 port 1514 vrf management
lldp run
lldp tlv-select basic-mgmt port-description
lldp tlv-select basic-mgmt system-name
lldp tlv-select basic-mgmt system-capabilities
lldp tlv-select basic-mgmt system-description
lldp tlv-select basic-mgmt management-address
lldp tlv-select ieee-8021-org-specific data-center-bridging
set lldp msg-tx-hold 1
set lldp timer msg-tx-interval 5
set lldp tx-fast-init 1
lldp notification-interval 1000
fault-management enable
maximum-paths 64
!
policy-map type queuing default ETS
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
```

```
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS1
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS1-SP1
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
```

```
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 450 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS1-SP2
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  bandwidth 300 mbps
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS2
 class type queuing default q0
  priority
```

```
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS2-SP1
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS2-SP2
```

```
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default ETS3
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
```

```
!
policy-map type queuing default ETS4
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
policy-map type queuing default default-out-policy
 class type queuing default q0
  priority
  bandwidth 1200 mbps
  exit
 class type queuing default q1
  priority
  exit
 class type queuing default q2
  priority
  bandwidth 200 mbps
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
```

```
  exit
 class type queuing default q7
  priority
  exit
!
vlan database
 vlan-reservation 4001-4094
 vlan 2-10 bridge 1 state enable
!
ip vrf management
!
interface ce1
 description Connected-Ethernet1/1-800G-7001
 load-interval 30
 ip address 104.1.1.1/24
 ipv6 address 1401::1/64
 mtu 9216
 service-policy type queuing output ETS1-SP1
 shape rate 1200 mbps burst 1000
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface ce2
!
interface ce3
!
interface ce4
!
interface ce5
 description Connected-cd3/1-7040
 priority-flow-control mode auto
 load-interval 30
 ip address 204.1.1.1/24
 ipv6 address 2401::1/64
 mtu 9216
 service-policy type queuing output ETS1-SP2
 shape rate 900 mbps burst 1000
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface ce6
!
interface ce7
 description Connected-Spirent-99.40-2/9
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 40.1.2.1/24
 ipv6 address 4002::1/64
```

```
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
interface ce8
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 ip address 88.1.1.1/24
 lldp-agent
  exit
!
interface ce26
!
interface eth0
 ip vrf forwarding management
 ip address dhcp
!
interface lo
 ip address 127.0.0.1/8
 ip address 4.4.4.4/32 secondary
 ipv6 address ::1/128
!
interface lo.management
 ip vrf forwarding management
 ip address 127.0.0.1/8
 ipv6 address ::1/128
 ipv6 router ospf area 0.0.0.0 instance-id 0
!
interface xe33
!
interface xe34
 description Connected-Spirent-99.10-6/6
 priority-flow-control mode on
 priority-flow-control advertise-local-config
 priority-flow-control enable priority 0 1 2 3 4 5 6 7
 load-interval 30
 ip address 40.1.1.1/24
 ipv6 address 4001::1/64
 mtu 9216
 ipv6 router ospf area 0.0.0.0 instance-id 0
 lldp-agent
  exit
!
 exit
!
router ospf 100
 ospf router-id 4.4.4.4
 network 4.4.4.4/32 area 0.0.0.0
```

```
 network 40.1.1.0/24 area 0.0.0.0
 network 104.1.1.0/24 area 0.0.0.0
 network 204.1.1.0/24 area 0.0.0.0
!
router ipv6 ospf
 router-id 4.4.4.4
!
router bgp 65004
 bgp router-id 4.4.4.4
 !
 bgp unnumbered-mode
 neighbor ce5 remote-as external
 neighbor ce5 as-origination-interval 1
 neighbor ce5 advertisement-interval 0
 neighbor ce5 fall-over bfd
 neighbor ce1 remote-as external
 neighbor ce1 as-origination-interval 1
 neighbor ce1 advertisement-interval 0
 neighbor ce1 fall-over bfd
 exit-unnumbered-mode
 !
 address-family ipv4 unicast
 network 4.4.4.4/32
 max-paths ebgp 10
 redistribute connected
 !
 bgp v4-unnumbered-mode
 neighbor ce5 activate
 neighbor ce1 activate
 exit-v4-unnumbered-mode
 !
 exit-address-family
 !
 exit
!
line console 0
 exec-timeout 0 0
line vty 0 16
 exec-timeout 0 0
!
!
end
```

Verify the QoS Priority Group (PG) settings, including the XON/XOFF and dynamic thresholds, for the defined profiles.

```
#sh qos-profile ingress-pg-map all
qos profile ingress-pg-map default
 priority-group 0 xon-offset 32 dynamic-threshold 5
```

```
 priority-group 1 xon-offset 1200 xoff-threshold 2400
 priority-group 2 xon-offset 32 dynamic-threshold 8
 priority-group 3 xon-offset 32 dynamic-threshold 8
 priority-group 4 xon-offset 32 dynamic-threshold 8
 priority-group 5 xon-offset 32 dynamic-threshold 8
 priority-group 6 xon-offset 32 dynamic-threshold 8
 priority-group 7 xon-offset 32 dynamic-threshold 8
!
qos profile ingress-pg-map pg2
 priority-group 0 xon-offset 200 dynamic-threshold 1
 priority-group 1 xon-offset 32 dynamic-threshold 8
 priority-group 2 xon-offset 32 dynamic-threshold 8
 priority-group 3 xon-offset 1000 xoff-threshold 2000
 priority-group 4 xon-offset 32 dynamic-threshold 8
 priority-group 5 xon-offset 2000 dynamic-threshold 9
 priority-group 6 xon-offset 32 dynamic-threshold 8
 priority-group 7 xon-offset 32 dynamic-threshold 8
!

#sh qos-profile ingress-pg-map interface ethernet3/1
profile name: pg2
 mapping:
 priority-group 0 xon-offset 200 dynamic-threshold 1
 priority-group 1 xon-offset 32 dynamic-threshold 8
 priority-group 2 xon-offset 32 dynamic-threshold 8
 priority-group 3 xon-offset 1000 xoff-threshold 2000
 priority-group 4 xon-offset 32 dynamic-threshold 8
 priority-group 5 xon-offset 2000 dynamic-threshold 9
 priority-group 6 xon-offset 32 dynamic-threshold 8
 priority-group 7 xon-offset 32 dynamic-threshold 8
```

Verify that traffic is being correctly classified and processed by the queuing policies on the interfaces.

```
#sh policy-map statistics type qos
+-----------------------------------+-----------------+-----------------+-----------------+----------------
--+
|           Class-map               |    Match pkts   |   Match bytes   |   Dropped pkts  |   Dropped Bytes  |
+-----------------------------------+-----------------+-----------------+-----------------+----------------
--+
#sh policy-map statistics type queuing
+---------------------------------+-----------------+-----------------+-----------------+------------------+
|            Class-map            |    Total pkts   |   Total bytes   |   Dropped pkts  |   Dropped Bytes  |
+---------------------------------+-----------------+-----------------+-----------------+------------------+
ethernet1/1
 q7                               291               28105             0                 0
ethernet2/1
 q7                               287               27506             0                 0
ethernet3/1
 q7                               292               27011             0                 0
ethernet30/1
 q7                               294               28028             0                 0
ethernet31/1
 q7                               281               26458             0                 0
ethernet32/1
 q7                               293               28045             0                 0
ethernet64/1
 q7                               281               26305             0                 0
#
```

The non-zero counts for Total pkts and Total bytes for class-map q7 (Queue 7) on multiple interfaces indicate that the queuing policy is operational.

The Dropped pkts and Dropped Bytes columns show 0 for all monitored interfaces and q7. This indicates that the buffers were not congested enough to trigger packet drops.

# Implementation Examples

Following are some the real time examples to create, attach, update PG profile.

### Latency-Sensitive Applications (Low Alpha)

For voice network traffic, consistent and predictable latency is critical. By configuring a low alpha value (e.g. 1/16 MMU alpha) on the relevant traffic classes, queues rely primarily on their reserved buffers rather than the shared pool. This ensures packets are forwarded with minimal jitter. Following is an ingress PG map profile example for low alpha value.

```
OcNOS(config)#qos profile ingress-pg-map pg2
OcNOS(config-ingress-pg-queue-map)#priority-group 3 xon-offset 2000 dynamic-threshold 2
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#exit
```

### Latency-Tolerant Applications (High Alpha)

For workloads like backup traffic or bulk file transfers, the priority is maximizing throughput rather than minimizing latency. By setting a higher alpha value (e.g. 1/4 or 1/2 MMU alpha), queues can aggressively borrow from the shared buffer, allowing them to handle large bursts of data efficiently. Following is an ingress PG map profile example for high alpha value.

```
OcNOS(config)#qos profile ingress-pg-map pg2
OcNOS(config-ingress-pg-queue-map)#priority-group 5 xon-offset 2000 dynamic-threshold 9
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#exit
```

### To create a PG profile.

```
OcNOS(config)#qos profile ingress-pg-map pg1
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#exit
```

### To add a map in the default global PG profile with dynamic threshold

```
OcNOS(config)#qos profile ingress-pg-map default
OcNOS(config-ingress-pg-queue-map)#priority-group 0 dynamic-threshold 5
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#exit
```

### To add a map in the default global PG profile with XON offsets and XOFF threshold

```
OcNOS(config)#qos profile ingress-pg-map default
OcNOS(config-ingress-pg-queue-map)#priority-group 1 xon-offset 1200 xoff-threshold 2400
OcNOS(config-ingress-pg-queue-map)#comm
```

### To attach a PG profile to an interface

```
OcNOS(config)#qos profile ingress-pg-map pg2
```

```
OcNOS(config-ingress-pg-queue-map)#priority-group 0 xon-offset 200 dynamic-
threshold 1
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#exit
OcNOS(config)#interface ce1
OcNOS(config-if)#qos map-profile ingress-pg-map pg2
OcNOS(config-if)#comm
```

To add a member interface to a LAG that has a PG profile attached

```
OcNOS(config)#bridge 1 protocol ieee vlan-bridge
OcNOS(config)#vlan 100 br 1
OcNOS(config)#interface sa10
OcNOS(config-if)#switchport
OcNOS(config-if)#bridge-group 1
OcNOS(config-if)#switchport mode trunk
OcNOS(config-if)#switchport trunk allowed vlan all
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#interface ce5
OcNOS(config-if)#static-channel-group 10
OcNOS(config-if)#int ce4
OcNOS(config-if)#static-channel-group 10
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#interface sa10
OcNOS(config-if)#qos map-profile ingress-pg-map pg2
OcNOS(config-if)#comm
OcNOS(config)#interface ce6
OcNOS(config-if)#static-channel-group 10
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#interface ce7
OcNOS(config-if)#static-channel-group 10
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#end
```

To attach a PG profile to a MLAG interface

```
OcNOS(config)#bridge 1 protocol rstp vlan-bridge
OcNOS(config)#comm
OcNOS(config)#interface sa20
OcNOS(config-if)#switchport
OcNOS(config-if)#bridge-group 1
OcNOS(config-if)#switchport mode trunk
OcNOS(config-if)#switchport trunk allowed vlan all
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#interface ce9
OcNOS(config-if)#static-channel-group 20
OcNOS(config-if)#exit
OcNOS(config)#interface ce10
```

```
OcNOS(config-if)#static-channel-group 20
OcNOS(config-if)#exit
OcNOS(config)#comm
OcNOS(config)#interface mlag1
OcNOS(config-if)#switchport
OcNOS(config-if)#bridge-group 1
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#interface sa20
OcNOS(config-if)#mlag 1
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#interface mlag1
OcNOS(config-if)#qos map-profile ingress-pg-map pg2
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#end
OcNOS(config)#interface ce13
OcNOS(config-if)#static-channel-group 20
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#end
```

To change the queue size for PFC triggers by modifying XON offset values

```
OcNOS(config)#qos profile ingress-pg-map PG_XON_TEST
OcNOS(config-ingress-pg-queue-map)#priority-group 1 xon-offset 20000
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#
```

To reconfigure XON offset in an ingress-pg-map with dynamic threshold mapped to a priority

```
OcNOS(config)#qos profile ingress-pg-map pg3
OcNOS(config-ingress-pg-queue-map)#priority-group 0 xon-offset 2000 dynamic-
threshold 10
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#priority-group 0 xon-offset 2900
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#exit
```

To configure egress dynamic-threshold value

```
OcNOS(config)#policy-map type queuing default default-out-policy
OcNOS(config-pmap-que-def)#class type queuing default q0
OcNOS(config-pmap-c-que-def)#dynamic-threshold 5
OcNOS(config-pmap-c-que-def)#comm
OcNOS(config-pmap-c-que-def)#exit
OcNOS(config-pmap-que-def)#exit
OcNOS(config)#end
```

## CLI Commands

The Switch Buffer Tuning introduces the following configuration commands.

- qos profile ingress-pg-map
- dynamic-threshold

# qos profile ingress-pg-map

Use this command to create a ingress priority group (PG) profile or update the default ingress PG profile.

Use `no` parameter of this command to remove a ingress PG profile.

Use `no` parameter of `priority-group` command to unset a PG mapping in the ingress PG profile.

Use show qos-profile to show the profile detail.

Use qos map-profile to map the profile on interface.

### Command Syntax

```
qos profile ingress-pg-map (NAME|default) priority-group <0-7> (xon-offset <1-
  83000> (xoff-threshold <1-83000> | dynamic-threshold <0-10> |) | xoff-threshold
  <1-83000> | dynamic-threshold <0-10>)
no qos profile ingress-pg-map (NAME|default)
no priority-group <0-7>
```

### Parameters

Use this command to update the priority mapping in the PG profile.

| | |
|---|---|
| `ingress-pg-map <NAME>` | Specifies the name of the ingress priority group map profile. |
| `default` | Specifies the default PG map profile. |
| `priority-group <0-7>` | Specifies the priority mapping in the PG profile. The values are defined in Kbytes by default. |
| `xon-offset <1-83000>` | Specifies XON buffer offset of the shared memory that a PG can receive. The value is specified in Kbytes by default.<br>When the buffer usage on the ingress priority group drops below this PFC XON offset from the shared limit, the priority group sends a PFC message to the peer to resume packet transmission.<br><br>When the ingress PG buffer reaches the configured limit, it triggers the transmission of PFC pause frames to its egress peer. |

| | |
|---|---|
| `xoff-threshold <1-83000>` | Specifies the absolute threshold at which the PG XOFF will start. The value is specified in Kbytes by default.Typically The difference between these thresholds provides hysteresis in toggling between X-OFF and X-ON, thereby limiting the PFC transmission rate. |
| `dynamic-threshold <0-10>` | Defines the configurable limit on how many buffers each queue can draw from the shared buffer pool. This pool operates according to a dynamic threshold parameter known as the alpha value.<br><br>The dynamic threshold modifies the PG queue size only in the absence of a configured `xoff-threshold`.<br><br>The dynamic threshold can be set individually for different queues, allowing fine-grained control over how each queue accesses the shared buffer. Following are the dynamic threshold values that can be configured:<br>• 0 1/128 MMU alpha.<br>• 1 1/64 MMU alpha.<br>• 2 1/32 MMU alpha.<br>• 3 1/16 MMU alpha.<br>• 4 1/8 MMU alpha.<br>• 5 1/4 MMU alpha.<br>• 6 1/2 MMU alpha.<br>• 7 1 MMU alpha.<br>• 8 2 MMU alpha.<br>• 9 4 MMU alpha.<br>• 10 8 MMU alpha<br><br>Note: Memory Management Unit (MMM) refers to block inside a switch that controls packet buffering and queue management. |

Note: Only a single threshold attribute—`xoff-threshold` or `dynamic-threshold`—is valid and permitted in the CLI configuration.

### Default

- `xon-offset` — 32
- `xoff-threshold` — None.
- `dynamic-threshold` — 8

### Command Mode

Configure Mode

### Applicability

Introduced in OcNOS Version 7.0.0. This command is supported only on the Trident3 (TD3) platforms, Trident 4 (TD4) platforms, Tomahawk3 (TH3) platforms, Tomahawk4 (TH4) platforms, and Tomahawk 5 (TH5) platforms.

### Example

Command to create and attach user-defined PG profile.

```
OcNOS#configure terminal
(config)#qos profile ingress-pg-map PG1
```

```
(config-ingress-pg-queue-map)#priority-group 0 xon-offset 30000
(config-ingress-pg-queue-map)#priority-group 1 xoff-threshold 20000
(config-ingress-pg-queue-map)#priority-group 2 dynamic-threshold 2
(config-ingress-pg-queue-map)#priority-group 3 xon-offset 2000 xoff-threshold
10000
(config-ingress-pg-queue-map)#priority-group 4 xon-offset 50000 dynamic-
threshold 9

(config)#interface xe65
(config-if)#qos map-profile ingress-pg-map PG1
```

Updating default global PG profile with XON-offset:

```
OcNOS#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
OcNOS(config)#qos profile ingress-pg-map default
OcNOS(config-ingress-pg-queue-map)#priority-group 1 xon-offset 5000
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#exit
OcNOS(config)#end
OcNOS#
```

Updating default global PG profile with XOFF-threshold:

```
OcNOS#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
OcNOS(config)#qos profile ingress-pg-map default
OcNOS(config-ingress-pg-queue-map)#priority-group 2 xoff-threshold 10000
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#end
OcNOS#
```

Updating default global PG profile with dynamic-threshold:

```
OcNOS#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
OcNOS(config)#qos profile ingress-pg-map default
OcNOS(config-ingress-pg-queue-map)#priority-group 3 dynamic-threshold 2
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#exit
OcNOS(config)#end
OcNOS#
```

Updating default global PG profile with XON-offset and XOFF-threshold:

```
OcNOS#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
OcNOS(config)#qos profile ingress-pg-map default
OcNOS(config-ingress-pg-queue-map)#priority-group 4 xon-offset 5000 xoff-
threshold 15000
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#end
OcNOS#
```

Updating default global PG profile with XON-offset and dynamic threshold:

```
OcNOS#conf t
```

```
Enter configuration commands, one per line.  End with CNTL/Z.
OcNOS(config)#qos profile ingress-pg-map default
OcNOS(config-ingress-pg-queue-map)#priority-group 5 xon-offset 1000 dynamic-
threshold 8
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#end
OcNOS#
```

Accessing default global PG profile:

```
OcNOS#conf t
Enter configuration commands, one per line. End with CNTL/Z. OcNOS(config)#qos
profile ingress-pg-map default OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#exit OcNOS(config)#end
```

Detaching a PG profile:

```
OcNOS(config)#int ce1
OcNOS(config-if)#no qos map-profile ingress-pg-map pg2 OcNOS(config-if)#comm
2025 Aug 20 01:17:47.594 : OcNOS : HSL : DEBUG : QOS: zNSM_SYNC: Successfully
set/unset xon: 5000 xoff: 15000 dynamic_threshold: 0 on port :5
OcNOS(config-if)#exit OcNOS(config)#end
```

# dynamic-threshold

Use this command to configure egress dynamic-threshold values.

Use `no` parameter of this command to unconfigure .

### Command Syntax

```
dynamic-threshold <0-10>
no dynamic-threshold
```

### Parameters

| | |
|---|---|
| `<0-10>` | Specifies the egress dynamic-threshold value in kbytes. It defines the dynamic limit of the PG queue. Define a configurable limit on how many buffers each queue can draw from the shared buffer pool. This pool operates according to a dynamic threshold parameter known as the alpha value.<br><br>The dynamic threshold can be set individually for different queues, allowing fine-grained control over how each queue accesses the shared buffer. Following are the dynamic threshold values that can be configured:<br>• 0 1/128 MMU alpha.<br>• 1 1/64 MMU alpha.<br>• 2 1/32 MMU alpha.<br>• 3 1/16 MMU alpha.<br>• 4 1/8 MMU alpha.<br>• 5 1/4 MMU alpha.<br>• 6 1/2 MMU alpha.<br>• 7 1 MMU alpha.<br>• 8 2 MMU alpha.<br>• 9 4 MMU alpha.<br>• 10 8 MMU alpha |

### Default

None

### Command Mode

config-pmap-c-que-def mode

policy-class-map-queue mode

### Applicability

Introduced in OcNOS Version 7.0.0. This command is supported only on the Trident3 (TD3) platforms, Trident 4 (TD4) platforms, Tomahawk3 (TH3) platforms, Tomahawk4 (TH4) platforms, and Tomahawk 5 (TH5) platforms.

### Example

Command to configure egress dynamic-threshold value:

```
OcNOS#configure terminal
(config)#policy-map type queuing default default-out-policy
(config-pmap-que-def)#class type queuing default q0
(config-pmap-c-que-def)#dynamic-threshold 7
```

The following existing CLI commands are updated to include `ingress-pg-map` attribute.

- show qos-profile
- qos map-profile

### show qos-profile

```
show qos-profile (type (cos-to-queue | dscp-encap | dscp-to-dscp | dscp-to-queue |
  exp-to-queue | queue-to-exp | precedence-to-precedence | precedence-to-queue |
  queue-color-to-cos |ingress-pg-map | egress-dynamic-ecn)(interface NAME| all)
```

The CLI is modified to include `ingress-pg-map` attribute.

`ingress-pg-map` - This attribute displays the details of the PG profile attached to an interface or all.

### qos map-profile

```
qos map-profile (cos-to-queue | dscp-to-queue | queue-color-to-cos | queue-color-
  to-dscp | precedence-to-queue | queue-to-precedence | ingress-pg-map| egress-
  dynamic-ecn) NAME
```

This CLI is modified to include `ingress-pg-map` attribute.

`ingress-pg-map` - This attribute attach or detach an ingress priority group profile to and from an interface.

## Troubleshooting

Following are some of the commands that can be used for troubleshooting:

```
show policy-map statistics type qos
show policy-map
show qos-profile ingress-pg-map(interface NAME| all)
```

## Glossary

The following provides definitions for key terms or abbreviations and their meanings used throughout this document:

| Key Terms/ Acronym | Description |
|---|---|
| PG | Priority group is mechanism to allocates packet buffer size based on traffic priority classes referred as Priority Groups (PG) instead of physical ports. |

| | |
|---|---|
| QoS | Quality of service refers to an ability to deliver, control the bandwidth, set priorities for specific network traffic, and provide an appropriate level of security. |
| PFC | Priority Flow Control is a packet control mechanism to manage when to pause frames to prevent packet loss. |

# Explicit Congestion Notification (ECN) Configuration

## Overview

Traditionally, packet congestion in TCP/IP networks is indicated by packet loss. However, Explicit Congestion Notification (ECN) is a mechanism that allows two endpoints in a TCP/IP network to signal congestion without dropping packets. The two endpoints are an ECN-enabled sender and an ECN-enabled receiver. ECN must be enabled on both endpoints and on all of the intermediate devices between the endpoints for ECN to work properly. Any device in the transmission path that does not support ECN breaks the end-to-end ECN functionality.

With ECN enabled, routers and switches that detect congestion can mark packets in the IP header instead of discarding them. An ECN field is used in the IP header with two bits (‘10’ and ‘01’) to indicate that the endpoints are ECN capable transport. The receiving endpoint then echoes this congestion notification back to the sender, prompting it to reduce the transmission rate just as if a packet loss had occurred.

ECN operation requires support on both endpoints as well as on the network devices in the forwarding path. If any device in the transmission path does not support ECN, the end-to-end ECN capability is disrupted. When successfully negotiated, ECN improves efficiency by reducing packet loss, lowering retransmissions, and enabling faster recovery during congestion events.

OcNOS supports following ECN Markings:

- Static ECN Marking
- Dynamic ECN Marking

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# CHAPTER 1 Static ECN Marking

## Overview

OcNOS with Explicit Congestion Notification (ECN) capability uses Weighted Random Early Detection (WRED) technique that prevents buffer overflows by static ECN (S-ECN) marking. It marks the ECN based on packet attributes and probabilistic mathematical functions.

WRED drops packets, based on the average queue length exceeding a specific threshold value, to indicate congestion. ECN is an extension to WRED in that ECN marks packets instead of dropping them when the average queue length exceeds a specific threshold value. When configured with the WRED -- Explicit Congestion Notification feature, routers and end hosts would use this marking as a signal that the network is congested and slow down sending packets.

ECN requires an ECN-specific field that has two bits--the ECN-capable Transport (ECT) bit and the CE (Congestion Experienced) bit--in the IP header. The ECT bit and the CE bit can be used to make four ECN field combinations of 00 to 11. The first number is the ECT bit and the second number is the CE bit. The table below lists each of the ECT and CE bit combination settings in the ECN field and what the combinations indicate.

Table 1-1 explains the output fields.

**Table 1-1: show BFD fields**

| ECT Bit | CE Bit | Combination Indicates |
|---|---|---|
| 0 | 0 | Not- ECN capable |
| 0 | 1 | Endpoints of the transport protocol are ECN capable |
| 1 | 0 | Endpoints of the transport protocol |
| 1 | 1 | Congestion experienced |

The ECN field combination 00 indicates that a packet is not using ECN. The ECN field combinations of 01 and 10 called as ECT(1) and ECT(0) respectively. This sets by the data sender to indicate that the endpoints of the transport protocol are ECN-capable. Routers treat those two field combinations identically. Data senders can use either one or both of these two combinations.

## Feature Characteristis

If the number of packets in the queue is below the minimum threshold, packets are transmitted. This happens whether or not ECN is enabled, and this treatment is identical to the treatment a packet receives when WRED only is being used on the network.

If the number of packets in the queue is between the minimum threshold and the maximum threshold, one of the following three scenarios can occur:

If the ECN field on the packet indicates that the endpoints are ECN-capable (that is, the ECT bit is set to 1 and the CE bit is set to 0, or the ECT bit is set to 0 and the CE bit is set to 1)--and the WRED algorithm determines that the packet should have been dropped based on the drop probability--the ECT and CE bits for the packet are changed to 1, and the packet is transmitted. This happens because ECN is enabled and the packet gets marked instead of dropped.

If the ECN field on the packet indicates that neither endpoint is ECN-capable (that is, the ECT bit is set to 0 and the CE bit is set to 0), the packet might be dropped based on the WRED drop probability. This is the identical treatment that a packet receives when WRED is enabled without ECN configured on the router.

If the ECN field on the packet indicates that the network is experiencing congestion (that is, both the ECT bit and the CE bit are set to 1), the packet is transmitted. No further marking is required.

If the number of packets in the queue is above the maximum threshold, packets are dropped based on the drop probability. This is the identical treatment a packet receives when WRED is enabled without ECN configured on the router.

## Topology




**Figure 1-21: Simple configuration of ECN**

# Configuring ECN on L3 Interface

Do the following to configure ECN on anL3 interface.

| | |
|---|---|
| `#configure terminal` | Enter inside configure mode |
| `(config)#qos enable` | Enable QoS on configuration mode. |
| `(config)#qos statisticsEnable` | QoS statistics on configuration mode. |
| `(config)#class-map match-any cmap` | Enter Class-map mode |
| `(cmap-qos-match-any-mode)#match precedence 3` | Configure match criteria as precedence with Value 3 |
| `(config-pmap-qos)#policy-map pmap` | Enter policy-map mode |
| `(config-pmap-qos)#class cmap` | Assign Class cmap to Policy-map pmap |
| `(cmap-qos-match-any-mode)#match precedence 3` | Configure match criteria as precedence with Value 3 |
| `(config-pmap-qos)#policy-map pmap` | Enter policy-map mode |
| `(config-pmap-qos)#class cmap` | Assign Class cmap to Policy-map pmap |
| `(config-pmap-c-qos)# police cir 328 mbps pir 556 mbps conform transmit exceed transmit violate transmit` | Police Precedence 3 frames @ Committed information rate of 328 mbps and pir 556 mbps conform transmit exceed transmit violate transmit. |
| `(config-pmap-c-qos)#end` | Exit out of policy-class-map mode |
| `#configure terminal` | Enter inside configure mode |
| `(config)#interface xe29` | Enter interface mode |
| `(config-if)#service-policy type qos input pmap` | Assign service-policy to interface on in-direction |
| `(config-if)#exit` | Exit interface mode |
| `(config)#policy-map type queuing default xyz` | Enter policy-map queuing mode |
| `(config-pmap-que-def)#class type queuing default q3` | Enter class-map type queuing |
| `(config-pmap-c-que-def)#shape percent 80` | Configure shape percent 80 in q3 |
| `(config-pmap-c-que-def)# random-detect min-threshold 100 max-threshold 200 packets ecn` | Configure ECN with Random Early Detection which includes minimum and maximum threshold in packets |

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| | |
|---|---|
| #configure terminal | Enter configure mode |
| (config)#interface xe30 | Enter interface mode |
| (config-if)#service-policy type queuing output xyz | Attach policy on egress interface |
| (config-if)#exit | Exit configure mode |

# Validation

Enter the commands listed in the sections below to confirm the configurations.

```
Router#show policy-map interface xe30
Interface xe30
Global statistics status : enabled
Service-policy (queuing) output: xyz
----------------------------------
Class-map (queuing): q0
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): q1
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): q2
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): q3
 shape percent 80
 priority level 1
 random-detect min-threshold 100 max-threshold 200 packets ecn
      output       : 44808 packets, 67210500 bytes
      dropped      : 10516 packets, 15774000 bytes
Class-map (queuing): q4
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): q5
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): q6
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): q7
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
```

```
      dropped      : 0 packets, 0 bytes
Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): mc-q7
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Wred Drop Statistics:
green  : 0 packets
 yellow : 0 packets
 red    : 0 packets
```

## Topology

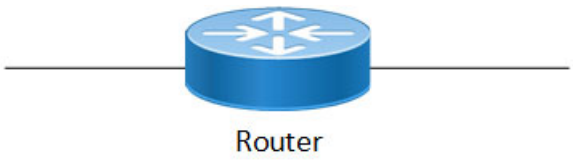



**Figure 1-22: Simple configuration of ECN**

# Configuring ECN on L2 Interface

Do the following to configure ECN on anL2 interface.

| | |
|---|---|
| `#configure terminal` | Enter inside configure mode |
| `(config)#bridge 1 protocol mstp` | Configure bridge 1 as MSTP aware |
| `(config)#interface xe29` | Enter interface mode |
| `(config-if)#switchport` | Configure xe29 as a layer 2 port |
| `(config-if)#bridge-group 1` | Associate bridge to an interface |
| `(config-if)#switchport mode trunk` | Configure port as trunk |
| `(config-if)#switchport trunk allowed vlan all` | Allow all the vlan on the interface xe29 |
| `(config-if)#exit` | Exit the xe29 interface mode |
| `(config)#interface xe30` | Enter interface mode |

| | |
|---|---|
| (config-if)#switchport | Configure xe30 as a layer 2 port |
| (config-if)#bridge-group 1 | Associate bridge to an interface |
| (config-if)#switchport mode trunk | Configure port as trunk |
| (config-if)#switchport trunk allowed vlan all | Allow all the vlan on the interface xe30 |
| (config-if)#exit | Exit the xe30 interface mode |
| (config)#qos enable | Enable QoS on configuration mode |
| (config)#qos statistics | Enable QoS statistics on configuration mode |
| (config)#class-map match-any cmap | Enter Class-map mode |
| (cmap-qos-match-any-mode)#match precedence 3 | Configure match criteria as precedence with Value 3 |
| (config-pmap-qos)#policy-map pmap | Enter policy-map mode |
| (config-pmap-qos)#class cmap | Assign Class cmap to Policy-map pmap |
| (config-pmap-c-qos)# police cir 328 mbps pir 556 mbps conform transmit exceed transmit violate transmit | Police Precedence 3 frames @ Committed information rate of 328 mbps and pir 556 mbps conform transmit exceed transmit violate transmit. |
| (config-pmap-c-qos)#end | Exit out of policy-class-map mode |
| #configure terminal | Enter inside configure mode |
| (config)#interface xe29 | Enter interface mode |
| (config-if)#trust dscp | Configure trust DSCP on the interface xe29 |
| (config-if)#service-policy type qos input pmap | Assign service-policy to interface on in-direction |
| (config-if)#exit | Exit interface mode |
| (config)#policy-map type queuing default xyz | Enter policy-map queuing mode |
| (config-pmap-que-def)#class type queuing default q3 | Enter class-map type queuing |
| (config-pmap-c-que-def)#shape average 900 mbps | Configure shape average 900 in q3 |
| (config-pmap-c-que-def)#random-detect green 1000 2000 yellow 3000 4000 red 5000 6000 bytes ecn | Configure ECN with Random Early Detection which includes minimum and maximum threshold for green, yellow and red packets |
| (config-pmap-c-que-def)#end | Exit pmap mode |
| #configure terminal | Enter configure mode |
| (config)#interface xe30 | Enter interface mode |
| (config-if)#service-policy type queuing output xyz | Attach policy on egress interface |
| (config-if)#exit | Exit configure mode |

# Validation

Enter the commands listed in the sections below to confirm the configurations.

```
 Router#show policy-map interface xe30
Interface xe30
Global statistics status : enabled
Service-policy (queuing) output: xyz
---------------------------------
Class-map (queuing): q0
```

```
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): q1
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): q2
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): q3
 shape average 900 mbps
 priority level 1
 random-detect green min-threshold 1000 max-threshold 2000 yellow minimu
m-threshold 3000 max-threshold 4000 red min-threshold 5000 maximum-thres
hold 6000 bytes ecn
      output       : 308318 packets, 462477000 bytes
      dropped      : 29774 packets, 44661000 bytes
Class-map (queuing): q4
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): q5
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): q6
 priority level 1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): q7
 priority level 1
      output       : 3 packets, 369 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): mc-q3
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): mc-q4
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): mc-q5
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Class-map (queuing): mc-q6
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
```

```
Class-map (queuing): mc-q7
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes
Wred Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets
```

# CHAPTER 2 Dynamic ECN Marking

## Overview

The existing ECN functionality is enhanced to support dynamic ECN (D-ECN) that allows more precise ECN marking based on shared buffer usage.

### Feature Characteristics

In Dynamic ECN, a dynamic threshold is used to allow more precise ECN marking by taking into account actual shared buffer usage. Typically, a D-ECN threshold value is based on D-ECN-Offset and D-ECN-Floor values.

D-ECN Threshold = (Queue's shared limit - D-ECN-Floor) - D-ECN-Offset, where

- D-ECN-Offset (D-ECN on-offset - Once queue size reached this offset, ECN is marked.)
- D-ECN-Floor (D-ECN off-offset - Once the queue size reaches this offset, ECN marking is stopped.)

While off-offset likely provides hysteresis (a threshold to stop marking). The off-offset, used in conjunction with the on-offset (a threshold for ECN marking), provides hysteresis for D-ECN marking. It determines the point (likely calculated as Queue's shared limit – off-offset) below which the queue's shared buffer usage must fall for the device to stop marking packets with ECN for that queue, after having started marking due to crossing the on-offset threshold.

This mechanism prevents rapid oscillation between marking and not marking when the queue usage hovers near the activation threshold, contributing to more stable congestion signaling.

Both Static ECN (S-ECN) and Dynamic ECN (D-ECN) can be enabled simultaneously, with the final ECN marking determined by a logical OR operation between the two.

Limitation:

This functionality is supported on Broadcom Tomahawk5 platforms only.

More than 3 D-ECN user defined profiles cannot be created.

### Benefits

This enhancement provides the following capabilities for AI/ML networking environment where lossless traffic is crucial:

- Controls congestion through tunable threshold values
- Provides more accurate ECN marking aligned with buffer usage
- Improves stability and performance for high-throughput

### Prerequisites

Ensure baseline QoS is enabled and potentially Static ECN via WRED is configured in an applied policy map.

# Configuring Dynamic ECN

## Topology

The following topology shows ECN Marked packets on the egress interfaces xe1 of Switch 1.

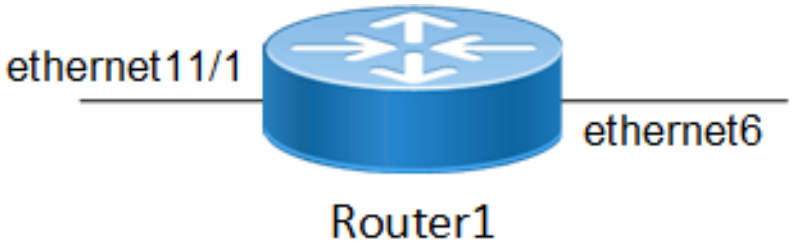



**Figure 2-23: ECN Enabled Bridge**

## Configuration

The following procedure defines a QoS profile with specific queue offsets, applying it to an interface, and validating its behavior under different traffic conditions.

1. Create a global D-ECN profile and define queue mapping.

```
OcNOS(config)#qos profile egress-dynamic-ecn DECN
OcNOS(config-eg-dynamic-ecn-map)#queue 0 on-offset 4000 off-offset 1000 kbytes
OcNOS(config-eg-dynamic-ecn-map)#queue 1 on-offset 5000000 off-offset 2000000
bytes
OcNOS(config-eg-dynamic-ecn-map)#queue 2 on-offset 4000 off-offset 5000 kbytes
OcNOS(config-eg-dynamic-ecn-map)#queue 3 on-offset 5000000 off-offset 6000000
bytes
OcNOS(config-eg-dynamic-ecn-map)#queue 4 on-offset 5000 off-offset 10000 kbytes
OcNOS(config-eg-dynamic-ecn-map)# queue 5 on-offset 3000000 off-offset 12000000
bytes
OcNOS(config-eg-dynamic-ecn-map)#commit
OcNOS(config-eg-dynamic-ecn-map)#exit
```

2. Assign the D-ECN profile to an interface.

```
OcNOS(config)#interface ethernet11/1
OcNOS(config-if)#load-interval 30
OcNOS(config-if)#ip address 20.1.1.1/24
OcNOS(config-if)#mtu 9216
OcNOS(config-if)#shape rate 9803 mbps burst 1000
OcNOS(config-if)#qos map-profile egress-dynamic-ecn DECN
OcNOS(config-if)#commit
OcNOS(config-if)#exit
```

### Sample Show Running Configuration

```
!
```

```
service password-encryption
!
logging console 5
logging level all 5
!
!
snmp-server enable traps link linkDown
snmp-server enable traps link linkUp
!
qos enable
qos statistics
qos profile egress-dynamic-ecn DECN
 queue 0 on-offset 4000 off-offset 1000 kbytes
 queue 1 on-offset 5000000 off-offset 2000000 bytes
 queue 2 on-offset 4000 off-offset 5000 kbytes
 queue 3 on-offset 5000000 off-offset 6000000 bytes
 queue 4 on-offset 5000 off-offset 10000 kbytes
 queue 5 on-offset 3000000 off-offset 12000000 bytes
!
hostname DUT1
port ethernet3 breakout 1X100g serdes 25g
port ethernet11 breakout 1X100g serdes 25g
tfo Disable
errdisable cause stp-bpdu-guard
feature dns relay
ip dns relay
ipv6 dns relay
!
vlan database
 vlan-reservation 4029-4094
!
ip vrf management
!
interface eth0
 ip vrf forwarding management
 ip address dhcp
!
interface ethernet0
!
interface ethernet1
!
interface ethernet2
!
interface ethernet3/1
 description Connected-Spirent
 load-interval 30
 ip address 10.1.1.1/24
 mtu 9216
!
interface ethernet10
```

```
!
interface ethernet11/1
 description Connected-DUT2
 load-interval 30
 ip address 20.1.1.1/24
 mtu 9216
 shape rate 9803 mbps burst 1000
 qos map-profile egress-dynamic-ecn DECN
!
interface ethernet12
!
interface ethernet63
!
interface lo
 ip address 127.0.0.1/8
 ip address 1.1.1.1/32 secondary
 ipv6 address ::1/128
!
interface lo.management
 ip vrf forwarding management
 ip address 127.0.0.1/8
 ipv6 address ::1/128
!
interface mgmt64
!
interface mgmt65
!
 exit
!
router ospf 100
 ospf router-id 1.1.1.1
 network 1.1.1.1/32 area 0.0.0.0
 network 10.1.1.0/24 area 0.0.0.0
 network 20.1.1.0/24 area 0.0.0.0
!
line console 0
 exec-timeout 0 0
!
!
end
!
```

## Validation

Confirm that the D-ECN profile `DECN` has been created with the intended on-offset and off-offset values for specific queues.

```
#show qos-profile egress-dynamic-ecn interface ethernet11/1
profile name: DECN
 mapping:
```

```
 queue 0 on-offset 4000 off-offset 1000 kbytes
 queue 1 on-offset 5000000 off-offset 2000000 bytes
 queue 2 on-offset 4000 off-offset 5000 kbytes
 queue 3 on-offset 5000000 off-offset 6000000 bytes
 queue 4 on-offset 5000 off-offset 10000 kbytes
 queue 5 on-offset 3000000 off-offset 12000000 bytes
```

### Scenario 1: Traffic Sent with Priority 0

In this scenario, traffic is sent with Priority 0, which maps to Queue 0 of the DECN profile. The queue parameters for Queue 0 are: on-offset 4000 kbytes and off-offset 1000 kbytes. The on-offset (4 MB) is greater than the off-offset (1 MB).

Repeatedly execute the following show command during congestion. Focus on the Q-Size (current queue depth in bytes) for the relevant egress queues (q0(E)).

```
DUT1#sh int counters rate mbps
+------------------+--------------+-------------+--------------+-------------+
|     Interface    |    Rx mbps   |    Rx pps   |    Tx mbps   |    Tx pps   |
+------------------+--------------+-------------+--------------+-------------+
 ethernet3/1          361.48         45185         0.00           0
 ethernet11/1         0.00           0             361.44         45179
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              16                1408                0                 0
 cpu                ospf                  (E) 0              8                 720                 0                 0
 cpu                arp                   (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                 (E) 0              8                 656                 0                 0
 ethernet3/1        pg-q0                 (I) 467868         NA                NA                  NA                NA
 ethernet11/1       q0                    (E) 473710         5202206           5202206000          0                 0
 ethernet11/1       mc-q3                 (E) 0              9                 770                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              16                1408                0                 0
 cpu                ospf                  (E) 0              8                 720                 0                 0
 cpu                arp                   (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                 (E) 0              8                 656                 0                 0
 ethernet3/1        pg-q0                 (I) 608584         NA                NA                  NA                NA
 ethernet11/1       q0                    (E) 610870         6318910           6318910000          0                 0
 ethernet11/1       mc-q3                 (E) 0              9                 770                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
```

```
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              16                1408                0                 0
 cpu                ospf                  (E) 0              8                 720                 0                 0
 cpu                arp                   (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                 (E) 0              8                 656                 0                 0
 ethernet3/1        pg-q0                 (I) 692404         NA                NA                  NA                NA
 ethernet11/1       q0                    (E) 698500         7033136           7033136000          0                 0
 ethernet11/1       mc-q3                 (E) 0              9                 770                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              16                1408                0                 0
 cpu                ospf                  (E) 0              8                 720                 0                 0
 cpu                arp                   (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                 (E) 0              8                 656                 0                 0
 ethernet3/1        pg-q0                 (I) 763778         NA                NA                  NA                NA
 ethernet11/1       q0                    (E) 779780         7681954           7681954000          0                 0
 ethernet11/1       mc-q3                 (E) 0              9                 770                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              16                1408                0                 0
 cpu                ospf                  (E) 0              8                 720                 0                 0
 cpu                arp                   (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                 (E) 0              8                 656                 0                 0
 ethernet3/1        pg-q0                 (I) 832358         NA                NA                  NA                NA
 ethernet11/1       q0                    (E) 840740         8170203           8170203000          0                 0
 ethernet11/1       mc-q3                 (E) 0              9                 770                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
```

```
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              16                1408                0                 0
 cpu                ospf                  (E) 0              8                 720                 0                 0
 cpu                arp                   (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                 (E) 0              8                 656                 0                 0
 ethernet3/1        pg-q0                 (I) 900176         NA                NA                  NA                NA
 ethernet11/1       q0                    (E) 908050         8718274           8718274000          0                 0
 ethernet11/1       mc-q3                 (E) 0              9                 770                 0                 0

DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              20                1760                0                 0
 cpu                ospf                  (E) 0              10                900                 0                 0
 cpu                arp                   (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                 (E) 0              10                820                 0                 0
 ethernet3/1        pg-q0                 (I) 3228848        NA                NA                  NA                NA
 ethernet11/1       q0                    (E) 3235960        27728891          27728891000         0                 0
 ethernet11/1       mc-q3                 (E) 0              11                942                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              20                1760                0                 0
 cpu                ospf                  (E) 0              10                900                 0                 0
 cpu                arp                   (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                 (E) 0              10                820                 0                 0
 ethernet3/1        pg-q0                 (I) 3282188        NA                NA                  NA                NA
 ethernet11/1       q0                    (E) 3288030        28162978          28162978000         0                 0
 ethernet11/1       mc-q3                 (E) 0              11                942                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
```

```
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              20                1760                0                0
 cpu                ospf                  (E) 0              10                900                 0                0
 cpu                arp                   (E) 0              1                 86                  0                0
 ethernet3/1        mc-q3                 (E) 0              10                820                 0                0
 ethernet3/1        pg-q0                 (I) 3336798        NA                NA                  NA               NA
 ethernet11/1       q0                    (E) 3347720        28633276          28633276000         0                0
 ethernet11/1       mc-q3                 (E) 0              11                942                 0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              20                1760                0                0
 cpu                ospf                  (E) 0              10                900                 0                0
 cpu                arp                   (E) 0              1                 86                  0                0
 ethernet3/1        mc-q3                 (E) 0              10                820                 0                0
 ethernet3/1        pg-q0                 (I) 3393948        NA                NA                  NA               NA
 ethernet11/1       q0                    (E) 3401060        29064737          29064737000         0                0
 ethernet11/1       mc-q3                 (E) 0              11                942                 0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              20                1760                0                0
 cpu                ospf                  (E) 0              10                900                 0                0
 cpu                arp                   (E) 0              1                 86                  0                0
 ethernet3/1        mc-q3                 (E) 0              10                820                 0                0
 ethernet3/1        pg-q0                 (I) 3459988        NA                NA                  NA               NA
 ethernet11/1       q0                    (E) 3470910        29632387          29632387000         0                0
 ethernet11/1       mc-q3                 (E) 0              11                942                 0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
```

```
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |     Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              20               1760               0                0
 cpu                ospf                  (E) 0              10               900                0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              10               820                0                0
 ethernet3/1        pg-q0                 (I) 3517138        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 3524250        30073593         30073593000        0                0
 ethernet11/1       mc-q3                 (E) 0              11               942                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DDUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |     Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              20               1760               0                0
 cpu                ospf                  (E) 0              10               900                0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              10               820                0                0
 ethernet3/1        pg-q0                 (I) 3790188        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 3793490        32290068         32290068000        0                0
 ethernet11/1       mc-q3                 (E) 0              11               942                0                0

DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |     Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              22               1936               0                0
 cpu                ospf                  (E) 0              11               990                0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              11               902                0                0
 ethernet3/1        pg-q0                 (I) 4348734        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 4359910        36885616         36885616000        0                0
 ethernet11/1       mc-q3                 (E) 0              12               1028               0                0

DUT1#
DUT1#
DUT1#
DUT1#
DUT1#
DUT1#
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |     Tx bytes     | Dropped pkts   |   Dropped
bytes   |
```

```
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              22               1936               0                0
 cpu                ospf                  (E) 0              11               990                0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              11               902                0                0
 ethernet3/1        pg-q0                 (I) 5300218        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 5304790        44630757         44630757000        0                0
 ethernet11/1       mc-q3                 (E) 0              12               1028               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        603080
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts    |      Tx bytes    |  Dropped pkts  |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              22               1936               0                0
 cpu                ospf                  (E) 0              11               990                0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              11               902                0                0
 ethernet3/1        pg-q0                 (I) 5351018        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 5354320        45028376         45028376000        0                0
 ethernet11/1       mc-q3                 (E) 0              12               1028               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        603080
DUT1#
```

The ECN bit starts marking from the 5.3MB.

```
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts    |      Tx bytes    |  Dropped pkts  |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              22               1936               0                0
 cpu                ospf                  (E) 0              11               990                0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              11               902                0                0
 ethernet3/1        pg-q0                 (I) 5391658        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 5401310        45408708         45408708000        0                0
 ethernet11/1       mc-q3                 (E) 0              12               1028               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        603080
DUT1#
```

```
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
 cpu                ipmc-reserved        (E) 0              22                1936                0                 0
 cpu                ospf                 (E) 0              11                990                 0                 0
 cpu                arp                  (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                (E) 0              11                902                 0                 0
 ethernet3/1        pg-q0                (I) 5442458        NA                NA                  NA                NA
 ethernet11/1       q0                   (E) 5449570        45787987          45787987000         0                 0
 ethernet11/1       mc-q3                (E) 0              12                1028                0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        603080
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
 cpu                ipmc-reserved        (E) 0              23                2026                0                 0
 cpu                ospf                 (E) 0              11                990                 0                 0
 cpu                arp                  (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                (E) 0              11                902                 0                 0
 ethernet3/1        pg-q0                (I) 5505958        NA                NA                  NA                NA
 ethernet11/1       q0                   (E) 5510530        46295155          46295155000         0                 0
 ethernet11/1       mc-q3                (E) 0              13                1114                0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        1827063
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
 cpu                ipmc-reserved        (E) 0              24                2112                0                 0
 cpu                ospf                 (E) 0              12                1080                0                 0
 cpu                arp                  (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                (E) 0              12                984                 0                 0
 ethernet3/1        pg-q0                (I) 6615938        NA                NA                  NA                NA
 ethernet11/1       q0                   (E) 6621780        55374545          55374545000         0                 0
 ethernet11/1       mc-q3                (E) 0              13                1114                0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
```

```
+------------------+----------------------+
 ethernet11/1        10407354
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              24               2112               0                0
 cpu                ospf                  (E) 0              12               1080               0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              12               984                0                0
 ethernet3/1        pg-q0                 (I) 6693154        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 6708140        56038518         56038518000        0                0
 ethernet11/1       mc-q3                 (E) 0              13               1114               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        11632937
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              24               2112               0                0
 cpu                ospf                  (E) 0              12               1080               0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              12               984                0                0
 ethernet3/1        pg-q0                 (I) 6774688        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 6784340        56662700         56662700000        0                0
 ethernet11/1       mc-q3                 (E) 0              13               1114               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        11632937
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              25               2202               0                0
 cpu                ospf                  (E) 0              12               1080               0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              12               984                0                0
 ethernet3/1        pg-q0                 (I) 6839458        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 6846570        57222674         57222674000        0                0
 ethernet11/1       mc-q3                 (E) 0              14               1200               0                0

DUT1#
DUT1#
```

```
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        12858460
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              25               2202               0                0
 cpu                ospf                 (E) 0              12               1080               0                0
 cpu                arp                  (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                (E) 0              12               984                0                0
 ethernet3/1        pg-q0                (I) 6901688        NA               NA                 NA               NA
 ethernet11/1       q0                   (E) 6915150        57730055         57730055000        0                0
 ethernet11/1       mc-q3                (E) 0              14               1200               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        12858460
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              25               2202               0                0
 cpu                ospf                 (E) 0              12               1080               0                0
 cpu                arp                  (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                (E) 0              12               984                0                0
 ethernet3/1        pg-q0                (I) 6974078        NA               NA                 NA               NA
 ethernet11/1       q0                   (E) 6982460        58293625         58293625000        0                0
 ethernet11/1       mc-q3                (E) 0              14               1200               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        14082242
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              25               2202               0                0
 cpu                ospf                 (E) 0              12               1080               0                0
 cpu                arp                  (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                (E) 0              12               984                0                0
 ethernet3/1        pg-q0                (I) 7031228        NA               NA                 NA               NA
 ethernet11/1       q0                   (E) 7038340        58777958         58777958000        0                0
 ethernet11/1       mc-q3                (E) 0              14               1200               0                0
```

```
DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        14082242
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              26                2332                0                 0
 cpu                ospf                  (E) 0              13                1170                0                 0
 cpu                arp                   (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                 (E) 0              12                984                 0                 0
 ethernet3/1        pg-q0                 (I) 7168134        NA                NA                  NA                NA
 ethernet11/1       q0                    (E) 7172960        59864594          59864594000         0                 0
 ethernet11/1       mc-q3                 (E) 0              15                1326                0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        15309267
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              26                2332                0                 0
 cpu                ospf                  (E) 0              14                1256                0                 0
 cpu                arp                   (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                 (E) 0              12                984                 0                 0
 ethernet3/1        pg-q0                 (I) 7301738        NA                NA                  NA                NA
 ethernet11/1       q0                    (E) 7315200        60991052          60991052000         0                 0
 ethernet11/1       mc-q3                 (E) 0              15                1326                0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        16534053
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              27                2418                0                 0
 cpu                ospf                  (E) 0              14                1256                0                 0
 cpu                arp                   (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                 (E) 0              13                1066                0                 0
```

```
 ethernet3/1        pg-q0                (I) 7516368         NA                NA                NA                NA
 ethernet11/1       q0                   (E) 7523480         62728932          62728932000       0                 0
 ethernet11/1       mc-q3                (E) 0               15                1326              0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        17760196
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0               27                2418              0                 0
 cpu                ospf                 (E) 0               14                1256              0                 0
 cpu                arp                  (E) 0               1                 86                0                 0
 ethernet3/1        mc-q3                (E) 0               13                1066              0                 0
 ethernet3/1        pg-q0                (I) 7584948         NA                NA                NA                NA
 ethernet11/1       q0                   (E) 7589520         63277600          63277600000       0                 0
 ethernet11/1       mc-q3                (E) 0               15                1326              0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        18984683
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0               27                2418              0                 0
 cpu                ospf                 (E) 0               14                1256              0                 0
 cpu                arp                  (E) 0               1                 86                0                 0
 ethernet3/1        mc-q3                (E) 0               13                1066              0                 0
 ethernet3/1        pg-q0                (I) 7638288         NA                NA                NA                NA
 ethernet11/1       q0                   (E) 7646670         63732680          63732680000       0                 0
 ethernet11/1       mc-q3                (E) 0               15                1326              0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        18984683
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0               27                2418              0                 0
```

```
 cpu                ospf                   (E) 0              14                1256               0                 0
 cpu                arp                    (E) 0              1                 86                 0                 0
 ethernet3/1        mc-q3                  (E) 0              13                1066               0                 0
 ethernet3/1        pg-q0                  (I) 7704328        NA                NA                 NA                NA
 ethernet11/1       q0                     (E) 7717790        64291138          64291138000        0                 0
 ethernet11/1       mc-q3                  (E) 0              15                1326               0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        20210552
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved          (E) 0              27                2418               0                 0
 cpu                ospf                   (E) 0              14                1256               0                 0
 cpu                arp                    (E) 0              1                 86                 0                 0
 ethernet3/1        mc-q3                  (E) 0              13                1066               0                 0
 ethernet3/1        pg-q0                  (I) 7763764        NA                NA                 NA                NA
 ethernet11/1       q0                     (E) 7777480        64755857          64755857000        0                 0
 ethernet11/1       mc-q3                  (E) 0              15                1326               0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        20210552
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved          (E) 0              27                2418               0                 0
 cpu                ospf                   (E) 0              14                1256               0                 0
 cpu                arp                    (E) 0              1                 86                 0                 0
 ethernet3/1        mc-q3                  (E) 0              13                1066               0                 0
 ethernet3/1        pg-q0                  (I) 7820914        NA                NA                 NA                NA
 ethernet11/1       q0                     (E) 7825740        65194300          65194300000        0                 0
 ethernet11/1       mc-q3                  (E) 0              15                1326               0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        20210552
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
```

```
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              27               2418               0                0
 cpu                ospf                  (E) 0              14               1256               0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              13               1066               0                0
 ethernet3/1        pg-q0                 (I) 7898384        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 7901940        65814692         65814692000        0                0
 ethernet11/1       mc-q3                 (E) 0              15               1326               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        21436610
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size       |     Tx pkts     |      Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              27               2418               0                0
 cpu                ospf                  (E) 0              14               1256               0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              13               1066               0                0
 ethernet3/1        pg-q0                 (I) 7945374        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 7954010        66207808         66207808000        0                0
 ethernet11/1       mc-q3                 (E) 0              15               1326               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        21436610
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size       |     Tx pkts     |      Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              27               2418               0                0
 cpu                ospf                  (E) 0              14               1256               0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              13               1066               0                0
 ethernet3/1        pg-q0                 (I) 7992364        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 7994650        66590690         66590690000        0                0
 ethernet11/1       mc-q3                 (E) 0              15               1326               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        21436610
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
```

```
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              27               2418               0                0
 cpu                ospf                  (E) 0              14               1256               0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              13               1066               0                0
 ethernet3/1        pg-q0                 (I) 8048244        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 8055610        67053443         67053443000        0                0
 ethernet11/1       mc-q3                 (E) 0              15               1326               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        22662866
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              27               2418               0                0
 cpu                ospf                  (E) 0              14               1256               0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              13               1066               0                0
 ethernet3/1        pg-q0                 (I) 8105394        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 8112760        67505535         67505535000        0                0
 ethernet11/1       mc-q3                 (E) 0              15               1326               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        22662866
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              27               2418               0                0
 cpu                ospf                  (E) 0              14               1256               0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              13               1066               0                0
 ethernet3/1        pg-q0                 (I) 8163814        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 8171180        68021380         68021380000        0                0
 ethernet11/1       mc-q3                 (E) 0              15               1326               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        23887051
DUT1#
DUT1#
```

```
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |     Tx bytes     | Dropped pkts    |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              27               2418               0                 0
 cpu                ospf                  (E) 0              14               1256               0                 0
 cpu                arp                   (E) 0              1                86                 0                 0
 ethernet3/1        mc-q3                 (E) 0              13               1066               0                 0
 ethernet3/1        pg-q0                 (I) 8238744        NA               NA                 NA                NA
 ethernet11/1       q0                    (E) 8244840        68610470         68610470000        0                 0
 ethernet11/1       mc-q3                 (E) 0              15               1326               0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        23887051
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |     Tx bytes     | Dropped pkts    |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              27               2418               0                 0
 cpu                ospf                  (E) 0              14               1256               0                 0
 cpu                arp                   (E) 0              1                86                 0                 0
 ethernet3/1        mc-q3                 (E) 0              13               1066               0                 0
 ethernet3/1        pg-q0                 (I) 8358124        NA               NA                 NA                NA
 ethernet11/1       q0                    (E) 8370570        69596225         69596225000        0                 0
 ethernet11/1       mc-q3                 (E) 0              15               1326               0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        25112001
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |     Tx bytes     | Dropped pkts    |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              27               2418               0                 0
 cpu                ospf                  (E) 0              15               1346               0                 0
 cpu                arp                   (E) 0              1                86                 0                 0
 ethernet3/1        mc-q3                 (E) 0              13               1066               0                 0
 ethernet3/1        pg-q0                 (I) 8407654        NA               NA                 NA                NA
 ethernet11/1       q0                    (E) 8411210        69969844         69969844000        0                 0
 ethernet11/1       mc-q3                 (E) 0              15               1326               0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
```

```
 ethernet11/1        25112001
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              27               2418               0                0
 cpu                ospf                  (E) 0              15               1346               0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              13               1066               0                0
 ethernet3/1        pg-q0                 (I) 8454644        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 8463280        70368735         70368735000        0                0
 ethernet11/1       mc-q3                 (E) 0              15               1326               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        26338023
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              28               2508               0                0
 cpu                ospf                  (E) 0              15               1346               0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              13               1066               0                0
 ethernet3/1        pg-q0                 (I) 8504174        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 8507730        70765972         70765972000        0                0
 ethernet11/1       mc-q3                 (E) 0              16               1412               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        26338023
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              28               2508               0                0
 cpu                ospf                  (E) 0              15               1346               0                0
 cpu                arp                   (E) 0              1                86                 0                0
 ethernet3/1        mc-q3                 (E) 0              13               1066               0                0
 ethernet3/1        pg-q0                 (I) 8551164        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 8555990        71144368         71144368000        0                0
 ethernet11/1       mc-q3                 (E) 0              16               1412               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
```

```
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        26338023
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+----------------------+-------------------+-----------------+--------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map    |      Q-Size       |     Tx pkts     |      Tx bytes      |  Dropped pkts   |   Dropped
bytes   |
+------------------+----------------------+-------------------+-----------------+--------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0               28                2508                 0                 0
 cpu                ospf                  (E) 0               15                1346                 0                 0
 cpu                arp                   (E) 0               1                 86                   0                 0
 ethernet3/1        mc-q3                 (E) 0               13                1066                 0                 0
 ethernet3/1        pg-q0                 (I) 8597646         NA                NA                   NA                NA
 ethernet11/1       q0                    (E) 8602980         71547781          71547781000          0                 0
 ethernet11/1       mc-q3                 (E) 0               16                1412                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        27563934
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+----------------------+-------------------+-----------------+--------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map    |      Q-Size       |     Tx pkts     |      Tx bytes      |  Dropped pkts   |   Dropped
bytes   |
+------------------+----------------------+-------------------+-----------------+--------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0               28                2508                 0                 0
 cpu                ospf                  (E) 0               15                1346                 0                 0
 cpu                arp                   (E) 0               1                 86                   0                 0
 ethernet3/1        mc-q3                 (E) 0               13                1066                 0                 0
 ethernet3/1        pg-q0                 (I) 8652764         NA                NA                   NA                NA
 ethernet11/1       q0                    (E) 8665210         71997342          71997342000          0                 0
 ethernet11/1       mc-q3                 (E) 0               16                1412                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        27563934
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+----------------------+-------------------+-----------------+--------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map    |      Q-Size       |     Tx pkts     |      Tx bytes      |  Dropped pkts   |   Dropped
bytes   |
+------------------+----------------------+-------------------+-----------------+--------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0               28                2508                 0                 0
 cpu                ospf                  (E) 0               15                1346                 0                 0
 cpu                arp                   (E) 0               1                 86                   0                 0
 ethernet3/1        mc-q3                 (E) 0               13                1066                 0                 0
 ethernet3/1        pg-q0                 (I) 8709914         NA                NA                   NA                NA
 ethernet11/1       q0                    (E) 8718550         72468888          72468888000          0                 0
 ethernet11/1       mc-q3                 (E) 0               16                1412                 0                 0
```

```
DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        27563934
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
 cpu                ipmc-reserved         (E) 0              28                2508                0                 0
 cpu                ospf                  (E) 0              15                1346                0                 0
 cpu                arp                   (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                 (E) 0              14                1148                0                 0
 ethernet3/1        pg-q0                 (I) 8772398        NA                NA                  NA                NA
 ethernet11/1       q0                    (E) 8778240        72952445          72952445000         0                 0
 ethernet11/1       mc-q3                 (E) 0              16                1412                0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        28788659
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
 cpu                ipmc-reserved         (E) 0              29                2594                0                 0
 cpu                ospf                  (E) 0              15                1346                0                 0
 cpu                arp                   (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                 (E) 0              14                1148                0                 0
 ethernet3/1        pg-q0                 (I) 8821674        NA                NA                  NA                NA
 ethernet11/1       q0                    (E) 8829040        73375762          73375762000         0                 0
 ethernet11/1       mc-q3                 (E) 0              16                1412                0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        28788659
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
 cpu                ipmc-reserved         (E) 0              29                2594                0                 0
 cpu                ospf                  (E) 0              15                1346                0                 0
 cpu                arp                   (E) 0              1                 86                  0                 0
 ethernet3/1        mc-q3                 (E) 0              14                1148                0                 0
 ethernet3/1        pg-q0                 (I) 8896604        NA                NA                  NA                NA
```

```
 ethernet11/1       q0                  (E) 8900160         73998715          73998715000         0                 0
 ethernet11/1       mc-q3               (E) 0               16                1412                0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        28788659
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0               29                2594                0                 0
 cpu                ospf                  (E) 0               15                1346                0                 0
 cpu                arp                   (E) 0               2                 172                 0                 0
 ethernet3/1        mc-q3                 (E) 0               15                1230                0                 0
 ethernet3/1        pg-q0                 (I) 8902954         NA                NA                  NA                NA
 ethernet11/1       q0                    (E) 8905240         74383033          74383033000         32                32000
 ethernet11/1       mc-q3                 (E) 0               16                1412                0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        30014796
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0               29                2594                0                 0
 cpu                ospf                  (E) 0               15                1346                0                 0
 cpu                arp                   (E) 0               2                 172                 0                 0
 ethernet3/1        mc-q3                 (E) 0               15                1230                0                 0
 ethernet3/1        pg-q0                 (I) 8901684         NA                NA                  NA                NA
 ethernet11/1       q0                    (E) 8906510         74780865          74780865000         32                32000
 ethernet11/1       mc-q3                 (E) 0               16                1412                0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        30014796
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0               29                2594                0                 0
 cpu                ospf                  (E) 0               15                1346                0                 0
```

```
 cpu                arp                   (E) 0              2                172                0                0
 ethernet3/1        mc-q3                 (E) 0              15               1230               0                0
 ethernet3/1        pg-q0                 (I) 8901684        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 8906510        75327220         75327220000        32               32000
 ethernet11/1       mc-q3                 (E) 0              16               1412               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        31238517
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              29               2594               0                0
 cpu                ospf                  (E) 0              15               1346               0                0
 cpu                arp                   (E) 0              2                172                0                0
 ethernet3/1        mc-q3                 (E) 0              15               1230               0                0
 ethernet3/1        pg-q0                 (I) 8897874        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 8906510        75757960         75757960000        150              150000
 ethernet11/1       mc-q3                 (E) 0              16               1412               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        31238517
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              29               2594               0                0
 cpu                ospf                  (E) 0              15               1346               0                0
 cpu                arp                   (E) 0              2                172                0                0
 ethernet3/1        mc-q3                 (E) 0              15               1230               0                0
 ethernet3/1        pg-q0                 (I) 8904224        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 8901430        76800871         76800871000        269              269000
 ethernet11/1       mc-q3                 (E) 0              16               1412               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        32464885
DUT1#
DUT1#
DUT1#
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
```

```
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |     Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              29               2594               0                0
 cpu                ospf                  (E) 0              15               1346               0                0
 cpu                arp                   (E) 0              2                172                0                0
 ethernet3/1        mc-q3                 (E) 0              15               1230               0                0
 ethernet3/1        pg-q0                 (I) 8904224        NA               NA                 NA               NA
 ethernet11/1       q0                    (E) 8900160        80133567         80133567000        505              505000
 ethernet11/1       mc-q3                 (E) 0              16               1412               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        36142406
DUT1#
```

The ECN marking started at 4.9 MB, this suggests the system's dynamic calculation or effective buffer space led to ECN marking somewhere between the on-offset (4 MB) and the full buffer capacity (which must be greater than 5.3 MB). The drops confirm the queue eventually exceeded its maximum ECN marking threshold and hit the drop threshold (likely the maximum queue depth).

### Scenario 2: Traffic Sent with Priority 3

In this scenario, traffic is sent with Priority 3, which maps to Queue 3 of the DECN profile. The queue parameters for Queue 3 are: on-offset 5,000,000 bytes (5 MB) and off-offset 6,000,000 bytes (6 MB). The off-offset is greater than the on-offset.

Verify that the D-ECN profile `DECN` has been created with the intended on-offset and off-offset values for specific queues.

```
DUT1#sh qos-profile egress-dynamic-ecn all
qos profile egress-dynamic-ecn DECN
 queue 0 on-offset 4000 off-offset 1000 kbytes
 queue 1 on-offset 5000000 off-offset 2000000 bytes
 queue 2 on-offset 4000 off-offset 5000 kbytes
 queue 3 on-offset 5000000 off-offset 6000000 bytes
 queue 4 on-offset 5000 off-offset 10000 kbytes
 queue 5 on-offset 3000000 off-offset 12000000 bytes
!
```

Repeatedly execute the following show command during congestion. Focus on the Q-Size (current queue depth in bytes) for the relevant egress queues (q3(E)).

```
DUT1#sh int counters rate mbps
+------------------+-------------+-------------+-------------+-------------+
|     Interface    |    Rx mbps  |    Rx pps   |    Tx mbps  |    Tx pps   |
+------------------+-------------+-------------+-------------+-------------+
DUT1#
DUT1#
DUT1#
DUT1#sh int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |     Tx bytes     | Dropped pkts   |   Dropped
bytes   |
```

```
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              3                262                0                0
 cpu                ospf                  (E) 0              1                90                 0                0
 ethernet3/1        mc-q3                 (E) 0              2                164                0                0
 ethernet11/1       mc-q3                 (E) 0              1                86                 0                0

DUT1#
DUT1#sh int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#sh int counters drop-stats
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              7                614                0                0
 cpu                ospf                  (E) 0              3                270                0                0
 cpu                arp                   (E) 0              1                68                 0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              4                328                0                0
 ethernet3/1        pg-q3                 (I) 162814         NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 171450         2734867          2734867000         0                0
 ethernet11/1       mc-q3                 (E) 0              3                258                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
-----------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              9                790                0                0
 cpu                ospf                  (E) 0              4                360                0                0
 cpu                arp                   (E) 0              1                68                 0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              5                410                0                0
 ethernet3/1        pg-q3                 (I) 1717294        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 1720850        15403857         15403857000        0                0
 ethernet11/1       mc-q3                 (E) 0              4                344                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
```

```
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              9                790                0                0
 cpu                ospf                  (E) 0              4                360                0                0
 cpu                arp                   (E) 0              1                68                 0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              5                410                0                0
 ethernet3/1        pg-q3                 (I) 1768094        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 1776730        15815800         15815800000        0                0
 ethernet11/1       mc-q3                 (E) 0              4                344                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              9                790                0                0
 cpu                ospf                  (E) 0              4                360                0                0
 cpu                arp                   (E) 0              1                68                 0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              5                410                0                0
 ethernet3/1        pg-q3                 (I) 1815084        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 1827530        16223716         16223716000        0                0
 ethernet11/1       mc-q3                 (E) 0              4                344                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
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DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
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+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              9                790                0                0
 cpu                ospf                  (E) 0              4                360                0                0
 cpu                arp                   (E) 0              1                68                 0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              5                410                0                0
 ethernet3/1        pg-q3                 (I) 1865884        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 1874520        16652934         16652934000        0                0
 ethernet11/1       mc-q3                 (E) 0              4                344                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
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DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
```

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+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |     Q-Size       |    Tx pkts     |     Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              9                790                0                0
 cpu                ospf                 (E) 0              4                360                0                0
 cpu                arp                  (E) 0              1                68                 0                0
 ethernet3/1        q7                   (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                (E) 0              5                410                0                0
 ethernet3/1        pg-q3                (I) 1919224        NA               NA                 NA               NA
 ethernet11/1       q3                   (E) 1927860        17056967         17056967000        0                0
 ethernet11/1       mc-q3                (E) 0              4                344                0                0

DUT1#
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DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
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DUT1#
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DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |     Q-Size       |    Tx pkts     |     Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              9                790                0                0
 cpu                ospf                 (E) 0              4                360                0                0
 cpu                arp                  (E) 0              2                154                0                0
 ethernet3/1        q7                   (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                (E) 0              5                410                0                0
 ethernet3/1        pg-q3                (I) 2371344        NA               NA                 NA               NA
 ethernet11/1       q3                   (E) 2379980        20747961         20747961000        0                0
 ethernet11/1       mc-q3                (E) 0              5                426                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
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DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |     Q-Size       |    Tx pkts     |     Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              9                790                0                0
 cpu                ospf                 (E) 0              4                360                0                0
 cpu                arp                  (E) 0              2                154                0                0
 ethernet3/1        q7                   (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                (E) 0              5                410                0                0
 ethernet3/1        pg-q3                (I) 2418334        NA               NA                 NA               NA
 ethernet11/1       q3                   (E) 2425700        21150485         21150485000        0                0
 ethernet11/1       mc-q3                (E) 0              6                512                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
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DUT1#
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```
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              10               880               0                0
 cpu                ospf                  (E) 0              4                360               0                0
 cpu                arp                   (E) 0              2                154               0                0
 ethernet3/1        q7                    (E) 0              1                64                0                0
 ethernet3/1        mc-q3                 (E) 0              5                410               0                0
 ethernet3/1        pg-q3                 (I) 2470404        NA               NA                NA               NA
 ethernet11/1       q3                    (E) 2481580        21586976         21586976000       0                0
 ethernet11/1       mc-q3                 (E) 0              6                512               0                0

DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              12               1056              0                0
 cpu                ospf                  (E) 0              6                540               0                0
 cpu                arp                   (E) 0              2                154               0                0
 ethernet3/1        q7                    (E) 0              1                64                0                0
 ethernet3/1        mc-q3                 (E) 0              6                492               0                0
 ethernet3/1        pg-q3                 (I) 4038854        NA               NA                NA               NA
 ethernet11/1       q3                    (E) 4047490        34346942         34346942000       0                0
 ethernet11/1       mc-q3                 (E) 0              7                598               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
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DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
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+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              12               1056              0                0
 cpu                ospf                  (E) 0              6                540               0                0
 cpu                arp                   (E) 0              2                154               0                0
 ethernet3/1        q7                    (E) 0              1                64                0                0
 ethernet3/1        mc-q3                 (E) 0              6                492               0                0
 ethernet3/1        pg-q3                 (I) 4084574        NA               NA                NA               NA
 ethernet11/1       q3                    (E) 4090670        34751620         34751620000       0                0
 ethernet11/1       mc-q3                 (E) 0              7                598               0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
```

```
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              12                1056                0                 0
 cpu                ospf                  (E) 0              6                 540                 0                 0
 cpu                arp                   (E) 0              2                 154                 0                 0
 ethernet3/1        q7                    (E) 0              1                 64                  0                 0
 ethernet3/1        mc-q3                 (E) 0              6                 492                 0                 0
 ethernet3/1        pg-q3                 (I) 4135374        NA                NA                  NA                NA
 ethernet11/1       q3                    (E) 4144010        35144895          35144895000         0                 0
 ethernet11/1       mc-q3                 (E) 0              7                 598                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
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+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              12                1056                0                 0
 cpu                ospf                  (E) 0              6                 540                 0                 0
 cpu                arp                   (E) 0              2                 154                 0                 0
 ethernet3/1        q7                    (E) 0              1                 64                  0                 0
 ethernet3/1        mc-q3                 (E) 0              6                 492                 0                 0
 ethernet3/1        pg-q3                 (I) 4178554        NA                NA                  NA                NA
 ethernet11/1       q3                    (E) 4192270        35540317          35540317000         0                 0
 ethernet11/1       mc-q3                 (E) 0              7                 598                 0                 0

DUT1#
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DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
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DUT1#
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E - Egress, I - Ingress, Q-Size is in bytes
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+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              12                1056                0                 0
 cpu                ospf                  (E) 0              6                 540                 0                 0
 cpu                arp                   (E) 0              2                 154                 0                 0
 ethernet3/1        q7                    (E) 0              1                 64                  0                 0
 ethernet3/1        mc-q3                 (E) 0              6                 492                 0                 0
 ethernet3/1        pg-q3                 (I) 4225544        NA                NA                  NA                NA
 ethernet11/1       q3                    (E) 4240530        35925450          35925450000         0                 0
 ethernet11/1       mc-q3                 (E) 0              7                 598                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
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DUT1#
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DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     | Dropped pkts    |   Dropped bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
 cpu                ipmc-reserved        (E) 0              12                1056                0                 0
 cpu                ospf                 (E) 0              6                 540                 0                 0
 cpu                arp                  (E) 0              2                 154                 0                 0
 ethernet3/1        q7                   (E) 0              1                 64                  0                 0
 ethernet3/1        mc-q3                (E) 0              6                 492                 0                 0
 ethernet3/1        pg-q3                (I) 4278884        NA                NA                  NA                NA
 ethernet11/1       q3                   (E) 4288790        36324390          36324390000         0                 0
 ethernet11/1       mc-q3                (E) 0              7                 598                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
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|  Interface       |  ECN marked packets  |
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DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     | Dropped pkts    |   Dropped bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
 cpu                ipmc-reserved        (E) 0              12                1056                0                 0
 cpu                ospf                 (E) 0              6                 540                 0                 0
 cpu                arp                  (E) 0              2                 154                 0                 0
 ethernet3/1        q7                   (E) 0              1                 64                  0                 0
 ethernet3/1        mc-q3                (E) 0              6                 492                 0                 0
 ethernet3/1        pg-q3                (I) 4324604        NA                NA                  NA                NA
 ethernet11/1       q3                   (E) 4335780        36725380          36725380000         0                 0
 ethernet11/1       mc-q3                (E) 0              7                 598                 0                 0

DUT1#
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DUT1#show int counters ecn
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|  Interface       |  ECN marked packets  |
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DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     | Dropped pkts    |   Dropped bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+-------------
 cpu                ipmc-reserved        (E) 0              13                1142                0                 0
 cpu                ospf                 (E) 0              6                 540                 0                 0
 cpu                arp                  (E) 0              2                 154                 0                 0
 ethernet3/1        q7                   (E) 0              1                 64                  0                 0
 ethernet3/1        mc-q3                (E) 0              7                 574                 0                 0
 ethernet3/1        pg-q3                (I) 4374134        NA                NA                  NA                NA
 ethernet11/1       q3                   (E) 4386580        37131835          37131835000         0                 0
 ethernet11/1       mc-q3                (E) 0              7                 598                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
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|  Interface       |  ECN marked packets  |
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DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
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+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |     Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              13               1142               0                0
 cpu                ospf                 (E) 0              6                540                0                0
 cpu                arp                  (E) 0              2                154                0                0
 ethernet3/1        q7                   (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                (E) 0              7                574                0                0
 ethernet3/1        pg-q3                (I) 4426204        NA               NA                 NA               NA
 ethernet11/1       q3                   (E) 4436110        37544472         37544472000        0                0
 ethernet11/1       mc-q3                (E) 0              7                598                0                0

DUT1#
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DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
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E - Egress, I - Ingress, Q-Size is in bytes
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+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |     Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              13               1142               0                0
 cpu                ospf                 (E) 0              6                540                0                0
 cpu                arp                  (E) 0              2                154                0                0
 ethernet3/1        q7                   (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                (E) 0              7                574                0                0
 ethernet3/1        pg-q3                (I) 4471924        NA               NA                 NA               NA
 ethernet11/1       q3                   (E) 4484370        37944866         37944866000        0                0
 ethernet11/1       mc-q3                (E) 0              7                598                0                0

DUT1#
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DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
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DUT1#
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E - Egress, I - Ingress, Q-Size is in bytes
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+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |     Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              13               1142               0                0
 cpu                ospf                 (E) 0              6                540                0                0
 cpu                arp                  (E) 0              2                154                0                0
 ethernet3/1        q7                   (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                (E) 0              7                574                0                0
 ethernet3/1        pg-q3                (I) 5176266        NA               NA                 NA               NA
 ethernet11/1       q3                   (E) 5189220        43662200         43662200000        0                0
 ethernet11/1       mc-q3                (E) 0              7                598                0                0

DUT1#
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DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
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DUT1#
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DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
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+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              14                1232                0                 0
 cpu                ospf                  (E) 0              7                 630                 0                 0
 cpu                arp                   (E) 0              2                 154                 0                 0
 ethernet3/1        q7                    (E) 0              1                 64                  0                 0
 ethernet3/1        mc-q3                 (E) 0              7                 574                 0                 0
 ethernet3/1        pg-q3                 (I) 5532374        NA                NA                  NA                NA
 ethernet11/1       q3                    (E) 5539740        46589865          46589865000         0                 0
 ethernet11/1       mc-q3                 (E) 0              8                 684                 0                 0

DUT1#
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+------------------+----------------------+
|  Interface       |  ECN marked packets  |
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DUT1#
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E - Egress, I - Ingress, Q-Size is in bytes
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+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              14                1232                0                 0
 cpu                ospf                  (E) 0              7                 630                 0                 0
 cpu                arp                   (E) 0              2                 154                 0                 0
 ethernet3/1        q7                    (E) 0              1                 64                  0                 0
 ethernet3/1        mc-q3                 (E) 0              7                 574                 0                 0
 ethernet3/1        pg-q3                 (I) 5579364        NA                NA                  NA                NA
 ethernet11/1       q3                    (E) 5593080        46978497          46978497000         0                 0
 ethernet11/1       mc-q3                 (E) 0              8                 684                 0                 0

DUT1#
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DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
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DUT1#
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E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              14                1232                0                 0
 cpu                ospf                  (E) 0              7                 630                 0                 0
 cpu                arp                   (E) 0              2                 154                 0                 0
 ethernet3/1        q7                    (E) 0              1                 64                  0                 0
 ethernet3/1        mc-q3                 (E) 0              7                 574                 0                 0
 ethernet3/1        pg-q3                 (I) 5632704        NA                NA                  NA                NA
 ethernet11/1       q3                    (E) 5641340        47413278          47413278000         0                 0
```

```
 ethernet11/1       mc-q3                (E) 0              8                684                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
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DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              14               1232               0                0
 cpu                ospf                 (E) 0              7                630                0                0
 cpu                arp                  (E) 0              2                154                0                0
 ethernet3/1        q7                   (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                (E) 0              7                574                0                0
 ethernet3/1        pg-q3                (I) 5691124        NA               NA                 NA               NA
 ethernet11/1       q3                   (E) 5693410        47839095         47839095000        0                0
 ethernet11/1       mc-q3                (E) 0              8                684                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              15               1318               0                0
 cpu                ospf                 (E) 0              7                630                0                0
 cpu                arp                  (E) 0              2                154                0                0
 ethernet3/1        q7                   (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                (E) 0              8                656                0                0
 ethernet3/1        pg-q3                (I) 5739384        NA               NA                 NA               NA
 ethernet11/1       q3                   (E) 5749290        48244010         48244010000        0                0
 ethernet11/1       mc-q3                (E) 0              8                684                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              15               1318               0                0
 cpu                ospf                 (E) 0              7                630                0                0
 cpu                arp                  (E) 0              2                154                0                0
 ethernet3/1        q7                   (E) 0              1                64                 0                0
```

```
 ethernet3/1        mc-q3                (E) 0              8                656                0                  0
 ethernet3/1        pg-q3                (I) 5797804        NA               NA                 NA                 NA
 ethernet11/1       q3                   (E) 5803900        48705431         48705431000        0                  0
 ethernet11/1       mc-q3                (E) 0              8                684                0                  0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              15               1318               0                  0
 cpu                ospf                 (E) 0              7                630                0                  0
 cpu                arp                  (E) 0              2                154                0                  0
 ethernet3/1        q7                   (E) 0              1                64                 0                  0
 ethernet3/1        mc-q3                (E) 0              8                656                0                  0
 ethernet3/1        pg-q3                (I) 5847334        NA               NA                 NA                 NA
 ethernet11/1       q3                   (E) 5849620        49114106         49114106000        0                  0
 ethernet11/1       mc-q3                (E) 0              8                684                0                  0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              15               1318               0                  0
 cpu                ospf                 (E) 0              7                630                0                  0
 cpu                arp                  (E) 0              2                154                0                  0
 ethernet3/1        q7                   (E) 0              1                64                 0                  0
 ethernet3/1        mc-q3                (E) 0              8                656                0                  0
 ethernet3/1        pg-q3                (I) 5896864        NA               NA                 NA                 NA
 ethernet11/1       q3                   (E) 5905500        49568426         49568426000        0                  0
 ethernet11/1       mc-q3                (E) 0              8                684                0                  0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0              15               1318               0                  0
```

```
 cpu               ospf                (E) 0             7               630               0               0
 cpu               arp                 (E) 0             2               154               0               0
 ethernet3/1       q7                  (E) 0             1               64                0               0
 ethernet3/1       mc-q3               (E) 0             8               656               0               0
 ethernet3/1       pg-q3               (I) 5950204       NA              NA                NA              NA
 ethernet11/1      q3                  (E) 5960110       49975592        49975592000       0               0
 ethernet11/1      mc-q3               (E) 0             8               684               0               0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu               ipmc-reserved       (E) 0             15              1318              0               0
 cpu               ospf                (E) 0             7               630               0               0
 cpu               arp                 (E) 0             2               154               0               0
 ethernet3/1       q7                  (E) 0             1               64                0               0
 ethernet3/1       mc-q3               (E) 0             8               656               0               0
 ethernet3/1       pg-q3               (I) 6001004       NA              NA                NA              NA
 ethernet11/1      q3                  (E) 6008370       50381591        50381591000       0               0
 ethernet11/1      mc-q3               (E) 0             8               684               0               0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu               ipmc-reserved       (E) 0             15              1318              0               0
 cpu               ospf                (E) 0             7               630               0               0
 cpu               arp                 (E) 0             2               154               0               0
 ethernet3/1       q7                  (E) 0             1               64                0               0
 ethernet3/1       mc-q3               (E) 0             8               656               0               0
 ethernet3/1       pg-q3               (I) 6049264       NA              NA                NA              NA
 ethernet11/1      q3                  (E) 6054090       50775924        50775924000       0               0
 ethernet11/1      mc-q3               (E) 0             8               684               0               0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        358374
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
```

```
|    Interface     |   Queue/Class-map   |     Q-Size       |     Tx pkts     |      Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15                1318                0                0
 cpu                ospf                  (E) 0              7                 630                 0                0
 cpu                arp                   (E) 0              2                 154                 0                0
 ethernet3/1        q7                    (E) 0              1                 64                  0                0
 ethernet3/1        mc-q3                 (E) 0              8                 656                 0                0
 ethernet3/1        pg-q3                 (I) 6097524        NA                NA                  NA               NA
 ethernet11/1       q3                    (E) 6101080        51176001          51176001000         0                0
 ethernet11/1       mc-q3                 (E) 0              8                 684                 0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        358374
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map   |     Q-Size       |     Tx pkts     |      Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15                1318                0                0
 cpu                ospf                  (E) 0              7                 630                 0                0
 cpu                arp                   (E) 0              2                 154                 0                0
 ethernet3/1        q7                    (E) 0              1                 64                  0                0
 ethernet3/1        mc-q3                 (E) 0              8                 656                 0                0
 ethernet3/1        pg-q3                 (I) 6147054        NA                NA                  NA               NA
 ethernet11/1       q3                    (E) 6154420        51600218          51600218000         0                0
 ethernet11/1       mc-q3                 (E) 0              8                 684                 0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        358374
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map   |     Q-Size       |     Tx pkts     |      Tx bytes     | Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15                1318                0                0
 cpu                ospf                  (E) 0              7                 630                 0                0
 cpu                arp                   (E) 0              2                 154                 0                0
 ethernet3/1        q7                    (E) 0              1                 64                  0                0
 ethernet3/1        mc-q3                 (E) 0              8                 656                 0                0
 ethernet3/1        pg-q3                 (I) 6195314        NA                NA                  NA               NA
 ethernet11/1       q3                    (E) 6207760        52009715          52009715000         0                0
 ethernet11/1       mc-q3                 (E) 0              8                 684                 0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        1583949
DUT1#
```

```
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15               1318               0                0
 cpu                ospf                  (E) 0              7                630                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              8                656                0                0
 ethernet3/1        pg-q3                 (I) 6248654        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 6252210        52409416         52409416000        0                0
 ethernet11/1       mc-q3                 (E) 0              8                684                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        1583949
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15               1318               0                0
 cpu                ospf                  (E) 0              7                630                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              8                656                0                0
 ethernet3/1        pg-q3                 (I) 6296914        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 6310630        52849253         52849253000        0                0
 ethernet11/1       mc-q3                 (E) 0              8                684                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        2808676
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15               1318               0                0
 cpu                ospf                  (E) 0              7                630                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              8                656                0                0
 ethernet3/1        pg-q3                 (I) 6352794        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 6358890        53272904         53272904000        0                0
 ethernet11/1       mc-q3                 (E) 0              8                684                0                0

DUT1#
DUT1#
```

```
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        2808676
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15                1318                0                 0
 cpu                ospf                  (E) 0              7                 630                 0                 0
 cpu                arp                   (E) 0              2                 154                 0                 0
 ethernet3/1        q7                    (E) 0              1                 64                  0                 0
 ethernet3/1        mc-q3                 (E) 0              8                 656                 0                 0
 ethernet3/1        pg-q3                 (I) 6399784        NA                NA                  NA                NA
 ethernet11/1       q3                    (E) 6413500        53693500          53693500000         0                 0
 ethernet11/1       mc-q3                 (E) 0              8                 684                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        2808676
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15                1318                0                 0
 cpu                ospf                  (E) 0              7                 630                 0                 0
 cpu                arp                   (E) 0              2                 154                 0                 0
 ethernet3/1        q7                    (E) 0              1                 64                  0                 0
 ethernet3/1        mc-q3                 (E) 0              8                 656                 0                 0
 ethernet3/1        pg-q3                 (I) 6458204        NA                NA                  NA                NA
 ethernet11/1       q3                    (E) 6464300        54107543          54107543000         0                 0
 ethernet11/1       mc-q3                 (E) 0              8                 684                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        4035567
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15                1318                0                 0
 cpu                ospf                  (E) 0              7                 630                 0                 0
 cpu                arp                   (E) 0              2                 154                 0                 0
 ethernet3/1        q7                    (E) 0              1                 64                  0                 0
 ethernet3/1        mc-q3                 (E) 0              8                 656                 0                 0
```

```
 ethernet3/1        pg-q3                (I) 6503924         NA                NA                NA                NA
 ethernet11/1       q3                   (E) 6517640         54527506          54527506000       0                 0
 ethernet11/1       mc-q3                (E) 0               8                 684               0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        4035567
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0               15                1318              0                 0
 cpu                ospf                 (E) 0               7                 630               0                 0
 cpu                arp                  (E) 0               2                 154               0                 0
 ethernet3/1        q7                   (E) 0               1                 64                0                 0
 ethernet3/1        mc-q3                (E) 0               8                 656               0                 0
 ethernet3/1        pg-q3                (I) 6559804         NA                NA                NA                NA
 ethernet11/1       q3                   (E) 6569710         54945687          54945687000       0                 0
 ethernet11/1       mc-q3                (E) 0               8                 684               0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        4035567
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved        (E) 0               15                1318              0                 0
 cpu                ospf                 (E) 0               7                 630               0                 0
 cpu                arp                  (E) 0               2                 154               0                 0
 ethernet3/1        q7                   (E) 0               1                 64                0                 0
 ethernet3/1        mc-q3                (E) 0               8                 656               0                 0
 ethernet3/1        pg-q3                (I) 6608064         NA                NA                NA                NA
 ethernet11/1       q3                   (E) 6619240         55357831          55357831000       0                 0
 ethernet11/1       mc-q3                (E) 0               8                 684               0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        5260967
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
```

```
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15               1318               0                0
 cpu                ospf                  (E) 0              7                630                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              8                656                0                0
 ethernet3/1        pg-q3                 (I) 6657594        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 6667500        55771959         55771959000        0                0
 ethernet11/1       mc-q3                 (E) 0              8                684                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        5260967
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15               1318               0                0
 cpu                ospf                  (E) 0              7                630                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              8                656                0                0
 ethernet3/1        pg-q3                 (I) 6712204        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 6728460        56234706         56234706000        0                0
 ethernet11/1       mc-q3                 (E) 0              8                684                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        5260967
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15               1318               0                0
 cpu                ospf                  (E) 0              7                630                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              8                656                0                0
 ethernet3/1        pg-q3                 (I) 6770624        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 6774180        56665032         56665032000        0                0
 ethernet11/1       mc-q3                 (E) 0              8                684                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        6485321
DUT1#
DUT1#
```

```
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    |  Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15               1318               0                 0
 cpu                ospf                  (E) 0              7                630                0                 0
 cpu                arp                   (E) 0              2                154                0                 0
 ethernet3/1        q7                    (E) 0              1                64                 0                 0
 ethernet3/1        mc-q3                 (E) 0              8                656                0                 0
 ethernet3/1        pg-q3                 (I) 6818884        NA               NA                 NA                NA
 ethernet11/1       q3                    (E) 6828790        57082415         57082415000        0                 0
 ethernet11/1       mc-q3                 (E) 0              8                684                0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        6485321
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    |  Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15               1318               0                 0
 cpu                ospf                  (E) 0              7                630                0                 0
 cpu                arp                   (E) 0              2                154                0                 0
 ethernet3/1        q7                    (E) 0              1                64                 0                 0
 ethernet3/1        mc-q3                 (E) 0              8                656                0                 0
 ethernet3/1        pg-q3                 (I) 6872224        NA               NA                 NA                NA
 ethernet11/1       q3                    (E) 6877050        57495016         57495016000        0                 0
 ethernet11/1       mc-q3                 (E) 0              8                684                0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        6485321
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    |  Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              15               1318               0                 0
 cpu                ospf                  (E) 0              7                630                0                 0
 cpu                arp                   (E) 0              2                154                0                 0
 ethernet3/1        q7                    (E) 0              1                64                 0                 0
 ethernet3/1        mc-q3                 (E) 0              8                656                0                 0
 ethernet3/1        pg-q3                 (I) 6917944        NA               NA                 NA                NA
 ethernet11/1       q3                    (E) 6925310        57905128         57905128000        0                 0
 ethernet11/1       mc-q3                 (E) 0              9                770                0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
```

```
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        7711568
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+----------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map    |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+----------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0               16                1408                0                 0
 cpu                ospf                  (E) 0               7                 630                 0                 0
 cpu                arp                   (E) 0               2                 154                 0                 0
 ethernet3/1        q7                    (E) 0               1                 64                  0                 0
 ethernet3/1        mc-q3                 (E) 0               8                 656                 0                 0
 ethernet3/1        pg-q3                 (I) 6971284         NA                NA                  NA                NA
 ethernet11/1       q3                    (E) 6976110         58318739          58318739000         0                 0
 ethernet11/1       mc-q3                 (E) 0               9                 770                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        7711568
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+----------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map    |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+----------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0               16                1408                0                 0
 cpu                ospf                  (E) 0               8                 720                 0                 0
 cpu                arp                   (E) 0               2                 154                 0                 0
 ethernet3/1        q7                    (E) 0               1                 64                  0                 0
 ethernet3/1        mc-q3                 (E) 0               8                 656                 0                 0
 ethernet3/1        pg-q3                 (I) 7017004         NA                NA                  NA                NA
 ethernet11/1       q3                    (E) 7027418         58704985          58704985000         0                 0
 ethernet11/1       mc-q3                 (E) 0               9                 770                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        7711568
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+----------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map    |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+----------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0               16                1408                0                 0
 cpu                ospf                  (E) 0               8                 720                 0                 0
 cpu                arp                   (E) 0               2                 154                 0                 0
 ethernet3/1        q7                    (E) 0               1                 64                  0                 0
 ethernet3/1        mc-q3                 (E) 0               8                 656                 0                 0
 ethernet3/1        pg-q3                 (I) 7067804         NA                NA                  NA                NA
```

```
 ethernet11/1       q3                  (E) 7075170         59119204          59119204000         0                 0
 ethernet11/1       mc-q3               (E) 0               9                 770                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        8935836
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved       (E) 0               16                1408                0                 0
 cpu                ospf                (E) 0               8                 720                 0                 0
 cpu                arp                 (E) 0               2                 154                 0                 0
 ethernet3/1        q7                  (E) 0               1                 64                  0                 0
 ethernet3/1        mc-q3               (E) 0               8                 656                 0                 0
 ethernet3/1        pg-q3               (I) 7118604         NA                NA                  NA                NA
 ethernet11/1       q3                  (E) 7124700         59534683          59534683000         0                 0
 ethernet11/1       mc-q3               (E) 0               9                 770                 0                 0

DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        8935836
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved       (E) 0               16                1408                0                 0
 cpu                ospf                (E) 0               8                 720                 0                 0
 cpu                arp                 (E) 0               2                 154                 0                 0
 ethernet3/1        q7                  (E) 0               1                 64                  0                 0
 ethernet3/1        mc-q3               (E) 0               8                 656                 0                 0
 ethernet3/1        pg-q3               (I) 7168134         NA                NA                  NA                NA
 ethernet11/1       q3                  (E) 7174230         59929345          59929345000         0                 0
 ethernet11/1       mc-q3               (E) 0               9                 770                 0                 0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        8935836
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved       (E) 0               16                1408                0                 0
```

```
 cpu                ospf                  (E) 0              8                720                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              8                656                0                0
 ethernet3/1        pg-q3                 (I) 7216394        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 7221220        60312092         60312092000        0                0
 ethernet11/1       mc-q3                 (E) 0              9                770                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        10162022
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              16               1408               0                0
 cpu                ospf                  (E) 0              8                720                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              8                656                0                0
 ethernet3/1        pg-q3                 (I) 7265924        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 7280910        60751844         60751844000        0                0
 ethernet11/1       mc-q3                 (E) 0              9                770                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        10162022
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              16               1408               0                0
 cpu                ospf                  (E) 0              8                720                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              8                656                0                0
 ethernet3/1        pg-q3                 (I) 7321804        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 7327900        61172398         61172398000        0                0
 ethernet11/1       mc-q3                 (E) 0              9                770                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        10162022
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
```

```
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              16               1408               0                0
 cpu                ospf                  (E) 0              8                720                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              8                656                0                0
 ethernet3/1        pg-q3                 (I) 7368794        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 7378700        61551811         61551811000        0                0
 ethernet11/1       mc-q3                 (E) 0              9                770                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        11387653
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              17               1494               0                0
 cpu                ospf                  (E) 0              8                720                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              9                738                0                0
 ethernet3/1        pg-q3                 (I) 7420864        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 7426960        61967600         61967600000        0                0
 ethernet11/1       mc-q3                 (E) 0              9                770                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        11387653
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              17               1494               0                0
 cpu                ospf                  (E) 0              8                720                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              9                738                0                0
 ethernet3/1        pg-q3                 (I) 7469124        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 7486650        62428120         62428120000        0                0
 ethernet11/1       mc-q3                 (E) 0              9                770                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
```

```
 ethernet11/1        11387653
DUT1#
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              19               1670               0                0
 cpu                ospf                  (E) 0              9                810                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              10               820                0                0
 ethernet3/1        pg-q3                 (I) 8897874        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 8902700        76261118         76261118000        116              116000
 ethernet11/1       mc-q3                 (E) 0              10               856                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        26093802
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              19               1670               0                0
 cpu                ospf                  (E) 0              9                810                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              10               820                0                0
 ethernet3/1        pg-q3                 (I) 8897874        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 8907780        76897331         76897331000        234              234000
 ethernet11/1       mc-q3                 (E) 0              10               856                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        26093802
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              19               1670               0                0
 cpu                ospf                  (E) 0              9                810                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              10               820                0                0
 ethernet3/1        pg-q3                 (I) 8899144        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 8905240        77967301         77967301000        352              352000
 ethernet11/1       mc-q3                 (E) 0              10               856                0                0
```

```
DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        27319501
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              19               1670               0                0
 cpu                ospf                  (E) 0              9                810                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              10               820                0                0
 ethernet3/1        pg-q3                 (I) 8902954        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 8903970        78799470         78799470000        352              352000
 ethernet11/1       mc-q3                 (E) 0              10               856                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        28544865
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              19               1670               0                0
 cpu                ospf                  (E) 0              9                810                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              10               820                0                0
 ethernet3/1        pg-q3                 (I) 8900414        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 8901430        79381642         79381642000        470              470000
 ethernet11/1       mc-q3                 (E) 0              10               856                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        28544865
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              19               1670               0                0
 cpu                ospf                  (E) 0              9                810                0                0
```

```
 cpu                arp                    (E) 0              2                154                0                0
 ethernet3/1        q7                     (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                  (E) 0              10               820                0                0
 ethernet3/1        pg-q3                  (I) 8902954        NA               NA                 NA               NA
 ethernet11/1       q3                     (E) 8902700        80251342         80251342000        588              588000
 ethernet11/1       mc-q3                  (E) 0              10               856                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        29770381
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved          (E) 0              19               1670               0                0
 cpu                ospf                   (E) 0              9                810                0                0
 cpu                arp                    (E) 0              2                154                0                0
 ethernet3/1        q7                     (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                  (E) 0              10               820                0                0
 ethernet3/1        pg-q3                  (I) 8900414        NA               NA                 NA               NA
 ethernet11/1       q3                     (E) 8902700        81034557         81034557000        588              588000
 ethernet11/1       mc-q3                  (E) 0              10               856                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        29770381
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
|    Interface     |   Queue/Class-map   |      Q-Size      |     Tx pkts     |      Tx bytes     |  Dropped pkts   |   Dropped
bytes   |
+------------------+---------------------+------------------+-----------------+-------------------+-----------------+------
-------------+
 cpu                ipmc-reserved          (E) 0              19               1670               0                0
 cpu                ospf                   (E) 0              9                810                0                0
 cpu                arp                    (E) 0              2                154                0                0
 ethernet3/1        q7                     (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                  (E) 0              10               820                0                0
 ethernet3/1        pg-q3                  (I) 8900414        NA               NA                 NA               NA
 ethernet11/1       q3                     (E) 8900160        81746163         81746163000        707              707000
 ethernet11/1       mc-q3                  (E) 0              10               856                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        30995866
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
```

```
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              19               1670               0                0
 cpu                ospf                  (E) 0              10               900                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              10               820                0                0
 ethernet3/1        pg-q3                 (I) 8896604        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 8901430        82396091         82396091000        707              707000
 ethernet11/1       mc-q3                 (E) 0              10               856                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        32220671
DUT1#
DUT1#
DUT1#show int counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
 * indicates monitor is active
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
|    Interface     |   Queue/Class-map  |      Q-Size      |     Tx pkts    |      Tx bytes    | Dropped pkts   |   Dropped
bytes   |
+------------------+--------------------+------------------+----------------+------------------+----------------+------
-------------+
 cpu                ipmc-reserved         (E) 0              20               1760               0                0
 cpu                ospf                  (E) 0              10               900                0                0
 cpu                arp                   (E) 0              2                154                0                0
 ethernet3/1        q7                    (E) 0              1                64                 0                0
 ethernet3/1        mc-q3                 (E) 0              10               820                0                0
 ethernet3/1        pg-q3                 (I) 8900414        NA               NA                 NA               NA
 ethernet11/1       q3                    (E) 8902700        83211870         83211870000        825              825000
 ethernet11/1       mc-q3                 (E) 0              11               942                0                0

DUT1#
DUT1#
DUT1#show int counters ecn
+------------------+----------------------+
|  Interface       |  ECN marked packets  |
+------------------+----------------------+
 ethernet11/1        32220671
DUT1#
DUT1#
DUT1#sh int counters rate mbps
+-------------------+--------------+-------------+--------------+-------------+
|     Interface     |    Rx mbps   |    Rx pps   |    Tx mbps   |    Tx pps   |
+-------------------+--------------+-------------+--------------+-------------+
 ethernet3/1          9804.80        1225599       0.00           0
 ethernet11/1         0.00           0             9803.85        1225481
DUT1#
DUT1#sh int counters rate mbps
+-------------------+--------------+-------------+--------------+-------------+
|     Interface     |    Rx mbps   |    Rx pps   |    Tx mbps   |    Tx pps   |
+-------------------+--------------+-------------+--------------+-------------+
 ethernet3/1          9804.80        1225599       0.00           0
 ethernet11/1         0.00           0             9803.85        1225481
DUT1#
DUT1#
DUT1#sh int counters rate mbps
+-------------------+--------------+-------------+--------------+-------------+
|     Interface     |    Rx mbps   |    Rx pps   |    Tx mbps   |    Tx pps   |
+-------------------+--------------+-------------+--------------+-------------+
 ethernet3/1          9804.80        1225599       0.00           0
 ethernet11/1         0.00           0             9803.85        1225481
DUT1#
DUT1#
```

```
DUT1#sh int counters drop-stats
Interface ethernet11/1
  Tx Unicast Queue Drops: 1652

DUT1#
DUT1#sh int counters drop-stats
Interface ethernet11/1
  Tx Unicast Queue Drops: 1770

DUT1#
DUT1#
DUT1#sh int counters drop-stats
Interface ethernet11/1
  Tx Unicast Queue Drops: 1888

DUT1#
DUT1#
DUT1#sh int counters drop-stats
Interface ethernet11/1
  Tx Unicast Queue Drops: 2007

DUT1#
DUT1#
DUT1#sh int counters drop-stats
Interface ethernet11/1
  Tx Unicast Queue Drops: 2125

DUT1#
DUT1#
DUT1#sh policy-map interface ethernet11/1

Interface ethernet11/1

Type Queuing policy-map : default-out-policy

Service-policy (queuing) output: default-out-policy
Interface Bandwidth 100000000 kbps
Port Shaper 9803 mbps
-----------------------------------
Class-map (queuing): q0
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q1
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q2
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q3
 priority
      output              : 103031224 packets, 103031224000 bytes
      dropped             : 2716 packets, 2716000 bytes

Class-map (queuing): q4
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q5
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q6
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes
```

```
Class-map (queuing): q7
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 12 packets, 1028 bytes
      dropped      : 0 packets, 0 bytes

Wred/Tail Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets
 ecn    : 51828361 packets


DUT1#sh policy-map interface ethernet11/1

Interface ethernet11/1

Type Queuing policy-map : default-out-policy

Service-policy (queuing) output: default-out-policy
Interface Bandwidth 100000000 kbps
Port Shaper 9803 mbps
-----------------------------------
Class-map (queuing): q0
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q1
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q2
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q3
 priority
      output              : 106358809 packets, 106358809000 bytes
      dropped             : 3070 packets, 3070000 bytes

Class-map (queuing): q4
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q5
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q6
 priority
      output              : 0 packets, 0 bytes
```

```
      dropped             : 0 packets, 0 bytes

Class-map (queuing): q7
 priority
      output              : 0 packets, 0 bytes
      dropped             : 0 packets, 0 bytes

Class-map (queuing): mc-q0
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q1
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q2
      output       : 0 packets, 0 bytes
      dropped      : 0 packets, 0 bytes

Class-map (queuing): mc-q3
      output       : 13 packets, 1114 bytes
      dropped      : 0 packets, 0 bytes

Wred/Tail Drop Statistics :
----------------------
 green  : 0 packets
 yellow : 0 packets
 red    : 0 packets
 ecn    : 55504842 packets


DUT1#
```

# Implementation Examples

Here's a real-time example illustrating how Dynamic ECN (D-ECN) functions:

Example:

Traffic enters Switch1 on interface `xe0` and is destined out of interface `xe11`.The D-ECN profile EG1 is applied to the egress interface `xe1`. Profile EG1 configures queue 3 with an on-offset of 7000 bytes and an off-offset of 8000 bytes.

```
qos enable
!
OcNOS(config-pmap-que-def)#int xe1
OcNOS(config-if)#qos map-profile egress-dynamic-ecn EG1
OcNOS(config-eg-dynamic-ecn-map)#queue 3 on-offset 70000 off-offset 8000 bytes
```

*Scenario:*

A burst of traffic arrives at `xe0`, destined for `xe1`, and this traffic maps to egress queue 3. The egress interface `xe1` starts experiencing congestion, causing packets to build up in queue 3.

The shared **buffer** usage for queue 3 on interface `xe1` begins to **increase** due to the congestion.

```
OcNOS(config)#policy-map type queuing default p3
OcNOS(config-pmap-que-def)#class type queuing default q3
OcNOS(config-pmap-c-que-def)#random-detect min-threshold 50 max-threshold 80
kbytes
```

The switch continuously **compares** the current shared buffer usage for queue 3 against the **D-ECN threshold**. This threshold is calculated as Queue's shared limit – D-ECN-Offset (where D-ECN-Offset is the on-offset value) . In this case, it's Queue's shared limit – 7000 bytes.

When the shared buffer usage for queue 3 reaches or exceeds (Queue's shared limit – 7000 bytes), the D-ECN mechanism signals the switch to **start marking the ECN field** (setting the CE codepoint) in the IP header of subsequent packets exiting queue 3 on interface `xe1`. Packets are marked, not dropped.

ECN-capable receiving endpoints detect the CE marking and **signal congestion back to the sender**. The sender then reduces its transmission rate, helping to alleviate the congestion on Switch1's egress queue 3.

As the sender reduces its rate, the buffer usage for queue 3 decreases. Once the usage drops below the deactivation threshold (calculated as Queue's shared limit – off-offset, or Queue's shared limit – 8000 bytes), the switch **stops marking packets** for queue 3. The slightly larger off-offset provides hysteresis, preventing rapid on/off marking if the queue usage fluctuates near the on-offset threshold.

Congestion is signaled dynamically based on shared buffer pressure before potential packet drops occur, allowing endpoints to react proactively. The **on-offset and off-offset provide precise control over when marking starts and stops**, tailored to buffer conditions.

# New CLI Commands

The feature introduces the following configuration commands.

- qos profile egress-dynamic-ecn - Creates a new egress dynamic ECN profile and map it to a queue size.

## qos profile egress-dynamic-ecn

Use this command to set the queue mapping for egress dynamic ECN profile.

Use the `no` form of this command delete the profile.

Use show qos-profile to show the profile detail.

Use qos map-profile to map the profile on interface.

### Command Syntax

```
qos profile egress-dynamic-ecn <NAME> queue <0-7> on-offset <1-266338050> off-
  offset <1-266338050> (packets | bytes | kbytes)
no qos profile egress-dynamic-ecn <NAME> no queue <0-7>
```

### Parameters

| | |
|---|---|
| `Name` | The profile name to be created. |
| `queue <0-7>` | The queue value. |
| `on-offset <1-266338050>` | ON-offset value |
| `off-offset <1-266338050>` | OFF-offset value |
| `(packets \| bytes \| kbytes)` | Offset units |

### Default

By default, "default" profile is created for all the profile types. These profiles can only be updated by the user neither be created nor be destroyed.

### Command Mode

config-eg-dynamic-ecn-map

### Applicability

This command was introduced in OcNOS version 7.0.0.

This command applies only to the Tomahawk 5 (TH5) platforms.

### Example

To create a new profile:

```
#configure terminal
(config)#qos profile egress-dynamic-ecn egr-dyn-ecn-map
(config-egress-prec-map)#queue 1 on-offset 7000 off-offset 9000 bytes
(config)#interface xe2
(config-if)#qos map-profile egress-dynamic-ecn egr-dyn-ecn-map
```

To create Dynamic-ECN profile

```
OcNOS(config)#qos profile egress-dynamic-ecn eg1
```

To delete D-ECN thresholds mapping for each queue in the profile.

```
OcNOS(config)#no qos profile egress-dynamic-ecn eg1
```

To attach a D-ECN profile on an interface

```
(config)#qos profile egress-dynamic-ecn egr-dyn-ecn-map
(config-eg-dynamic-ecn-map)#queue 1 on-offset 20 off-offset 50 packets
(config)#qos profile egress-dynamic-ecn egr-dyn-ecn-map
(config-egress-prec-map)#queue 1 on-offset 7000 off-offset 9000 bytes
(config)#interface xe2
(config-if)#qos map-profile egress-dynamic-ecn egr-dyn-ecn-map
OcNOS(config)#end
```

Simultaneously supporting Static and D-ECN profile on an interface. Static-ECN is via WRED ECN marking. The final marking is the logical OR of the two ECN features.

```
OcNOS(config)#qos profile egress-dynamic-ecn egr-dyn-ecn-map
OcNOS(config-eg-dynamic-ecn-map)#queue 2 on-offset 70000 off-offset 90000 bytes
```

# Existing CLI Commands

The following two CLIs are modified to include **`egress-dynamic-ecn`** attribute.

- qos map-profile - Updated to attach or detach an egress dynamic ECN profile to and from an interface. .
- show qos-profile - Updated to displays the details of egress dynamic ECN.

## qos map-profile

Use this command to attach (map) a profile to an interface.

Use the `no` form of this command to remove a profile.

### Command Syntax

```
qos map-profile (cos-to-queue | dscp-to-queue | queue-color-to-cos | queue-color-to-dscp | precedence-to-queue | queue-to-precedence | ingress-pg-map | egress-dynamic-ecn) NAME
no qos map-profile (cos-to-queue | dscp-to-queue | queue-color-to-cos | queue-color-to-dscp| precedence-to-queue | queue-to-precedence | ingress-pg-map | egress-dynamic-ecn) NAME
```

### Parameters

**egress-dynamic-ecn**

Profile for egress dynamic ECN map

### Default

No default D-ECN profile.

### Command Mode

Interface modes

### Applicability

The `egress-dynamic-ecn` option is added in OcNOS version 7.0.0. It applies only for Tomahawk 5 (TH5) platforms.

### Example

To create a D-ECN profile EG1 is to the egress interface `xe1`.

```
OcNOS(config-pmap-que-def)#int xe1
OcNOS(config-if)#qos map-profile egress-dynamic-ecn EG1
OcNOS(config-eg-dynamic-ecn-map)#queue 3 on-offset 70000 off-offset 8000 bytes
```

## show qos-profile

Use this command to show the all configured QoS profiles configurations like type, name, maps configured except for the default maps, attached info (to how many interfaces it is attached) etc,

### Command Syntax

```
show qos-profile (type (cos-to-queue | dscp-encap | dscp-to-dscp | dscp-to-queue | exp-to-queue | queue-to-exp | precedence-to-precedence | precedence-to-queue | queue-color-to-cos |ingress-pg-map | egress-dynamic-ecn)(interface NAME| all)
```

### Parameters

**egress-dynamic-ecn**

Specify the profile for egress dynamic ECN map

### Command Mode

Privileged exec

Configuration Mode

Interface Mode

### Applicability

The `egress-dynamic-ecn` option is added in OcNOS version 7.0.0. It applies only for Tomahawk 5 (TH5) platforms.

### Examples

To display the Dynamic-ECN profile mapping deatils:

```
OcNOS#sh qos-profile egress-dynamic-ecn all
qos profile egress-dynamic-ecn eg1
 queue 2 on-offset 70000 off-offset 90000 bytes
 queue 3 on-offset 100 off-offset 200 kbytes
 queue 6 on-offset 40 off-offset 50 kbytes
!

OcNOS#show qos-profile egress-dynamic-ecn interface ethernet1
profile name: eg1
 mapping:
  queue 2  on-offset 70000  off-offset 90000   bytes
  queue 3  on-offset 100  off-offset 200   kbytes
  queue 6  on-offset 40  off-offset 50   kbytes
```

# Troubleshooting

Following are some of the commands used for troubleshooting:

```
show interface (IFNAME|) counters (active|)
show interface (IFNAME|) counters rate (kbps|mbps|gbps|)
show interface (IFNAME|) counters error-stats
show interface (IFNAME|) counters protocol
show interface (IFNAME|) counters queue-stats
show interface cpu counters queue-stats
show interface cpu counters
show class-map (type (qos|queuing)|) (NAME|)
show policy-map statistics type qos
show priority-flow-control deadlock-status [ IFNAME ]
show qos-profile egress-dynamic-ecn all
```

# Glossary

The following table provides definitions for key terms or abbreviations and their meanings used throughout this document:

| Key Terms/Acronym | Description |
|---|---|
| S-ECN | Static Explicit Congestion Notification |
| D-ECN | Dynamic Explicit Congestion Notification |

# Quality of Service Command Reference

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# CHAPTER 1 Quality of Service Commands

This chapter is a reference for the ingress Quality of Service (QoS) and hierarchical QoS.


- bandwidth
- class-map type qos
- class-map type queuing
- class type qos
- class type queuing
- clear qos statistics
- cpu-queue
- dynamic-threshold
- egress cos map
- egress dscp map
- ingress cos map
- ingress dscp map
- lossless
- match access-group
- match cos
- match cos inner
- match dscp
- match ip rtp
- match mac
- match precedence
- match protocol
- match qos-group
- match traffic-type
- match vlan
- match vlan inner
- police
- policy-map
- priority
- priority (queuing)
- qos (enable | disable)
- qos map-profile
- qos profile
- qos profile egress-dynamic-ecn
- qos profile ingress-pg-map
- qos profile precedence-to-queue


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- qos profile queue-to-precedence
- qos remark
- qos statistics
- queue-limit
- random-detect
- service-policy
- service-policy type qos
- service-policy type queuing
- set bridge cos
- set bridge dscp
- set cos
- set dscp
- set precedence
- set qos-group
- set qos queue scheduler
- set queue
- shape
- shape rate
- show class-map
- show cpu-queue details
- show interface counters
- show policy-map
- show policy-map interface
- show storm-control
- show qos-profile
- show qos-profile interface
- show queuing interface
- show running-config qos
- show running-config cpu-queue
- storm-control
- trust dscp
- wrr-queue weight

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# bandwidth

Use this command to allocate a minimum percentage of the interface bandwidth to a queue.

Use the `no` command to remove a bandwidth configuration.

### Command Syntax

```
bandwidth (<1-1000000000> (kbps|mbps|gbps) | percent <1-100>)
no bandwidth
```

### Parameters

| | |
|---|---|
| `<1-1000000000>` | Bandwidth value |
| `kbps` | Units in kilobits/sec. |
| `mbps` | Units in megabits/sec. |
| `gbps` | Units in gigabits/sec. |
| `percent <1-100>` | Specify the percentage from 1 to 100. |

### Default

No default value is specified

### Command Mode

Policy-class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Examples

```
(config)# policy-map type queuing PQOS
(config-pmap-que)# class type queuing 1p7q4t-out-pq1
(config-pmap-c-que)# bandwidth 10 mbps
```

# class-map type qos

Use this command to create a class-map of type qos.

Use the `no` command to remove a class-map.

Note:

- Class-map without any match qualification behaves similar to default class by matching all the packets on the interface it is attached via service policy.
- In a class-map, adding or deleting match criteria with misconfiguration will have silent exit and will not proceed with operation.

### Command Syntax

```
class-map (type qos|) (match-any|match-all|) NAME
no class-map (type qos|) (match-any|match-all|) NAME
```

### Parameters

| | |
|---|---|
| `type qos` | Ingress/egress class map. |
| `NAME` | Specify the class map name (Max Size 32) |
| `match-any` | Match any parameter (boolean OR) |
| `match-all` | Match all parameters (boolean AND) |

### Default

By default, match type is match-all for any class-map

### Command Mode

Configuration Mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
#configure terminal
(config)# class-map type qos C_QOS1
```

# class-map type queuing

Use this command to create a class-map of type queuing.

Use the `no` command to remove a class-map.

Note: Class-maps with no action are treated as incomplete configuration and don't take any effect until the action is added. Class-map deletion is not allowed if it is referenced by any policy-map.

### Command Syntax

```
class-map type queuing (match-any|) NAME
no class-map type queuing (match-any|) NAME
```

### Parameters

| | |
|---|---|
| `type queuing` | Egress class map |
| `NAME` | Specify the class map name (Max Size 32) |
| `match-any` | Match any parameter (boolean OR) |

### Default

By default, class-map type is match-any

### Command Mode

Configuration Mode

### Applicability

This command was introduced before OcNOS version 1.3.

This command applies only to the Trident II and Trident II+ platforms.

### Examples

```
#configure terminal
(config)# class-map type queuing C_QOS1
```

# class type qos

Use this command to add a QoS class-map to a qos policy map.

Use the `no command` to remove a QoS class-map from the policy map.

Note: Implicit priority of the classes in a policy-map will be calculated based on the number of matches with VLAN match given lower weight-age over other matches. In case of classes with conflicting matches, it is not guaranteed which class the traffic would hit. Users are recommended to use priority in such cases.

### Command Syntax

```
class (type qos|) (NAME|class-default)
no class (type qos|) (NAME|class-default)
```

### Parameters

| | |
|---|---|
| `type qos` | Ingress/egress class map. |
| `NAME` | Specify the class map name |
| `class-default` | Specify the default class map |

### Default

By default, class is type qos

### Command Mode

Policy-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)#
(config)#policy-map type qos PP
(config-pmap-que)#class type qos C_PP_1
```

# class type queuing

Use this command to add a queuing class-map to a queuing policy map.

Use the `no` command to remove a queuing class-map from the policy map.

### Command Syntax

```
class (type queuing ((default (q0|q1|q2|q3|q4|q5|q6|q7))|NAME) | NAME | queuing
  class-default)
no class (type queuing|) NAME
```

### Parameters

| | |
|---|---|
| `type queuing` | Egress class map |
| `NAME` | Specify the class map name |
| `<q0-q7>` | Default queue name |
| `class-default` | Specify the default class map |

### Default

No default value is specified

### Command Mode

Policy Map type queuing Mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)#
(config)#policy-map type queuing PP
(config-pmap-que)#class type queuing C_PP_1
```

# clear qos statistics

Use this command to clear the quality of service (QoS) statistics.

### Command Syntax

```
clear qos statistics (interface IFNAME|) ((type qos|type qos input|type qos
  output|type queuing|type all)|)
```

### Parameters

| | |
|---|---|
| `interface IFNAME` | (Optional) Specifies the interface name for which to clear QoS statistics (maximum length 32 characters). |
| `type qos` | (Optional) Clears QoS statistics |
| `type qos input` | (Optional) Clears QoS input statistics |
| `type qos output` | (Optional) Clears QoS output statistics |
| `type queuing` | (Optional) Clears queuing class statistics |
| `type all` | (Optional) Clears all QoS and queuing statistics |

### Default

if no parameters are configured, the command will clear type QoS and type queuing class statistics on all interfaces.

### Command Mode

Privileged Exec mode

### Applicability

Introduced before OcNOS version 1.3.

### Examples

To clear QoS statistics on all interfaces, use the following command:

```
OcNOS#clear qos statistics
```

# cpu-queue

Use this command to configure create a cpu queue for vxlan.

Use the `no` form of this command to remove a cpu queue.

### Command Syntax

```
cpu-queue <queue-name> ( (rate <value>|)  (lossy|lossless|)  (monitor|no-monitor|)
  )
no cpu-queue <queue-name> ( (rate|)  (lossy|lossless|)  (monitor|no-monitor) |)
```

### Parameters

| | |
|---|---|
| `queue-name` | Name of the cpu queue |
| `rate` | When the packets are uplifted |
| `lossy` | If enabled, packets are dropped at cpu-queue when the cpu-queues congested |
| `loseless` | If enabled, packets are dropped at ingress port |
| `monitor` | Enable logging when cpu-queue discards packets |
| `no-monitor` | Disable logging |

### Default

Default value for vxlan cpu-queue command is 500.

### Command Mode

Configure mode

### Applicability

This command was introduced before OcNOS version 1.3.8

### Example

```
#configure terminal
(config)#cpu-queue cpu rate 500
(config-dscp-queue)#exit
```

# dynamic-threshold

Use this command to configure egress dynamic-threshold values.

Use `no` parameter of this command to unconfigure .

### Command Syntax

```
dynamic-threshold <0-10>
no dynamic-threshold
```

### Parameters

| | |
|---|---|
| `<0-10>` | Specifies the egress dynamic-threshold value in kbytes.<br>Define a configurable limit on how many buffers each queue can draw from the shared buffer pool. This pool operates according to a dynamic threshold parameter known as the alpha value.<br><br>The dynamic threshold can be set individually for different queues, allowing fine-grained control over how each queue accesses the shared buffer. Following are the dynamic threshold values that can be configured:<br>• 0 1/128 MMU alpha.<br>• 1 1/64 MMU alpha.<br>• 2 1/32 MMU alpha.<br>• 3 1/16 MMU alpha.<br>• 4 1/8 MMU alpha.<br>• 5 1/4 MMU alpha.<br>• 6 1/2 MMU alpha.<br>• 7 1 MMU alpha.<br>• 8 2 MMU alpha.<br>• 9 4 MMU alpha.<br>• 10 8 MMU alpha |

### Default

### Command Mode

config-pmap-c-que-def mode

policy-class-map-queue mode

### Applicability

Introduced in OcNOS version 7.0.0. This command is supported only on the Trident IV, Tomahawk IV, and Tomahawk V platforms.

### Example

Command to configure egress dynamic-threshold value:

```
OcNOS#configure terminal
(config)#policy-map type queuing default default-out-policy
(config-pmap-que-def)#class type queuing default q0
(config-pmap-c-que-def)#dynamic-threshold 7
```

# egress cos map

Use this command to map a queue value to the CoS value.

Use the `no` form of this command to remove the map.

Note:

- Egress CoS map will be taking effect only when remark CoS is enabled.
- Color is an optional parameter. If not provided, the same map will be set for all colors.
- If ingress qos policy-map is configured with set cos action on ingress interface, set action will take priority over egress cos map and packet will egress out with set cos value.

### Command Syntax

```
queue <0-7> (color (green|yellow|red|all)|) cos <0-7>
no queue <0-7> (color (green|yellow|red|all)|)
```

### Parameters

| | |
|---|---|
| `<0-7>` | Identifying queue number |
| `color` | Maps different colors such as green or yellow or red or all |
| `<0-7>` | CoS value |

### Default

By default, CoS to queue mapping is one to one.

### Command Mode

Egress cos map mode

### Applicability

This command was introduced in OcNOS DC version 4.2.

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Example

```
(config)#qos profile queue-color-to-cos default
(config-egress-cos-map)#queue 1 color green cos 5
(config-egress-cos-map)#queue 1 cos 6
```

Color is an optional parameter. So if users do not provide color, for all colors same CoS remarking will be set. If user provides color, then only for that specific color egress map will be changed. If user provides map for all colors as well as without color, map with color will take priority.

```
(config-egress-cos-map)#no queue 1 color green
(config-egress-cos-map)#no queue 1
```

If user want to remove all the mapping of queue (for all colors) no need to provide color, else can provide specific color to remove specific map .

# egress dscp map

Use this command to map a queue to a DSCP value.

Use the `no` form of this command to remove the map.

Note:

- Egress DSCP map will be taking effect only when remark DSCP is enabled.
- Color is an optional parameter. If not provided, the same map will be set for all colors.
- If ingress qos policy-map is configured with set dscp/precedence action on ingress interface, set action will take priority over egress dscp map and packet will egress out with set scp/precedence value.

### Command Syntax

```
queue <0-7> (color (green|yellow|red|all)|) dscp <0-63>
no queue <0-7> (color (green|yellow|red|all)|)
```

### Parameters

| | |
|---|---|
| `<0-7>` | Identifying queue number |
| `color` | Maps different colors such as green or yellow or red or all |
| `dscp <0-63>` | DSCP value |

### Default

By default, 8 DSCP values are mapped to one queue.

For example: DSCP 0-7 queue 0, DSCP 8-15 queue 1.

### Command Mode

Egress dscp map mode

### Applicability

This command was introduced in OcNOS DC version 4.2

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Example

```
(config)#qos profile queue-color-to-dscp default
(config-egress-dscp-map)#queue 2 color yellow dscp 40
(config-egress-dscp-map)#queue 2 dscp 36
```

If user specifies color in map then map will be set for that specific color else for all colors same map will be set.

```
(config-egress-dscp-map)#no queue 2 color yellow
(config-egress-dscp-map)#no queue 2
```

If user want to remove all the mapping of dscp (for all colors) no need to provide color, else can provide specific color to remove specific map.

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# ingress cos map

Use this command to map a CoS value to the queue.

Use the `no` form of this command to remove the map.

### Command Syntax

```
cos <0-7> (dei (0|1|all)|) queue <0-7> (color (green|yellow|red)|)
no cos <0-7> (dei (0|1|all)|)
```

### Parameters

| | |
|---|---|
| `<0-7>` | CoS value |
| `dei` | Drop Eligible Indicator (0\|1\|all) |
| `queue <0-7>` | Identifying queue number |
| `color` | Maps different colors such as green or yellow or red or all. |

### Default

By default, CoS to queue mapping is one to one, and DEI 0 will be mapped to color "green" and DEI 1 will be mapped to color "yellow”.

### Command Mode

Ingress cos map mode

### Applicability

This command was introduced in OcNOS DC version 4.2.

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Example

```
(config)#qos profile cos-to-queue default
(config-ingress-cos-map)#cos 1 queue 2
```

# ingress dscp map

Use this command to map a DSCP value to the queue.

Use the `no` form of this command to remove the map.

Note: Color is an optional parameter. If not provided, it will be set as the default value. Please refer the Configuration Guide for the default value table.

### Command Syntax

```
dscp <0-63> queue <0-7> (color (green|yellow|red)|)
no dscp <0-63>
```

### Parameters

| | |
|---|---|
| `<0-63>` | DSCP value |
| `queue <0-7>` | Identifying queue number |
| `color` | Maps different colors such as green or yellow or red or all. |

### Default

By default, 8 DSCP values are mapped to one queue.

For example: DSCP 0-7 queue 0, DSCP 8-15 queue 1.

### Command Mode

Ingress dscp map mode

### Applicability

This command was introduced in OcNOS DC version 4.2.

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Example

```
(config)#qos profile dscp-to-queue default
(config-ingress-dscp-map)#dscp 1 queue 2
```

# lossless

Use this command to enable lossless setting on egress queue.

### Command Syntax

```
(no|) lossless
```

### Parameters

None

### Default

Disabled

### Command Mode

Policy-class-map-queue mode

### Applicability

This command was introduced in OcNOS version 6.2.

### Example

```
OcNOS#con t
OcNOS(config)#policy-map type queuing default p1
OcNOS(config-pmap-que)#class type queuing default q0
OcNOS(config-pmap-c-que)#lossless
```

# match access-group

Use this command to classify the group based on the access group.

Use the `no command` remove access group match criteria from a class map

### Command Syntax

```
match access-group NAME
no match access-group NAME
```

### Parameters

`access-group NAME` Specify the access group name

### Default

No default value is specified

### Command Mode

Class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)# class-map class_acl
(config-cmap-qos)# match access-group my_acl
```

# match cos

Use this command to classify the traffic based on cos

Use the `no command` to remove the match configuration.

Note: The match commands which accept range have silent exit which makes removal of these match configurations easier. For example, classify the traffic based on cos using the command `match cos 2,4,6` and remove the match configuration using the command `no match cos 2-6`.

### Command Syntax

```
match cos WORD
no match cos
```

### Parameters

| | |
|---|---|
| `WORD` | CoS value or list of specified CoS values. Valid values are from 0 to 7. |

### Default

No default value is specified

### Command Mode

Class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)#class-map type qos C_QOS1
(config-cmap-qos)#match cos 1
```

# match cos inner

Use this command to classify the traffic based on inner cos.

Use the `no` command to remove the match configuration.

Note: The match commands which accept range have silent exit which makes removal of these match configurations easier. For example, classify the traffic based on inner cos using the command `match cos inner 2,4,6` and remove the match configuration using the command `no match cos inner 2-6`.

### Command Syntax

```
match cos inner WORD
no match cos inner
```

### Parameters

| | |
|---|---|
| `WORD` | Inner CoS value or list of specified CoS values. Valid values are from 0 to 7. |

### Default

No default value is specified

### Command Mode

Class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)#class-map type qos C_QOS1
(config-cmap-qos)#match cos inner 1
```

# match dscp

Use this command to classify the traffic based on dscp.

Use the `no` command to remove the configured dscp value.

Note: The match commands which accept range have silent exit which makes removal of these match configurations easier. For example, classify the traffic based on dscp using the command `match dscp 2,4,6` and remove the match configuration using the command `no match dscp 2-6`.

### Command Syntax

```
match dscp [WORD | af11 | af12 | af13 | af21 | af22 | af23 | af31| af32 | af33 |
  af41 | af42 | af43 | cs1 | cs2 | cs3 | cs4 | cs5 | cs6| cs7 | default | ef]
no match dscp
```

### Parameters

| | |
|---|---|
| `WORD` | <0-63> List of DSCP values. |
| `af11` | AF11 dscp (001010). |
| `af12` | AF12 dscp (001100) |
| `af13` | AF13 dscp (001110) |
| `af21` | AF21 dscp (010010) |
| `af22` | AF22 dscp (010100) |
| `af23` | AF23 dscp (010110) |
| `af31` | AF31 dscp (011010) |
| `af32` | AF32 dscp (011100) |
| `af33` | AF33 dscp (011110) |
| `af41` | AF41 dscp (100010) |
| `af42` | AF42 dscp (100100) |
| `af43` | AF43 dscp (100110) |
| `cs1` | CS1(precedence 1) dscp (001000) |
| `cs2` | CS2(precedence 2) dscp (010000) |
| `cs3` | CS3(precedence 3) dscp (011000) |
| `cs4` | CS4(precedence 4) dscp (100000) |
| `cs5` | CS5(precedence 5) dscp (101000) |
| `cs6` | CS6(precedence 6) dscp (110000) |
| `cs7` | CS7(precedence 7) dscp (111000) |
| `default` | Default dscp (000000) |
| `ef` | EF dscp (101110) |
| `all` | Delete all matched DSCP values. |

### Default

No default value is specified

### Command Mode

Class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)#class-map type qos C_QOS7
(config-cmap-qos)#match dscp 48-55
```

# match ip rtp

Use this command to configure a class map to use the Real-Time Protocol (RTP) port as a match criteria.

Use the `no command` to remove the RTP port as a match criteria.

Note: The match commands which accept range have silent exit which makes removal of these match configurations easier. For example, classify the traffic based on RTP port using the command `match ip rtp 5000,7000, 9000` and remove the match configuration using the command `no match ip rtp 5000-9000`.

### Command Syntax

```
match ip rtp WORD
no match ip rtp
```

### Parameters

| | |
|---|---|
| `WORD` | Specify User Datagram Protocol (UDP) or list of UDP ports that are using RTP. Valid values are from 2000 to 65535. |

### Default

No default value is specified

### Command Mode

Class-map type qos

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)# class-map my_test
(config-cmap-qos)# match ip rtp 2300
```

# match mac

Use this command to classify based on the mac address (can be source or destination or both)

Use the `no` command to remove the match configuration.

### Command Syntax

```
match mac (src |dest) (XX:XX:XX:XX:XX:XX| XX-XX-XX-XX-XX-XX |XXXX.XXXX.XXXX)
no match mac (src |dest)
```

### Parameters

| | |
|---|---|
| `mac src` | Specifies the source Ethernet MAC |
| `mac dest` | Specifies the destination Ethernet MAC |
| `XX:XX:XX:XX:XX:XX` | MAC address option 1 |
| `XX-XX-XX-XX-XX-XX` | MAC address option 2 |
| `XXXX.XXXX.XXXX` | MAC address option 3 |

### Default

No default value is specified

### Command Mode

Class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)#class-map type qos C_QOS1
(config-cmap-qos)#match mac src 11:22:33:44:55:66
(config-cmap-qos)#match mac dest 3344.5566.7788
```

# match precedence

Use this command to traffic classification based on precedence.

Use the `no` command to remove the match configuration.

Note: The match commands which accept range have silent exit which makes removal of these match configurations easier. For example, classify the traffic based on precedence using the command `match precedence 2,4,6` and remove the match configuration using the command `no match precedence 2-6`.

### Command Syntax

```
match precedence [WORD | critical | flash | flash-override | immediate | internet |
  network | priority | routine | 0-7]
no match precedence
```

### Parameters

| | |
|---|---|
| `word` | IP precedence value |
| `critical` | Critical precedence |
| `flash` | Flash precedence |
| `flash-override` | Flash override precedence |
| `immediate` | Immediate precedence |
| `internet` | Internetwork control precedence |
| `network` | Network control precedence |
| `priority` | Priority precedence |
| `routine` | Routine precedence |
| `all` | Delete all matched IP precedence values. |
| `0-7` | Valid values are in range 0-7 |

### Default

No default value is specified

### Command Mode

Class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)# class-map my_test
(config-cmap-qos)# match precedence 7
```

# match protocol

Use this command to classify traffic based on protocol.

Use the `no command` to remove the specified protocol as a match criteria.

### Command Syntax

```
match protocol (arp | bridging |cdp | clns | clns-is |clns-es | dhcp | isis |
  netbios )
no match protocol
```

### Parameters

| | |
|---|---|
| `arp` | Address Resolution Protocol (ARP) |
| `bridging` | Bridging |
| `cdp` | Cisco Discovery Protocol (CDP) |
| `clns` | Connection-less Network Service (CLNS) |
| `clns-is` | CLNS Intermediate System |
| `clns-es` | CLNS end System |
| `dhcp` | Dynamic Host Configuration (DHCP) |
| `isis` | Intermediate system to intermediate system (IS-IS) |
| `netbios` | NetBIOS Extended User Interface (NetBEUI) |
| `all` | Delete all matched protocols. |

### Default

No default value is specified

### Command Mode

Class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)# class-map my_test
(config-cmap-qos)# match protocol
```

# match qos-group

Use this command to match a QoS group in a type queuing class map.

Use the `no` to remove a QoS match on a queue number from a type queuing class map.

### Command Syntax

```
match qos-group <1-2000>
no match qos-group <1-2000>
```

### Parameters

| | |
|---|---|
| `qos-group <1-2000>` | Specify qos group value or list of qos group values specified in bytes. |

### Default

No default value is specified

### Command Mode

Class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

This command applies only to Trident II and Trident II+ platforms.

### Examples

```
(config)#
(config)#class-map type queuing match-any C_PP_1
(config-cmap-que)#match qos-group 1
```

# match traffic-type

Use this command to classify based on traffic-type

Use the `no` command to remove the match configuration.

Note: Class with match traffic type default will have lower priority over class with other traffic type match.

### Command Syntax

```
match traffic-type (l2-uc|l2-uc-unknown|default)
no match traffic-type (l2-uc|l2-uc-unknown|default)
```

### Parameters

| | |
|---|---|
| `traffic-type l2-uc` | Match L2 Unicast traffic |
| `traffic-type l2-uc-unknown` | Match Unknown L2 Unicast traffic |
| `traffic-type default` | Match all other traffic-types |

### Default

No default value is specified

### Command Mode

Class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Examples

```
(config)#class-map type qos C_QOS1
(config-cmap-qos)#match traffic-type l2-uc
```

# match vlan

Use this command to classify the traffic based on a VLAN.

Use the `no` command to remove the match configuration.

Note: The match commands which accept range have silent exit which makes removal of these match configurations easier. For example, classify the traffic based on VLAN using the command `match vlan 2,4,6` and remove the match configuration using the command `no match vlan 2-6`.

### Command Syntax

```
match vlan WORD
no match vlan (WORD|all)
```

### Parameters

| | |
|---|---|
| `WORD` | Enter VLAN ID <1-4094> or range of VLAN ID's separated by commas. For example, 2 or 2,4-5 or 50,51,52 or 100-120,122-130 etc. |
| `all` | Delete all VLAN ID entries. |

### Default

No default value is specified

### Command Mode

Class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)#class-map type qos C_QOS1
(config-cmap-qos)#match vlan 1
```

# match vlan inner

Use this command to classify the traffic based on the inner VLAN.

Use the `no` command to remove the match configuration.

Note: The match commands which accept range have silent exit which makes removal of these match configurations easier. For example, classify the traffic based on the inner VLAN using the command `match vlan inner 2,4,6` and remove the match configuration using the command `no match vlan inner 2-6`.

### Command Syntax

```
match vlan inner WORD
no match vlan inner (WORD|all)
```

### Parameters

| | |
|---|---|
| `WORD` | Enter VLAN ID <1-4094> or list of VLAN ID's separated by commas. For example, 2,4 etc. |
| `all` | Delete all VLAN ID entries. |

### Default

No default value is specified

### Command Mode

Class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)#class-map type qos C_QOS1
(config-cmap-qos)#match vlan inner 1
```

# police

Use this command to configure policing of the data rates for a particular class of traffic.

Use the `no` command to remove a policing configuration.

Note: Committed Information Rate (CIR) and Peak Information Rate (PIR) can only be whole numbers.

Note: Granularity for policer is 8kbps.

### Command Syntax

```
police (colour-blind | colour-aware |) (cir) (<1-2000000000> (kbps|mbps|gbps) |
  percent <1-100>) ((pir (<1-2000000000> (kbps|mbps|gbps) | percent <1-100>)|)(bc)
  <1-256000> (kbytes|mbytes|ms|us)|)((be)<1-256000>
  (kbytes|mbytes|ms|us)|)((conform (transmit | set-prec-transmit <0-7> | set-dscp-
  transmit <0-63> | set-cos-transmit <0-7> )) |)((exceed (drop | set-dscp-transmit
  <0-63> | set-cos-transmit <0-7> | transmit ))|) ((violate (drop | set-dscp-
  transmit <0-63> | transmit))|))
no police
```

### Parameters

| | |
|---|---|
| `colour-blind` | Do not police on color. |
| `colour-aware` | Do police on color. |
| `cir <1-2000000000>` | Specify Committed information rate. |
| `pir <1-2000000000>` | Peak information rate. |
| `kbps` | Specify the units of kbps per second. |
| `mbps` | Specify the units of mbps per second. |
| `gbps` | Specify the units of gbps per second. |
| `Percent` | Specify the rate in percent. |
| `bc <1-256000>` | Burst rate committed. |
| `be <1-256000>` | Burst rate extended. |
| `transmit` | Specify the action of transmitting packets. |
| `set-prec-transmit` | Sets the IP precedence field to the specified value and transmits the packet. |
| `set-dscp-transmit` | Sets the Differentiated Service Code Point (DSCP) field to the specified value and transmits the packet. |
| `set-cos-transmit` | Sets the class of service (CoS) field to the specified value and transmits the packet. |
| `drop` | Specify the action of dropping packets. |
| `conform` | Sets the action to take when the data rate is within bounds |

| | |
|---|---|
| `exceed` | Sets the action to take when the data rate is exceeded. Default is drop. |
| `violate` | Sets the action to take when the data rate violates the configured rate values. The default is drop. |

## Default

**Table 2: Default values**

| Parameter | Default |
|---|---|
| policer-type | Color-Blind |
| `cir` | N/A |
| `pir` | 0 |
| `bc` | 0 |
| `be` | 0 |
| `conform` | Transmit |
| `exceed` | Drop |
| `violate` | Drop |

## Command Mode

Policy-map mode

## Applicability

This command was introduced before OcNOS version 1.3. On Tomahawk 3 and Tomahawk 4 hardware, the policer is not supported in the egress direction.

## Examples

```
(config)# policy-map type qos 2345
(config-pmap-qos)#class type qos 2345
(config-pmap-c-qos)# police cir 2 mbps pir 4 mbps bc 2 mbytes be 4 mbytes conform
transmit exceed set-cos-transmit 1 violate drop
```

## Usage

Traffic policing is based on the concept of *marking* IP packets, and then *metering* the packets in relation to how they are marked. This is called the “Two Rate Three Color Marker (trTCM)” process.

The Two Rate Three Color Marker (trTCM) meters an IP packet stream, and marks its packets as either green, yellow, or red. A packet is marked RED if it exceeds the *Peak Information Rate* (PIR). Otherwise it is marked either YELLOW or GREEN depending on whether it exceeds or does not exceed the Committed Information Rate (CIR). The trTCM is useful, for example, for ingress policing of a service, where a peak rate needs to be enforced separately from a committed rate.

The Meter meters each packet and passes the packet and the metering result to the Marker. The Meter operates in one of two modes – Color-Blind or Color-Aware. In the Color-Blind mode, the Meter assumes that the packet stream is uncolored.In the Color-Aware mode, the Meter assumes that some preceding entity has pre-colored the incoming packet stream so that each packet is either GREEN, YELLOW, or RED.

The following describes the equations used to determine the BC an BE values:

Note: CIR, PIR, BC, and BE values are all in kbits/sec.

```
=================
BC = CIR * 5 / 1000;
Range check [64kbytes-256mbytes]
if (BC / 8) < 64)
then BC = 64 * 8;
else if (BC / 8) > 256000)
then BC = 256000 * 8;
=================
```

Same calculation for BE, as well.

Note: If the PIR value is not mentioned in the configuration, then the CIR value itself is considered for BE calculation.

```
=================
BE = PIR * 5 / 1000;
Range check [64kbytes-256mbytes]
if (BE / 8) < 64)
then BE = 64 * 8;
else if (BE / 8) > 256000)
then BE = 256000 * 8;
==================
```

For example:

```
Configure: police CIR 1 mbps
Hardware: CIR = 1000kbits/sec , BC = 512kbits, BE = 512kbits

Configure: police CIR 1 mbps PIR 200 mbps
Hardware: CIR = 1000kbits/sec, BC = 512kbits, PIR = 200000kbits/sec, BE = 1000kbits
```

For additional information regarding policing, see RFC 2697 and RFC 2698.

# policy-map

Use this command to create a policy map and enter policy-map mode.

Use the `no` command to remove a policy map.

Note: You cannot delete a policy map if it is attached to an interface.

### Command Syntax

```
policy-map {NAME | (type (qos|queuing (|default)) NAME)}
no policy-map {NAME |(type (qos|queuing (|default)) NAME)}
```

### Parameters

| | |
|---|---|
| `NAME` | Policy map name (maximum 32 characters) |
| `type qos` | QoS policy map |
| `type queuing` | Queuing policy map |
| `type default` | Default class map |
| `type NAME` | Specify the class map name (Max Size 32) |

### Default

No default value is specified

### Command Mode

Configuration mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)#
(config)#policy-map type qos PQOS
```

# priority

Use this command to set the user priority for the class attached to this policy-map.
Use the `no` parameter with this command to unset the priority value.

Note: The higher the priority number in a policy map, the greater the priority assigned to the class. User-configured priorities override default priorities. This rule does not apply to classes with match access-group criteria, as priorities in such cases are determined by the sequence number in the access list. This behavior is consistent across all platforms.

### Command Syntax

```
priority <1-1000>
no priority
```

### Parameters

| | |
|---|---|
| `<1-1000>` | Priority value |

### Default

No default value is specified

### Command Mode

Policy-class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
#configure terminal
(config)#policy-map pmap1
(config-pmap)#class cmap1
(config-pmap-c)#priority 20
```

# priority (queuing)

Use this command to configure a single output queuing class as the priority queue.

Note: Priority can be set only on default queues (such as queues in the default queuing policy-map).

### Command Syntax

```
priority
```

### Parameters

None

### Default

No default value is specified. Higher priority queue will have higher priority always when set.

### Command Mode

Policy map-class type queuing mode

### Applicability

This command was introduced before OcNOS version 1.3.

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Examples

```
#configure terminal
(config)#policy-map type queuing default default-out-policy
(config-pmap-que)#class type queuing default q0
(config-pmap-c-que)#priority
```

# qos (enable | disable)

Use this command to globally enable or disable Quality-of-Service (QoS).

Note: Enabling or disabling QoS is a disruptive operation, stopping all traffic on ports which causes traffic loss.

### Command Syntax

```
qos (enable | disable)
```

### Parameters

| | |
|---|---|
| `enable` | Globally enable QoS |
| `disable` | Globally disable QoS |

### Default

By default, QoS is enabled.

### Command Mode

Configure

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
#configure terminal
(config)# qos enable

(config)#qos disable
```

# qos map-profile

Use this command to attach (map) a profile to an interface.

Use the no form of this command to remove a profile.

Note:

- By-default, "default" profiles are attached on their supported interfaces (cos-to-queue and queue-to-cos on L2 interfaces and DSCP-to-queue and queue-color-to-DSCP on L3 interfaces).
- You can create and attach your own profile to supported interfaces. After removing a user-defined profiles from an interface, the "default" profile is applied.

### Command Syntax

```
qos map-profile (cos-to-queue | dscp-to-queue | queue-color-to-cos | queue-color-to-dscp | precedence-to-queue | queue-to-precedence | ingress-pg-map | egress-dynamic-ecn) NAME
no qos map-profile (cos-to-queue | dscp-to-queue | queue-color-to-cos | queue-color-to-dscp| precedence-to-queue | queue-to-precedence | ingress-pg-map | egress-dynamic-ecn) NAME
```

### Parameters

| | |
|---|---|
| `cos-to-queue` | Profile for CoS to queue map |
| `dscp-to-queue` | Profile for DSCP to queue map |
| `queue-color-to-cos` | Profile for queue color to CoS map |
| `queue-color-to-dscp` | Profile for queue color to DSCP map |
| `precedence-to-queue` | Profile for precedence to queue map |
| `queue-to-precedence` | Profile for queue to precedence map |
| `ingress-pg-map` | Profile for ingress priority group map |
| `egress-dynamic-ecn` | Profile for egress dynamic ECN map |
| `NAME` | Profile map name (maximum 32 characters) |

### Default

By default, the default cos-to-queue-profile is applied to an L2 interface, and the default DSCP-to-queue profile is attached to an L3 interface.

### Command Mode

Interface modes

### Applicability

This command was introduced in OcNOS DC version 4.2

The `egress-dynamic-ecn` option is added in OcNOS version 7.0.0. It applies only for Tomahawk 5 (TH5) platforms.

### Example

```
(config-if)#qos map-profile cos-to-queue cos-map
(config-if)#qos map-profile dscp-to-queue dscp-map
(config-if)#qos map-profile queue-color-to-cos egress-cos-map
(config-if)#qos map-profile queue-color-to-dscp q-to-dscp-map
```

Attaching a PG profile.

```
OcNOS(config)#int ce1
OcNOS(config-if)#qos map-profile ingress-pg-map pg2
OcNOS(config-if)#commit
OcNOS(config-if)#exit
OcNOS(config)#end
```

Updating the PG profile attached to an interface.

```
OcNOS(config)#qos profile ingress-pg-map pg2
OcNOS(config-ingress-pg-queue-map)#priority-group 0 xon-offset 1000 xoff-
threshold 600 dynamic-threshold 6
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#exit
OcNOS(config)#end
```

Attaching a PG profile to a LAG interface.

```
OcNOS#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
OcNOS(config)#bridge 1 protocol ieee vlan-bridge
OcNOS(config)#vlan 100 br 1
OcNOS(config)#int sa10
OcNOS(config-if)#switchport
OcNOS(config-if)#bridge-group 1
OcNOS(config-if)#switchport mode trunk
OcNOS(config-if)#switchport trunk allowed vlan all
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#int ce5
OcNOS(config-if)#static-channel-group 10
OcNOS(config-if)#int ce4
% Warning: Executing the CLI from higher config mode level
OcNOS(config-if)#static-channel-group 10
OcNOS(config-if)#comm
OcNOS(config-if)#
OcNOS(config-if)#exit
OcNOS(config)#int sa10
OcNOS(config-if)#qos map-profile ingress-pg-map pg2
```

```
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#end
```

Adding a member interface to a LAG that has a PG profile attached:

```
OcNOS#sh run qos
qos enable
!
qos profile ingress-pg-map default
 priority-group 0 xon-offset 3500 xoff-threshold 2000 dynamic-threshold 9
 priority-group 1 xon-offset 2400 xoff-threshold 1200
!
qos profile ingress-pg-map pg2
 priority-group 0 xon-offset 1000 xoff-threshold 600 dynamic-threshold 6
!
!
!
!
interface sa10
 qos map-profile ingress-pg-map pg2
!


OcNOS(config)#int ce6
OcNOS(config-if)#static-channel-group 10
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#int ce7
OcNOS(config-if)#static-channel-group 10
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#end
```

Attaching a PG profile to a MLAG interface.

```
OcNOS#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
OcNOS(config)#bridge 1 protocol rstp vlan-bridge
OcNOS(config)#comm
OcNOS(config)#int sa20
OcNOS(config-if)#switchport
OcNOS(config-if)#bridge-group 1
OcNOS(config-if)#switchport mode trunk
OcNOS(config-if)#switchport trunk allowed vlan all
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#int ce9
OcNOS(config-if)#static-channel-group 20
```

```
OcNOS(config-if)#exit
OcNOS(config)#int ce10
OcNOS(config-if)#static-channel-group 20
OcNOS(config-if)#exit
OcNOS(config)#comm
OcNOS(config)#int mlag1
OcNOS(config-if)#switchport
OcNOS(config-if)#bridge-group 1
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#int sa20
OcNOS(config-if)#mlag 1
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#int mlag1
OcNOS(config-if)#qos map-profile ingress-pg-map pg2
OcNOS(config-if)#comm
OcNOS(config-if)#exit
OcNOS(config)#end
```

To create a D-ECN profile EG1 is to the egress interface `xe1`.

```
      OcNOS(config-pmap-que-def)#int xe1
      OcNOS(config-if)#qos map-profile egress-dynamic-ecn EG1
OcNOS(config-eg-dynamic-ecn-map)#queue 3 on-offset 70000 off-offset 8000 bytes
```

# qos profile

Use this command to create new profiles or to update "default" profiles.

Use the no form of this command to remove the "user-defined" profiles, or to undo custom updates in "default" profiles.

### Command Syntax

```
qos profile (cos-to-queue | dscp-to-queue | queue-color-to-cos | queue-color-to-
  dscp) (NAME|default)
no qos profile (cos-to-queue | dscp-to-queue | queue-color-to-cos | queue-color-to-
  dscp) (NAME|default)
```

### Parameters

| | |
|---|---|
| `cos-to-queue` | Profile for CoS to queue map |
| `dscp-to-queue` | Profile for DSCP to queue map |
| `queue-color-to-cos` | Profile for queue color to CoS map |
| `queue-color-to-dscp` | Profile for queue color to DSCP map |
| `NAME` | Profile map name (maximum 32 characters) |

### Default

By default, "default" profile is created for all the profile types. These profiles can only be updated by the user neither be created nor be destroyed.

### Command Mode

Configure modes

### Applicability

This command was introduced in OcNOS DC version 4.2.

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Example

To create a new profile:

```
(config)#qos profile cos-to-queue cos-map
(config)#qos profile dscp-to-queue dscp-map
(config)#qos profile queue-color-to-cos egress-cos-map
(config)#qos profile queue-color-to-dscp q-to-dscp-map
```

To update the "default" profile:

```
(config)#qos profile cos-to-queue default
(config)#qos profile dscp-to-queue default
(config)#qos profile queue-color-to-cos default
(config)#qos profile queue-color-to-dscp default
```

# qos profile egress-dynamic-ecn

Use this command to set the queue mapping for egress dynamic ECN profile.

Use the `no` form of this command delete the profile.

Use show qos-profile to show the profile detail.

Use qos map-profile to map the profile on interface.

### Command Syntax

```
qos profile egress-dynamic-ecn <NAME> queue <0-7> on-offset <1-266338050> off-
  offset <1-266338050> (packets | bytes | kbytes)
no qos profile egress-dynamic-ecn <NAME> no queue <0-7>
```

### Parameters

| | |
|---|---|
| `Name` | The profile name to be created. |
| `queue <0-7>` | The queue value. |
| `qon offset <1-266338050>` | ON-offset value |
| `off-offset <1-266338050>` | OFF-offset value |
| `(packets \| bytes \| kbytes)` | Offset units |

### Default

By default, "default" profile is created for all the profile types. These profiles can only be updated by the user neither be created nor be destroyed.

### Command Mode

config-eg-dynamic-ecn-map

### Applicability

This command was introduced in OcNOS version 7.0.0.

This command applies only to the Tomahawk 5 (TH5) platforms.

### Example

To create a new profile:

```
#configure terminal
(config)#qos profile egress-dynamic-ecn egr-dyn-ecn-map
(config-egress-prec-map)#queue 1 on-offset 7000 off-offset 9000 bytes
(config)#interface xe2
(config-if)#qos map-profile egress-dynamic-ecn egr-dyn-ecn-map
```

To create Dynamic-ECN profile

```
OcNOS(config)#qos profile egress-dynamic-ecn eg1
```

To delete D-ECN thresholds mapping for each queue in the profile.

```
OcNOS(config)#no qos profile egress-dynamic-ecn eg1
```

To attach a D-ECN profile on an interface

```
(config)#qos profile egress-dynamic-ecn egr-dyn-ecn-map
(config-eg-dynamic-ecn-map)#queue 1 on-offset 20 off-offset 50 packets
(config)#qos profile egress-dynamic-ecn egr-dyn-ecn-map
(config-egress-prec-map)#queue 1 on-offset 7000 off-offset 9000 bytes
(config)#interface xe2
(config-if)#qos map-profile egress-dynamic-ecn egr-dyn-ecn-map
OcNOS(config)#end
```

Simultaneously supporting Static and D-ECN profile on an interface. Static-ECN is via WRED ECN marking. The final marking is the logical OR of the two ECN features.

```
OcNOS(config)#qos profile egress-dynamic-ecn egr-dyn-ecn-map
OcNOS(config-eg-dynamic-ecn-map)#queue 2 on-offset 70000 off-offset 90000 bytes
```

# qos profile ingress-pg-map

Use this command to create a ingress priority group (PG) profile or update the default ingress PG profile.

Use `no` parameter of this command to remove a ingress PG profile.

Use `no` parameter of `priority-group` command to unset a PG mapping in the ingress PG profile.

Use show qos-profile to show the profile detail.

Use qos map-profile to map the profile on interface.

### Command Syntax

```
qos profile ingress-pg-map (NAME|default) priority-group <0-7> (xon-offset <0-
  83000> (xoff-threshold <> | dynamic-threshold <0-10> |) | xoff-threshold <> |
  dynamic-threshold <0-10>)no qos profile ingress-pg-map (NAME|default)
no qos profile ingress-pg-map (NAME|default)
no priority-group <0-7>
```

### Parameters

Use this command to update the priority mapping in the PG profile.

| | |
|---|---|
| `ingress-pg-map <NAME>` | Specifies the name of the ingress priority group map profile. |
| `default` | Specifies the default PG map profile. |
| `priority-group <0-7>` | Specifies the priority mapping in the PG profile. The values are defined in Kbytes by default. |
| `xon-offset <1-83000>` | Specifies XON buffer offset of the shared memory that a PG can receive. The value is specified in Kbytes by default.<br>When the buffer usage on the ingress priority group drops below this PFC XON offset from the shared limit, the priority group sends a PFC message to the peer to resume packet transmission.<br><br>When the ingress PG buffer reaches the configured limit, it triggers the transmission of PFC pause frames to its egress peer. |

| | |
|---|---|
| `xoff-threshold <1-83000>` | Specifies the absolute threshold at which the PG XOFF will start. The value is specified in Kbytes by default.Typically The difference between these thresholds provides hysteresis in toggling between X-OFF and X-ON, thereby limiting the PFC transmission rate. |
| `dynamic-threshold <0-10>` | Defines the configurable limit on how many buffers each queue can draw from the shared buffer pool. This pool operates according to a dynamic threshold parameter known as the alpha value.<br><br>The dynamic threshold modifies the PG queue size only in the absence of a configured `xoff-threshold`.<br><br>The dynamic threshold can be set individually for different queues, allowing fine-grained control over how each queue accesses the shared buffer. Following are the dynamic threshold values that can be configured:<br>• 0 1/128 MMU alpha.<br>• 1 1/64 MMU alpha.<br>• 2 1/32 MMU alpha.<br>• 3 1/16 MMU alpha.<br>• 4 1/8 MMU alpha.<br>• 5 1/4 MMU alpha.<br>• 6 1/2 MMU alpha.<br>• 7 1 MMU alpha.<br>• 8 2 MMU alpha.<br>• 9 4 MMU alpha.<br>• 10 8 MMU alpha<br>Note: Memory Management Unit (MMM) refers to block inside a switch that controls packet buffering and queue management. |

Note: Only a single threshold attribute—`xoff-threshold` or `dynamic-threshold`—is valid and permitted in the CLI configuration.

### Default

- `xon-offset` — 32
- `xoff-threshold` — None.
- `dynamic-threshold` — 8

### Command Mode

Configure Mode

### Applicability

Introduced in OcNOS version 7.0.0. This command is supported only on the Trident3 (TR3) platforms, Trident 4 (TR4) platforms, Tomahawk3 (TH3) platforms, Tomahawk4 (TH4) platforms, and Tomahawk 5 (TH5) platforms.

### Example

Command to create and attach user-defined PG profile.

```
OcNOS#configure terminal
(config)#qos profile ingress-pg-map PG1
```

```
(config-ingress-pg-queue-map)#priority-group 0 xon-offset 30000
(config-ingress-pg-queue-map)#priority-group 1 xoff-threshold 20000
(config-ingress-pg-queue-map)#priority-group 2 dynamic-threshold 2
(config-ingress-pg-queue-map)#priority-group 3 xon-offset 2000 xoff-threshold
10000
(config-ingress-pg-queue-map)#priority-group 4 xon-offset 50000 dynamic-
threshold 9

(config)#interface xe65
(config-if)#qos map-profile ingress-pg-map PG1
```

Updating default global PG profile with XON-offset:

```
OcNOS#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
OcNOS(config)#qos profile ingress-pg-map default
OcNOS(config-ingress-pg-queue-map)#priority-group 1 xon-offset 5000
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#exit
OcNOS(config)#end
OcNOS#
```

Updating default global PG profile with XOFF-threshold:

```
OcNOS#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
OcNOS(config)#qos profile ingress-pg-map default
OcNOS(config-ingress-pg-queue-map)#priority-group 2 xoff-threshold 10000
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#end
OcNOS#
```

Updating default global PG profile with dynamic-threshold:

```
OcNOS#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
OcNOS(config)#qos profile ingress-pg-map default
OcNOS(config-ingress-pg-queue-map)#priority-group 3 dynamic-threshold 2
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#exit
OcNOS(config)#end
OcNOS#
```

Updating default global PG profile with XON-offset and XOFF-threshold:

```
OcNOS#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
OcNOS(config)#qos profile ingress-pg-map default
OcNOS(config-ingress-pg-queue-map)#priority-group 4 xon-offset 5000 xoff-
threshold 15000
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#end
OcNOS#
```

Updating default global PG profile with XON-offset and dynamic threshold:

```
OcNOS#conf t
```

```
Enter configuration commands, one per line.  End with CNTL/Z.
OcNOS(config)#qos profile ingress-pg-map default
OcNOS(config-ingress-pg-queue-map)#priority-group 5 xon-offset 1000 dynamic-
threshold 8
OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#end
OcNOS#
```

Accessing default global PG profile:

```
OcNOS#conf t
Enter configuration commands, one per line. End with CNTL/Z. OcNOS(config)#qos
profile ingress-pg-map default OcNOS(config-ingress-pg-queue-map)#comm
OcNOS(config-ingress-pg-queue-map)#exit OcNOS(config)#end
```

Detaching a PG profile:

```
OcNOS(config)#int ce1
OcNOS(config-if)#no qos map-profile ingress-pg-map pg2 OcNOS(config-if)#comm
2025 Aug 20 01:17:47.594 : OcNOS : HSL : DEBUG : QOS: zNSM_SYNC: Successfully
set/unset xon: 5000 xoff: 15000 dynamic_threshold: 0 on port :5
OcNOS(config-if)#exit OcNOS(config)#end
```

# qos profile precedence-to-queue

Use this command to set the precedence to queue profile.

Use the no form of this command delete the profile.

Use show qos-profile to show the profile detail.

Use qos map-profile to map the profile on interface.

### Command Syntax

```
qos profile precedence-to-queue (NAME|)
precedence <0-7> queue <0-7>
no qos profile precedence-to-queue (NAME|)
no precedence <0-7> queue <0-7>
```

### Parameters

| | |
|---|---|
| NAME | The profile name to be created |
| precedence <0-7> | Precedence value |
| queue <0-7> | The queue value |

### Command Mode

Configure modes

### Applicability

This command was introduced in OcNOS version 5.0.

### Example

```
#configure terminal
(config)#qos profile precedence-to-queue prec-map
(config-ingress-prec-map)#precedence 1 queue 1
(config)#interface xe1
(config-if)#qos map-profile precedence-to-queue prec-map
```

# qos profile queue-to-precedence

Use this command to set the queue to precedence profile.

Use the `no` form of this command delete the profile.

Use show qos-profile to show the profile detail.

Use qos map-profile to map the profile on interface.

### Command Syntax

```
qos profile queue-to-precedence (NAME|)
queue <0-7> precedence <0-7>
no qos profile queue-to-precedence (NAME|)
no queue <0-7> precedence <0-7>
```

### Parameters

| | |
|---|---|
| `NAME` | The profile name to be created |
| `queue <0-7>` | The queue value |
| `precedence <0-7>` | Precedence value |

### Command Mode

Configure modes

### Applicability

This command was introduced in OcNOS version 5.0.

### Example

```
#configure terminal
(config)#qos profile queue-to-precedence egress-prec-map
(config-egress-prec-map)#queue 1 precedence 0
(config)#interface xe2
(config-if)#qos map-profile queue-to-precedence egress-prec-map
```

# qos remark

Use this command to enable remarking of the Class of service (CoS) and Differentiated Services Control Protocol (DSCP) set by the egress map.

Use the `no` command to disable remarking of the CoS and DSCP.

### Command Syntax

In Config mode

```
qos remark (cos|dei|dscp)
no qos remark (cos|dei|dscp)
```

In Interface mode

```
qos remark (cos|dei|dscp)(enable|disable)
no qos remark (cos|dei|dscp)
```

### Parameters

| | |
|---|---|
| `type` | Remarking type. For example, CoS or DEI (Drop Eligible Indicator bit) or DSCP |
| `(enable\|disable)` | Remarking action |

### Default

By default, remarking is disabled.

### Command Mode

Configure mode, Interface mode

### Applicability

This command was introduced in OcNOS DC version 4.2.

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Examples

Interface remarking will take priority over global remarking configurations.

```
((config)#qos remark cos
(config)#qos remark dscp
(config-if)# qos remark cos disable
(config-if)# qos remark cos enable
(config-if)# qos remark dscp disable
```

# qos statistics

Use this command to enable Quality of Service (QoS) statistics.

Use the `no` command to disable QoS statistics

Note: Class-map statistics is cleared whenever the match or action property of the class is modified dynamically.

### Command Syntax

```
qos statistics
no qos statistics
```

### Parameters

None

### Default

By default, QoS statistics is disabled

### Command Mode

Configure Mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)#qos statistics
```

# queue-limit

Use this command to configure tail drop by setting queue limits on egress queues.

Use the `no command` to remove a queue limit.

### Command Syntax

```
queue-limit (<1-629145600>) (packets|bytes|kbytes|mbytes|ms)
no queue-limit
```

### Parameters

| | |
|---|---|
| `<1-629145600>` | Specify queue-limit threshold range values in packets, bytes, mbytes,ms us or Kilobytes. |
| `packets` | Specify the units of queue-limit in packets (min 9 - max 614400) |
| `bytes` | Specify the units of queue-limit in bytes (min 9416 - max 629145600) |
| `kbytes` | Specify the units of queue-limit in kilobytes (min 9 - max 614400) |
| `mbytes` | Specify the units of queue-limit in mega-bytes (min 1 - max 600) |
| `ms` | Specify the units of queue-limit in milliseconds (min 1 - max 50) |
| `us` | Specify the units of queue-limit in micro-seconds (min 1 - max 50000) |

### Default

Default queue size is 62914560 bytes

### Command Mode

Policy-class-map-queue mode

### Applicability

This command was introduced in OcNOS version 3.0.

### Examples

```
(config)# policy-map type queuing default P1
(config-pmap-que-def)#class type queuing default q1
(config-pmap-c-que-def)# queue-limit 1 mbytes
```

# random-detect

Use this command to configure weighted random early detection (WRED).

Use the `no command` to remove a WRED configuration.

Note: Explicit Congestion Notification (ECN) ECN-WRED is independent of WRED and max queue size parameters. With ECN, queue size can be reached until default max queue size is exceeded.

### Command Syntax

```
random-detect green (min-threshold|)<1-524288> (max-threshold|)<1-524288> (drop-
  probability <1-100>|) yellow (min-threshold|)<1-524288> (max-threshold|)<1-
  524288> (drop-probability <1-100>|) red (min-threshold|)<1-524288> (max-
  threshold|)<1-524288>) (drop-probability <1-100>|) (packets | bytes |
  kbytes)(ecn|)
random-detect (min-threshold|)<1-524288> (max-threshold|)<1-524288> (packets |
  bytes | kbytes) (drop-probability <1-100>|) (ecn|)
random-detect weight <0-15>


no random-detect green (min-threshold|)<1-524288> (max-threshold|)<1-524288> (drop-
  probability <1-100>|) yellow (min-threshold|)<1-524288> (max-threshold|)<1-
  524288> (drop-probability <1-100>|) red (min-threshold|)<1-524288> (max-
  threshold|)<1-524288>) (drop-probability <1-100>|) (packets | bytes |
  kbytes)(ecn|)
no random-detect (min-threshold|)<1-524288> (max-threshold|)<1-524288> (packets |
  bytes | kbytes) (drop-probability <1-100>|) (ecn|)
no random-detect weight
```

### Parameters

`min-threshold`

Specify the minimum threshold. In the range of <1-524288>

`max-threshold`

Specify the maximum threshold. In the range of <1-524288>

`drop-probability`

Specify the probability of dropping. In the range <1-100>

`Packets, bytes, kbytes`

Specify the thresholds in Packets, Bytes, or Kilobytes.

`ecn` Explicit Congestion Notification

`weight` Specify the weight level . In the range <0-15>

### Default

No default value is specified

### Command Mode

Policy-class map mode

### Applicability

This command was introduced before OcNOS version 1.3.

Drop-probability and weight were introduced on OcNOS DC version 4.2.

This command applies only to the Trident II, Trident II+, Trident III, Tomahawk, and Helix platforms.

### Examples

```
(config)# policy-map type queuing default xyz
(config-pmap-que)#class type queuing default q1
(config-pmap-c-que)#random-detect min-threshold 200 max-threshold 512 kbytes
drop-probability 50 ecn
(config-pmap-c-que)#random-detect weight 10
(config-pmap-c-que)#no random-detect
```

# service-policy

Use this command to attach a child policy onto a parent policy.

Use the `no` command detach child policy from the parent policy.

### Command Syntax

```
service-policy NAME
no service-policy NAME
```

### Parameters

| | |
|---|---|
| `NAME` | Specify the policy map to attach to the parent policy. |

### Default

No default value is specified

### Command Mode

Policy-class-map queuing mode

### Applicability

This command was introduced before OcNOS version 1.3.

This command applies only to the Trident II and Trident II+ platforms.

### Examples

```
(config)#policy-map type queuing P1
(config-pmap-que)#class type queuing empty5b
(config-pmap-c-que)#service-policy PQOS
```

# service-policy type qos

Use this command to attach a service-policy of type qos to the interface.

Use the `no` command to remove a service-policy from an interface.

### Command Syntax

```
service-policy type qos (input|output) NAME
no service-policy type qos (input|output) NAME
```

### Parameters

| | |
|---|---|
| `type qos (input\|output)` | Specify whether the policy map is of input or output type QoS. |
| `NAME` | Specify the policy map to attach to this interface. |

### Default

No default value is specified

### Command Mode

Interface mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)#int xe3
(config-if)#service-policy type qos input PQOS
```

# service-policy type queuing

Use this command to attach a service-policy of type queuing to the interface.

Use the `no` command to remove a service-policy from an interface.

### Command Syntax

```
service-policy type queuing output NAME
no service-policy type queuing output NAME
```

### Parameters

| | |
|---|---|
| `type queuing` | Specify whether the policy map is of type queuing. |
| `NAME` | Specify the policy map to attach to this interface. |

### Default

By default, default-out-policy is attached on all interface

### Command Mode

Interface mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)#int xe3
(config-if)#service-policy type queuing output PQOS
```

# set bridge cos

Use this command to set the Class-of-Service (CoS) value for L2 packets only.

Use the `no` parameter with this command to unset a CoS value.

### Command Syntax

```
set bridge cos (<0-7>)
no set bridge cos
```

### Parameters

| | |
|---|---|
| `<0-7>` | CoS value. |

### Default

No default value is specified

### Command Mode

Policy-class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Examples

```
#configure terminal
(config)#policy-map pmap1
(config-pmap)#class cmap1
(config-pmap-c)#set bridge cos 2
```

# set bridge dscp

Use this command to set the DSCP value for L3 packets only.

Use the `no` parameter with this command to unset a DSCP value.

### Command Syntax

```
set bridge dscp (<0-63>|af11| af12| af13| af21| af22| af23| af31|
                af32| af33| af41| af42| af43| cs1| cs2| cs3| cs4| cs5|
                cs6| cs7| default| ef)
no set bridge dscp
```

### Parameters

| | |
|---|---|
| `<0-63>` | DSCP value |
| `af11` | DSCP (001011) decimal value 11 |
| `af12` | DSCP (001100) decimal value 12 |
| `af13` | DSCP (001101) decimal value 13 |
| `af21` | DSCP (010101) decimal value 21 |
| `af22` | DSCP (010110) decimal value 22 |
| `af23` | DSCP (010111) decimal value 23 |
| `af31` | DSCP (011111) decimal value 31 |
| `af32` | DSCP (010000) decimal value 32 |
| `af33` | DSCP (010001) decimal value 33 |
| `af41` | DSCP (101001) decimal value 41 |
| `af42` | DSCP (101010) decimal value 42 |
| `af43` | DSCP (101011) decimal value 38 |
| `cs1` | (Precedence 1) DSCP (001000) decimal value 8 |
| `cs2` | (Precedence 2) DSCP (010000) decimal value 16 |
| `cs3` | (Precedence 3) DSCP (011000) ecimal value 24 |
| `cs4` | (Precedence 4) DSCP (100000) decimal value 32 |
| `cs5` | (Precedence 5) DSCP (101000) decimal value 40 |
| `cs6` | (Precedence 6) DSCP (110000) decimal value 48 |
| `cs7` | (Precedence 7) DSCP (111000) decimal value 56 |
| `default` | DSCP (000000) decimal value 0 |
| `ef` | DSCP (101110) decimal value 46 |

### Default

No default value is specified

### Command Mode

Policy-class-map mode

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### Applicability

This command was introduced before OcNOS version 1.3.

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Examples

```
#configure terminal
(config)#policy-map pmap1
(config-pmap)#class cmap1
(config-pmap-c)#set bridge dscp 25
```

# set cos

Use this command for matching traffic classes set action as change cos in the egress packet to the prescribed value.

Use the `no command` to remove the assigned value from the class.

### Command Syntax

```
set cos <0-7>
no set cos
```

### Parameters

| | |
|---|---|
| `<0-7>` | Specify CoS value to assign for this class of traffic |

### Default

No default value is specified

### Command Mode

Policy-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Examples

```
(config)# policy-map my_policy1
(config-pmap-qos)# class traffic_class2
(config-pmap-c-qos)# no set cos
```

# set dscp

Use this command for matching traffic classes set action as change DSCP in the egress packet to the prescribed value.

Use the `no` command to remove the assigned value from the class.

### Command Syntax

```
set dscp (<0-63>|af11| af12| af13| af21| af22| af23| af31|
              af32| af33| af41| af42| af43| cs1| cs2| cs3| cs4| cs5|
              cs6| cs7| default| ef )
no set dscp
```

### Parameters

| | |
|---|---|
| `<0-63>` | DSCP value |
| `af11` | DSCP (001011) decimal value 11 |
| `af12` | DSCP (001100) decimal value 12 |
| `af13` | DSCP (001101) decimal value 13 |
| `af21` | DSCP (010101) decimal value 21 |
| `af22` | DSCP (010110) decimal value 22 |
| `af23` | DSCP (010111) decimal value 23 |
| `af31` | DSCP (011111) decimal value 31 |
| `af32` | DSCP (010000) decimal value 32 |
| `af33` | DSCP (010001) decimal value 33 |
| `af41` | DSCP (101001) decimal value 41 |
| `af42` | DSCP (101010) decimal value 42 |
| `af43` | DSCP (101011) decimal value 38 |
| `cs1` | (Precedence 1) DSCP (001000) decimal value 8 |
| `cs2` | (Precedence 2) DSCP (010000) decimal value 16 |
| `cs3` | (Precedence 3) DSCP (011000) ecimal value 24 |
| `cs4` | (Precedence 4) DSCP (100000) decimal value 32 |
| `cs5` | (Precedence 5) DSCP (101000) decimal value 40 |
| `cs6` | (Precedence 6) DSCP (110000) decimal value 48 |
| `cs7` | (Precedence 7) DSCP (111000) decimal value 56 |
| `default` | DSCP (000000) decimal value 0 |
| `ef` | DSCP (101110) decimal value 46 |

### Default

No default value is specified

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### Command Mode

Policy map class mode

### Applicability

This command was introduced before OcNOS version 1.3.

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Examples

```
#configure terminal
(config)#policy-map pmap1
(config-pmap)#class cmap1
(config-pmap-c)#set dscp af12
```

# set precedence

Use this command for matching traffic classes set action as change precedence in the egress packet to the prescribed value.

Use the `no command` to leave the precedence value unchanged for the class.

### Command Syntax

```
set (precedence (<0-7>| critical| flash | flash-override|immediate|internet|
  network| priority| routine))
no set precedence
```

### Parameters

| | |
|---|---|
| `<0-7>` | Specify IP precedence value to assign for this class of traffic |
| `critical` | Critical precedence |
| `flash` | Flash precedence |
| `flash-override` | Flash override precedence |
| `immediate` | Immediate precedence |
| `internet` | Internetwork control precedence |
| `network` | Network control precedence |
| `priority` | Priority precedence |
| `routine` | Routine precedence |

### Default

No default value is specified

### Command Mode

Policy-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Examples

```
(config)# policy-map policy1
(config-pmap-qos)# class class2
(config-pmap-c-qos)# set precedence 3
```

# set qos-group

Use this command to match a QoS group in a type queuing class map.

Use the `no` command to remove a QoS group match on a queue number from a type queuing class map.

### Command Syntax

```
set qos-group <1-2000>
no set qos-group <1-2000>
```

### Parameters

| | |
|---|---|
| `<1-2000>` | Specify the QoS group value to assign for this class of traffic. |

### Default

No default value is specified

### Command Mode

Policy-class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

This command applies only to the Trident II and Trident II+ platforms.

### Examples

```
(config)#
(config)#policy-map type qos PQOS
(config-pmap-qos)#class type qos C_QOS1
(config-pmap-c-qos)#set qos-group 1
```

# set qos queue scheduler

Use this command to change the scheduler mode of Unicast Queue and Non-Unicast queue groups to WRR or SP.

Use the `no` command to disable the set mode, and to change to the default mode

### Command Syntax

```
set qos ((wrr uc <1-127> non-uc <1-127>)|sp)
no set qos (wrr|sp)
```

### Parameters

| | |
|---|---|
| `wrr` | Weighted Round Robin Mode |
| `uc <1-127>` | Unicast Queues from 1 to 127 |
| `non-uc <1-127>` | Non-Unicast Queues from 1 to 127 |
| `sp` | Strict Priority Mode |

### Default

The default is WRR with 32:2.

### Command Mode

Configure Mode

### Applicability

This command was introduced before OcNOS version 1.3 for platforms Trident II and Trident II+

Tomahawk support is provided with OcNOS DC version 4.2.

Tomahawk supports only wrr setting between uc and mc queues.

### Examples

```
(config)#set qos wrr uc 30 non-uc 40
(config)#no set qos wrr
```

# set queue

Use this command for matching traffic classes set action as change cos in the egress packet to the prescribed value.

Use the `no` command to remove the assigned value from the class.

### Command Syntax

```
set queue <0-7>
no set queue
```

### Parameters

| | |
|---|---|
| `<0-7>` | Specify queue value to assign for this class of traffic |

### Default

No default value is specified

### Command Mode

Policy-map-class qos mode

### Applicability

'This command was introduced before OcNOS version 1.3.

This command applies only to the Trident II, Trident II+, and Tomahawk platforms.

### Examples

```
(config)# policy-map my_policy1
(config-pmap-qos)# class traffic_class2
(config-pmap-c-qos)# set queue 4
```

# shape

Use this command to configure shaping on an egress queue to impose a maximum rate on it.

Use the `no command` to remove a shaping configuration.

### Command Syntax

```
shape (<1-1000000000> (kbps|mbps|gbps) | percent <1-100>)
no shape
```

### Parameters

| | |
|---|---|
| `<1-1000000000>` | Specify an optional keyword. Shaping is based on an average rate. Average rate for shaping in the range of `<1-1000000000>` |
| `kbps` | Specify the units of kbps per second. |
| `mbps` | Specify the units of mbps per second. |
| `gbps` | Specify the units of gbps per second. |
| `percent <1-100>` | Specify the percentage from 1 to 100. |

### Default

No default value is specified

### Command Mode

Policy-class-map mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)# policy-map type queuing my_queue
(config-pmap-que)# class type queuing PQOS
(config-pmap-c-que)# shape percent 25
```

# shape rate

Use this command to configure shaping on an egress port to impose a maximum rate on it.

Use the `no` form of the command to remove a shaping configuration.

### Command Syntax

```
shape rate <1-1000000000> (kbps|mbps|gbps) burst SHAPE_BURST_RATE
no shape rate
```

### Parameters

| | |
|---|---|
| `<1-1000000000>` | Average rate for shaping in the following range:<br>8 kbps to 1000 gbps for Trident3<br>1 kbps to 1000 gbps for other XGS platforms |
| `kbps` | Units of kbps per second. |
| `mbps` | Units of mbps per second. |
| `gbps` | Units of gbps per second. |
| `SHAPE_BURST_RATE` | The burst size allowed by the traffic shaper. It determines the maximum amount of data to send or receive before shaping the traffic per the specified rate..<br>The burst value in kbits in the following range::<br><2-1000000> for Trident3 and tomahwak<br><1-1000000> for other XGS platforms<br>The limitation of 1000000 kbits is often a default or practical limit set by the network device or software. This limit ensures that bursts of traffic beyond this size are controlled to prevent network congestion or degradation of service quality. It is the maximum value supported by the hardware. |

### Default

NA

### Command Mode

Interface mode

### Applicability

This command was introduced in OcNOS version 1.3.8.

### Examples

```
(config)#interface xe11
(config-if)#shape rate 100 mbps burst 20
```

# show class-map

Use this command to display qos/queuing class maps.

### Command Syntax

```
show class-map (type (qos|queuing)|) (NAME|)
```

### Parameters

| | |
|---|---|
| `type qos` | Specify the QoS type class map |
| `type queuing` | Specify the queuing type class map |
| `NAME` | Specify the named class map |

### Command Mode

Privileged executive mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
#show class-map type qos
Type qos class-maps
===================
class-map type qos 1234
match cos 3
class-map type qos 2345
QOS-ACCESS-LIST-NAME: 101


#show class-map 1234
Type qos class-maps
===================
class-map type qos 1234
match cos 3
```

# show cpu-queue details

Use this command to display details about CPU queue for QoS.

### Command Syntax

```
show cpu-queue details
```

### Parameters

None

### Command Mode

Exec mode

### Applicability

This command was introduced before OcNOS version 1.3.8

### Example

```
#show cpu-queue details
* - Can not configure the parameter
Cpu queue       Rate In PPS             Lossy Status            Monitor Status
Name      Configured  Default     Configured  Default     Configured  Default
========= ==========  =======     ==========  ==========  ==========  ===========
sflow     10000       32000           -       *lossy      no-monitor   monitor
bgp           -       1500            -        lossless       -        monitor
vrrp          -       500             -        lossless       -        monitor
rip           -       500             -        lossless       -        monitor
ospf      0           2000        lossy        lossless   monitor      monitor
dhcp          -       100             -        lossy          -        no-monitor
nd        200         6000        lossless     lossless   monitor      monitor
pim           -       4000            -       *lossy          -       *no-monitor
arp       100         6000        lossy        lossless   no-monitor   monitor
igmp          -       4000            -       *lossy          -       *no-monitor
bpdu      1000        10000           -        lossless   monitor      monitor
ccm           -       500             -        lossy          -        no-monitor
bfd           -       2000            -        lossy          -        no-monitor
ptp           -       1000            -        lossy          -        no-monitor
isis          -       500             -        lossless       -        monitor
trill-isis    -       1000            -        lossless       -        monitor
acl           -       200             -       *lossy          -       *no-monitor
vxlan         -       500             -        lossy          -        monitor
```

Table 3 explains the output fields.

**Table 3: show CPU Queue fields**

| Entry | Description |
|---|---|
| CPU queue name | Name of the CPU queue |
| Rate In PPS | At which packets are successfully delivered |
| `Lossy Status` | Status of the network lossy or lossless |
| `Monitor Status` | Status of the network monitor |

# show interface counters

Use this command to see the interface counters.

Note: VPLS BUM traffic will not be read in the interface queue statistics.

### Command Syntax

```
show interface IFNAME counters queue-stats | (statistics (type queuing rate))
```

### Parameters

`IFNAME` Interface name

`statistics (type queuing rate)`. Displays statistics of the particular queuing rate type.

### Command Mode

Exec

### Applicability

This command was introduced in OcNOS version 3.0.

### Examples

```
#show interface xe1 counters queue-stats
E - Egress, I - Ingress, Q-Size is in bytes
+---+------+--------+---------+---------+-----------+
| Q | Q-Sz | Tx pkt | Tx byte | Drp pkt | Drop byte |
+---+------+--------+---------+---------+-----------+
q0   629160 100      12000     0         0
q1   629160 0        0         0         0
q2   629160 0        0         0         0
q3   629160 0        0         0         0
q4   629160 0        0         0         0
q5   629160 0        0         0         0
q6   629160 0        0         0         0
q7   629160 0        0         0         0
```

# show policy-map

Use this command to display:

1. Type qos/queuing policy-map
2. Non zero statistics for type qos or queuing classes on interfaces

### Command Syntax

```
show policy-map statistics type qos
show policy-map statistics type queuing default (rate (gbps|kbps|mbps)|)
```

### Parameters

| | |
|---|---|
| `type qos` | Type qos policy-map |
| `statistics` | Displays QoS statistics. |
| `type queuing` | Type queuing policy-maps |
| `default` | Default queue of the port |
| `rate` | Show instantaneous rate (gbps/kbps/mbps) |

### Command Mode

Privileged executive and Configure mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
P1#show policy-map statistics
Type qos class-map statistics:
+--------------------------------+-----------------+-----------------+-----------------+------------------+
|           Class-map            |    Match pkts   |   Match bytes   |   Dropped pkts  |   Dropped Bytes  |
+--------------------------------+-----------------+-----------------+-----------------+------------------+
ce29/1
C1                              100               6796              0                 0

Type queuing class-map statistics:
+--------------------------------+-----------------+-----------------+-----------------+------------------+
|           Class-map            |    Total pkts   |   Total bytes   |   Dropped pkts  |   Dropped Bytes  |
+--------------------------------+-----------------+-----------------+-----------------+------------------+
ce1/1
q7                              1689              108888            0                 0
ce2/1
q6                              8                 912               0                 0
ce5/1
q6                              8                 912               0                 0
ce29/1
q7                              104               7052              0                 0

P1#show policy-map statistics type qos
+--------------------------------+-----------------+-----------------+-----------------+------------------+
|           Class-map            |    Match pkts   |   Match bytes   |   Dropped pkts  |   Dropped Bytes  |
+--------------------------------+-----------------+-----------------+-----------------+------------------+
ce29/1
C1                              100               6796              0                 0
```

# show policy-map interface

Use this command to display the statistics and the configurations of the input and output policies that are attached to an interface.

### Command Syntax

```
show policy-map interface (NAME (type (qos (input | output |)| queuing)|
  (statistics (class NAME (type (qos | queuing (rate|)) | type (qos | queuing (rate
  (gbps|kbps|mbps)|)))) | class NAME)|brief)
```

### Parameters

| | |
|---|---|
| `interface IFNAME` | Specifies the interface name for which to display policy maps (maximum length 32 characters). |
| `type qos` | (Optional) Displays QoS policy maps for the specified interface. |
| `type qos input` | (Optional) Displays QoS input policy maps for the specified interface. |
| `type qos output` | (Optional) Displays QoS output policy maps for the specified interface. |
| `statistics class` | (Optional) Displays statistics of the particular class. |
| `statistics class NAME` | (Optional) Name of the particular class. |
| `statistics type` | (Optional) Displays statistics of the particular type. |
| `statistics type qos` | (Optional) Displays statistics of the particular QoS type. |
| `statistics type queing rate (gbps\|kbps\|mbps)` | (Optional) Displays statistics of the particular queuing rate type in gbps or bps or mbps. |
| `interface class NAME` | (Optional) Displays statistics of the particular class. |
| `type queuing` | (Optional) Displays queuing policy-maps for the specified interface. |
| `brief` | Displays all QoS and queuing policy maps for the specified interface. |

### Command Mode

Privileged executive and Configure mode

### Applicability

Introduced before OcNOS version 1.3.

### Examples

```
OcNOS#show policy-map interface xe19/1
```

```
Interface xe19/1
Global statistics status : enabled

Service-policy (qos) input : p1
--------------------------------
 Class-map (qos): c1 (match all)
 match vlan 2
 police cir 2 mbps
      matched    : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (qos): c3 (match all)
 police cir 2 mbps
      matched    : 2172408 packets, 2172408000 bytes
      dropped    : 2128959 packets, 2128959000 bytes


Service-policy (queuing) output: default-out-policy
--------------------------------
 Class-map (queuing): q0
 priority level 1
 bandwidth percent 1
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q1
 priority level 1
 bandwidth percent 1
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q2
 priority level 1
 bandwidth percent 1
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q3
 priority level 1
 bandwidth percent 1
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q4
 priority level 1
 bandwidth percent 1
      output     : 0 packets, 0 bytes
      dropped    : 0 packets, 0 bytes


 Class-map (queuing): q5
 priority level 1
```

```
bandwidth percent 1
     output     : 0 packets, 0 bytes
     dropped    : 0 packets, 0 bytes


Class-map (queuing): q6
 priority level 1
bandwidth percent 1
     output     : 0 packets, 0 bytes
     dropped    : 0 packets, 0 bytes


Class-map (queuing): q7
priority level 1
bandwidth percent 1
     output     : 1445 packets, 92536 bytes
     dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q0
     output     : 0 packets, 0 bytes
     dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q1
     output     : 0 packets, 0 bytes
     dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q2
     output     : 0 packets, 0 bytes
     dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q3
     output     : 0 packets, 0 bytes
     dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q4
     output     : 0 packets, 0 bytes
     dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q5
     output     : 0 packets, 0 bytes
     dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q6
     output     : 0 packets, 0 bytes
     dropped    : 0 packets, 0 bytes


Class-map (queuing): mc-q7
     output     : 0 packets, 0 bytes
     dropped    : 0 packets, 0 bytes
```

# show storm-control

Use the command to verify the BUM rate limit configured.

### Command Syntax

```
show storm-control (INTERFACE-NAME|)
```

### Parameters

| | |
|---|---|
| INTERFACE-NAME | Specifies the interface name for which to display the storm control details |

### Command Mode

Privileged executive mode

### Applicability

Introduced before OcNOS version 1.3.

### Example

```
OcNOS#show storm-control xe2
*The hardware applicable value is displayed
Port          BcastLevel    McastLevel    DlfLevel      Discards
xe2           100.0000%     100.0000%     100.0000%     0

OcNOS#show storm-control
*The hardware applicable value is displayed
Port   BcastLevel(burst)     McastLevel(burst)    DlfLevel(burst)    Discards
xe64/2 1000.000 fps          2000.000 fps         5000.000 fps       7144132
```

# show qos-profile

Use this command to show the all configured QoS profiles configurations like type, name, maps configured except for the default maps, attached info (to how many interfaces it is attached) etc,

### Command Syntax

```
show qos-profile (type (cos-to-queue | dscp-encap | dscp-to-dscp | dscp-to-queue |
exp-to-queue | queue-to-exp | precedence-to-precedence | precedence-to-queue |
queue-color-to-cos |ingress-pg-map | egress-dynamic-ecn)(interface NAME| all)
```

### Parameters

| | |
|---|---|
| `all` | Displays all configured profiles |
| `cos-to-queue` | Displays profile for cos to Traffic-Class map |
| `dscp-encap` | Displays profile for dscp encapsulation map |
| `dscp-to-dscp` | Displays profile for in Dscp to Dscp map |
| `dscp-to-queue` | Displays profile for dscp to Traffic-Class map |
| `exp-to-queue` | Displays profile for exp to Traffic-Class map |
| `precedence-to-precedence` | Displays profile for precedence to precedence map |
| `precedence-to-queue` | Displays profile for precedence to Traffic-Class map |
| `queue-color-to-cos` | Displays profile for Traffic-Class color to cos map |
| `ingress-pg-map` | Specify the profile for ingress priority group map. In the show output, the `xoff-threshold` is displayed only when configured. If not configured, the dynamic-threshold is displayed, as it is the default setting for PG queues, which includes pre-set PG and `xon-offset` values. |
| `egress-dynamic-ecn` | Specify the profile for egress dynamic ECN map |
| `interface NAME` | Profile map name (maximum 32 characters) |

### Command Mode

Privileged exec

Configuration Mode

Interface Mode

### Applicability

This command was introduced in OcNOS DC version 4.2. The `egress-dynamic-ecn` option is added in OcNOS version 7.0.0. It applies only for Tomahawk 5 (TH5) platforms.

### Examples

```
OcNOS#show qos-profile in xe1
profile name: default
 profile type: cos-to-queue (Ingress)
 mapping:
 ---------------+----------------- | ---------------+-----------------
      INPUT     |     OUTPUT       |      INPUT     |     OUTPUT
 ---------------+----------------- | ---------------+-----------------
```

```
   COS   |  DEI   | Queue |  Color    |   COS   |  DEI   | Queue |  Color
 --------+--------+-------+---------- | --------+--------+-------+---------
  0        0        0       green     |  0        1        0       yellow
  1        0        1       green     |  1        1        1       yellow
  2        0        2       green     |  2        1        2       yellow
  3        0        3       green     |  3        1        3       yellow
  4        0        4       green     |  4        1        4       yellow
  5        0        5       green     |  5        1        5       yellow
  6        0        6       green     |  6        1        6       yellow
  7        0        7       green     |  7        1        7       yellow

profile name: default
 profile type: queue-color-to-cos (Egress)
 Status: Inactive
mapping:
 -----------------+-------- | -----------------+-------- | -----------------+----
----
      INPUT       | OUTPUT  |       INPUT      | OUTPUT  |       INPUT      |
OUTPUT
 -----------------+-------- | -----------------+-------- | -----------------+----
----
  Queue | Color   | COS     |  Queue | Color   | COS     |  Queue | Color   | COS
 -------+---------+-------- | -------+---------+-------- | -------+---------+----
----
  0        green     0       |  0        yellow    0       |  0        red       0
  1        green     1       |  1        yellow    1       |  1        red       1
  2        green     2       |  2        yellow    2       |  2        red       2
  3        green     3       |  3        yellow    3       |  3        red       3
  4        green     4       |  4        yellow    4       |  4        red       4
  5        green     5       |  5        yellow    5       |  5        red       5
  6        green     6       |  6        yellow    6       |  6        red       6
  7        green     7       |  7        yellow    7       |  7        red       7

OcNOS#show qos-profile ingress-pg-map interface ethernet0
profile name: pg1
 mapping:
  priority-group 0  xon-offset 48  xoff-threshold 32   dynamic-threshold 7
  priority-group 1  xon-offset 200  xoff-threshold 400   dynamic-threshold 2
  priority-group 2  xon-offset 48  xoff-threshold 32   dynamic-threshold 7
  priority-group 3  xon-offset 48  xoff-threshold 32   dynamic-threshold 7
  priority-group 4  xon-offset 1000  xoff-threshold 2400   dynamic-threshold 0
  priority-group 5  xon-offset 48  xoff-threshold 32   dynamic-threshold 7
  priority-group 6  xon-offset 48  xoff-threshold 32   dynamic-threshold 7
  priority-group 7  xon-offset 48  xoff-threshold 32   dynamic-threshold 7

OcNOS#show qos-profile ingress-pg-map all
qos profile ingress-pg-map default
 priority-group 0 xon-offset 48 xoff-threshold 32 dynamic-threshold 7
 priority-group 1 xon-offset 48 xoff-threshold 32 dynamic-threshold 7
 priority-group 2 xon-offset 48 xoff-threshold 32 dynamic-threshold 7
 priority-group 3 xon-offset 48 xoff-threshold 32 dynamic-threshold 7
 priority-group 4 xon-offset 48 xoff-threshold 32 dynamic-threshold 7
 priority-group 5 xon-offset 48 xoff-threshold 32 dynamic-threshold 7
 priority-group 6 xon-offset 48 xoff-threshold 32 dynamic-threshold 7
 priority-group 7 xon-offset 48 xoff-threshold 32 dynamic-threshold 7
!
qos profile ingress-pg-map pg1
```

```
 priority-group 0 xon-offset 48 xoff-threshold 32 dynamic-threshold 7
 priority-group 1 xon-offset 200 xoff-threshold 400 dynamic-threshold 2
 priority-group 2 xon-offset 48 xoff-threshold 32 dynamic-threshold 7
 priority-group 3 xon-offset 48 xoff-threshold 32 dynamic-threshold 7
 priority-group 4 xon-offset 1000 xoff-threshold 2400 dynamic-threshold 0
 priority-group 5 xon-offset 48 xoff-threshold 32 dynamic-threshold 7
 priority-group 6 xon-offset 48 xoff-threshold 32 dynamic-threshold 7
 priority-group 7 xon-offset 48 xoff-threshold 32 dynamic-threshold 7
!
OcNOS#show qos-profile ingress-pg-map interface ethernet0
profile name: pg1
 mapping:
  priority-group 0  xon-offset 48  xoff-threshold 32   dynamic-threshold 7
  priority-group 1  xon-offset 200  xoff-threshold 400   dynamic-threshold 2
  priority-group 2  xon-offset 48  xoff-threshold 32   dynamic-threshold 7
  priority-group 3  xon-offset 48  xoff-threshold 32   dynamic-threshold 7
  priority-group 4  xon-offset 1000  xoff-threshold 2400   dynamic-threshold 0
  priority-group 5  xon-offset 48  xoff-threshold 32   dynamic-threshold 7
  priority-group 6  xon-offset 48  xoff-threshold 32   dynamic-threshold 7
  priority-group 7  xon-offset 48  xoff-threshold 32   dynamic-threshold 7
```

To display the Dynamic-ECN profile mapping deatils:

```
OcNOS#sh qos-profile egress-dynamic-ecn all
qos profile egress-dynamic-ecn eg1
 queue 2 on-offset 70000 off-offset 90000 bytes
 queue 3 on-offset 100 off-offset 200 kbytes
 queue 6 on-offset 40 off-offset 50 kbytes
!

OcNOS#show qos-profile egress-dynamic-ecn interface ethernet1
profile name: eg1
 mapping:
  queue 2  on-offset 70000  off-offset 90000   bytes
  queue 3  on-offset 100  off-offset 200   kbytes
  queue 6  on-offset 40  off-offset 50   kbytes
```

To display the Dynamic-ECN profile mapping deatils:

```
OcNOS#sh qos-profile egress-dynamic-ecn all
qos profile egress-dynamic-ecn eg1
 queue 2 on-offset 70000 off-offset 90000 bytes
 queue 3 on-offset 100 off-offset 200 kbytes
 queue 6 on-offset 40 off-offset 50 kbytes
!

OcNOS#show qos-profile egress-dynamic-ecn interface ethernet1
profile name: eg1
 mapping:
  queue 2  on-offset 70000  off-offset 90000   bytes
  queue 3  on-offset 100  off-offset 200   kbytes
queue 6  on-offset 40  off-offset 50   kbytes
```

# show qos-profile interface

Use this command to show the all configured QoS profiles configurations attached on an interface.

### Command Syntax

```
show qos-profile interface NAME
```

### Parameters

| | |
|---|---|
| NAME | Profile map name (maximum 32 characters) |

### Command Mode

Privileged exec, config, interface, class-map, policy-map and policy-map-class

### Applicability

This command was introduced in OcNOS-SP version 1.0.

### Examples

```
(config)#show qos-profile interface xe11
 profile name: cos-map
 profile type: cos-to-queue
 mapping:
 qos profile cos-to-queue cos-map
 cos 0 dei 0 queue 0 color green
 cos 0 dei 1 queue 0 color yellow
 cos 0 queue 0
 cos 1 dei 0 queue 1 color green
 cos 1 dei 1 queue 1 color yellow
 cos 1 queue 1
 cos 2 dei 0 queue 2 color green
 cos 2 dei 1 queue 2 color yellow
 cos 2 queue 2
 cos 3 dei 0 queue 3 color green
 cos 3 dei 1 queue 3 color yellow
 cos 3 queue 3
 cos 4 dei 0 queue 4 color green
 cos 4 dei 1 queue 4 color yellow
 cos 4 queue 4
 cos 5 dei 0 queue 5 color green
 cos 5 dei 1 queue 5 color yellow
 cos 5 queue 5
 cos 6 dei 0 queue 6 color green
```

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# show queuing interface

Use this command to dispay the configurations of queues attached to an interface.

### Command Syntax

```
show queuing interface NAME
```

### Parameters

| | |
|---|---|
| NAME | Interface name. |

### Command Mode

Privileged exec & config mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
# show queuing interface xe1/1
Egress Queuing for Ethernet xe1/1 [System]
-------------------------------------------------------------------------------------------------------
L0              L1              L2              Group PrioLevel   Shape Bandwidth
-------------------------------------------------------------------------------------------------------
q0                                                -      High        - -
q1                                                -      High        - -
q2                                                -      High        - -
q3                                                -      High        - -
q4                                                -      High        - -
q5                                                -      High        - -
q6                                                -      High        - -
q7                                                -      High        - -
```

# show running-config qos

Use this command to show the user configured QoS configurations.

### Command Syntax

```
show running-config qos (all|)
```

### Parameters

| | |
|---|---|
| `all` | Show all QoS related configuration information including all defaults. |

### Command Mode

Exec, config, interface, class-map, policy-map and policy-map-class

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
#show running-config qos
qos enable
!

#show running-config qos  all
!
qos enable
!
 qos profile cos-to-queue default
 cos 0 dei 0 queue 0 color green
 cos 0 dei 1 queue 0 color yellow
 cos 0 queue 0
 cos 1 dei 0 queue 1 color green
 cos 1 dei 1 queue 1 color yellow
 cos 1 queue 1
 cos 2 dei 0 queue 2 color green
 cos 2 dei 1 queue 2 color yellow
 cos 2 queue 2
 cos 3 dei 0 queue 3 color green
 cos 3 dei 1 queue 3 color yellow
 cos 3 queue 3
 cos 4 dei 0 queue 4 color green
 cos 4 dei 1 queue 4 color yellow
 cos 4 queue 4
 cos 5 dei 0 queue 5 color green
 cos 5 dei 1 queue 5 color yellow
 cos 5 queue 5
 cos 6 dei 0 queue 6 color green
 cos 6 dei 1 queue 6 color yellow
 cos 6 queue 6
 cos 7 dei 0 queue 7 color green
 cos 7 dei 1 queue 7 color yellow
 cos 7 queue 7
!
qos profile queue-color-to-cos default
```

```
 queue 0 color green cos 0
 queue 0 color yellow cos 0
 queue 0 color red cos 0
 queue 0 color all cos 0
 queue 1 color green cos 1
 queue 1 color yellow cos 1
 queue 1 color red cos 1
 queue 1 color all cos 1
 queue 2 color green cos 2
 queue 2 color yellow cos 2
 queue 2 color red cos 2
 queue 2 color all cos 2
 queue 3 color green cos 3
 queue 3 color yellow cos 3
 queue 3 color red cos 3
 queue 3 color all cos 3
 queue 4 color green cos 4
queue 4 color yellow cos 4
 queue 4 color red cos 4
 queue 4 color all cos 4
 queue 5 color green cos 5
 queue 5 color yellow cos 5
 queue 5 color red cos 5
 queue 5 color all cos 5
 queue 6 color green cos 6
 queue 6 color yellow cos 6
 queue 6 color red cos 6
 queue 6 color all cos 6
 queue 7 color green cos 7
 queue 7 color yellow cos 7
 queue 7 color red cos 7
 queue 7 color all cos 7
!
qos profile dscp-to-queue default
 dscp 0 queue 0 color green
 dscp 1 queue 0 color green
 dscp 2 queue 0 color green
 dscp 3 queue 0 color green
 dscp 4 queue 0 color green
 dscp 5 queue 0 color green
 dscp 6 queue 0 color green
 dscp 7 queue 0 color green
 dscp 8 queue 1 color green
 dscp 9 queue 1 color green
 dscp 10 queue 1 color green
 dscp 11 queue 1 color green
 dscp 12 queue 1 color yellow
 dscp 13 queue 1 color green
 dscp 14 queue 1 color red
 dscp 15 queue 1 color green
 dscp 16 queue 2 color green
 dscp 17 queue 2 color green
 dscp 18 queue 2 color green
 dscp 19 queue 2 color green
 dscp 20 queue 2 color yellow
 dscp 21 queue 2 color green
 dscp 22 queue 2 color red
```

```
 dscp 23 queue 2 color green
 dscp 24 queue 3 color green
 dscp 25 queue 3 color green
 dscp 26 queue 3 color green
 dscp 27 queue 3 color green
 dscp 28 queue 3 color yellow
dscp 29 queue 3 color green
 dscp 30 queue 3 color red
 dscp 31 queue 3 color green
 dscp 32 queue 4 color green
 dscp 33 queue 4 color green
 dscp 34 queue 4 color green
 dscp 35 queue 4 color green
 dscp 36 queue 4 color yellow
 dscp 37 queue 4 color green
 dscp 38 queue 4 color red
 dscp 39 queue 4 color green
 dscp 40 queue 5 color green
 dscp 41 queue 5 color green
 dscp 42 queue 5 color green
 dscp 43 queue 5 color green
 dscp 44 queue 5 color green
 dscp 45 queue 5 color green
 dscp 46 queue 5 color green
 dscp 47 queue 5 color green
 dscp 48 queue 6 color green
 dscp 49 queue 6 color green
 dscp 50 queue 6 color green
 dscp 51 queue 6 color green
 dscp 52 queue 6 color green
 dscp 53 queue 6 color green
 dscp 54 queue 6 color green
 dscp 55 queue 6 color green
 dscp 56 queue 7 color green
 dscp 57 queue 7 color green
 dscp 58 queue 7 color green
 dscp 59 queue 7 color green
 dscp 60 queue 7 color green
 dscp 61 queue 7 color green
 dscp 62 queue 7 color green
 dscp 63 queue 7 color green
!
qos profile queue-color-to-dscp default
 queue 0 color green dscp 0
 queue 0 color yellow dscp 0
 queue 0 color red dscp 0
 queue 0 color all dscp 0
 queue 1 color green dscp 10
 queue 1 color yellow dscp 12
 queue 1 color red dscp 14
 queue 1 color all dscp 8
 queue 2 color green dscp 18
 queue 2 color yellow dscp 20
 queue 2 color red dscp 22
 queue 2 color all dscp 16
 queue 3 color green dscp 26
 queue 3 color yellow dscp 28
```

```
 queue 3 color red dscp 30
 queue 3 color all dscp 24
 queue 4 color green dscp 34
 queue 4 color yellow dscp 36
 queue 4 color red dscp 38
 queue 4 color all dscp 32
 queue 5 color green dscp 40
 queue 5 color yellow dscp 40
 queue 5 color red dscp 40
 queue 5 color all dscp 40
 queue 6 color green dscp 48
 queue 6 color yellow dscp 48
 queue 6 color red dscp 48
 queue 6 color all dscp 48
 queue 7 color green dscp 56
 queue 7 color yellow dscp 56
 queue 7 color red dscp 56
 queue 7 color all dscp 56
!
policy-map type queuing default default-out-policy
 class type queuing default q0
  priority
  exit
 class type queuing default q1
  priority
  exit
class type queuing default q2
  priority
  exit
 class type queuing default q3
  priority
  exit
 class type queuing default q4
  priority
  exit
 class type queuing default q5
  priority
  exit
 class type queuing default q6
  priority
  exit
 class type queuing default q7
  priority
  exit
!
interface xe1/1
 service-policy type queuing default default-out-policy
!
interface xe1/2
 service-policy type queuing default default-out-policy
!
interface xe1/3
 service-policy type queuing default default-out-policy
!
interface xe1/4
 service-policy type queuing default default-out-policy
!
```

```
interface xe2/1
 service-policy type queuing default default-out-policy
```

# show running-config cpu-queue

Use this command to display details about CPU queue information based on processes running.

### Command Syntax

```
show running-config cpu-queue
```

### Parameters

None

### Command Mode

Exec mode

### Applicability

This command was introduced before OcNOS version 1.3.8

### Example

```
#show running-config | in cpu-queue
cpu-queue sflow rate 10000 no-monitor
cpu-queue ospf rate 0 lossy monitor
cpu-queue nd rate 200 lossless monitor
cpu-queue arp rate 100 lossy no-monitor
cpu-queue bpdu rate 1000 monitor
```

# storm-control

Use this command to set the rising threshold level for broadcast, multicast, or destination lookup failure traffic. The storm control action occurs when traffic utilization reaches this level.

Storm control is used to block the forwarding of unnecessary flooded traffic. A packet storm occurs when a large number of broadcast packets are received on a port. Forwarding these packets can cause the network to slow down or time out.

Use the `no` form of this command to disable storm control.

Note:

- Granularity of storm-control is around 18 kbps for lower values and it increases when configured with increase in rate. Deviation is expected +-7/8 % of rate configured for lower value rate changes.
- If the burst-size limit is set too low, too many packets will be subjected to rate limiting, and the desired rate limit will not be achieved. The burst size needs to be large enough to accommodate the maximum transmission unit (MTU) size of the packets.
- The `storm-control dlf` command applies rate limiting to all Broadcast, Unknown Unicast, and Multicast (BUM) traffic, not just the unknown unicast packets that typically trigger DLF.

### Command Syntax

```
storm-control (errdisable|((broadcast|multicast|dlf) (level LEVEL | <0-4294967294>
  (kbps|mbps|gbps|fps) burst-size <32-128000>)))
no storm-control (errdisable|broadcast|multicast|dlf)
```

### Parameters

| | |
|---|---|
| `errdisable` | Error disable interface on storm control |
| `broadcast` | Broadcast rate limiting. |
| `multicast` | Multicast rate limiting. |
| `dlf` | Destination lookup failure (DLF) limiting. |
| `level` | Sets the percentage of the threshold. |
| `LEVEL` | The percentage of the threshold; percentage of the maximum speed (pps) of the interface <0.0000-1000.0000>. |
| `<0-4294967294>` | Sets absolute threshold value <0-1000000000> |
| `kbps` | Specifies the units of Kilobits per second. |
| `mbps` | Specifies the units of Megabits per second. |
| `gbps` | Specifies the units of Gigabits per second. |
| `fps` | Specifies the units of Frames per second. |
| `burst-size` | Set burst size |
| `<32-128000>` | Value of burst in kbps |

### Default

Disabled

### Command Mode

Interface mode

### Applicability

This command was introduced in OcNOS version 3.0.

### Examples

```
#configure terminal
(config)#interface xe1
(config-if)#storm-control broadcast level 30

(config)#interface xe2
(config-if)#storm-control multicast level 30

(config)#interface xe3
(config-if)#storm-control multicast 300 mbps

(config)#interface xe4
(config-if)#no storm-control multicast
```

# trust dscp

Use this command to use dscp value to decide queue mapping for packets in Layer 2 interfaces.

The no parameter with this command un-sets trust dscp.

### Command Syntax

```
trust dscp
no trust dscp
```

### Parameters

None

### Default

By default, trust dscp is disabled on L2 interface

### Command Mode

Interface mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
#configure terminal
(config)#int xe1/1
(config-if)#trust dscp
```

# wrr-queue weight

Use this command to set wrr-queue weight for a queue.

Use the priority command to un-set configured wrr configuration.

### Command Syntax

```
wrr-queue weight <1-127>
```

### Parameters

| | |
|---|---|
| <1-127> | wrr queue weight to be configured. |

### Default

No default value is specified

### Command Mode

Policy-class-map queuing Mode

### Applicability

This command was introduced before OcNOS version 1.3.

### Examples

```
(config)#policy-map type queuing default default-out-policy
(config-pmap-que-def)# class type queuing default q0
(config-pmap-c-que-def)#wrr-queue weight 2
(config-pmap-c-que-def)#priority
```

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