



Extreme OS ONE SR v22.2.2.0 QoS Configuration Guide

Traffic Management

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Abstract

The *Extreme OS ONE SR QoS Configuration Guide* version 22.2.2.0 is designed for IT professionals and network engineers and contains advanced procedures for deploying and managing Quality of Service (QoS) across complex, multiplatform networks. This guide includes procedures for fabric QoS for both access and fabric traffic to enable comprehensive traffic classification, marking, and prioritization capabilities for both traditional access traffic and Virtual Extensible LAN (VxLAN) fabric traffic. This guide also includes procedures for egress port scheduling, which intelligently prioritizes and schedules packet transmission at egress ports, ensuring optimal network performance and traffic flow management.



Preface

Read the following topics to learn about:

- The meanings of text formats used in this document.
- Where you can find additional information and help.
- How to reach us with questions and comments.

Text Conventions

Unless otherwise noted, information in this document applies to all supported environments for the products in question. Exceptions, like command keywords associated with a specific software version, are identified in the text.

When a feature, function, or operation pertains to a specific hardware product, the product name is used. When features, functions, and operations are the same across an entire product family, such as Extreme Networks switches, the product is referred to as *the switch*.

Table 1: Notes and warnings






Icon	Notice type	Alerts you to..
	Tip	Helpful tips and notices for using the product
	Note	Useful information or instructions
	Important	Important features or instructions
	Caution	Risk of personal injury, system damage, or loss of data
	Warning	Risk of severe personal injury

Table 2: Text

Convention	Description
screen displays	This typeface indicates command syntax, or represents information as it is displayed on the screen.
The words <i>enter</i> and <i>type</i>	When you see the word <i>enter</i> in this guide, you must type something, and then press the Return or Enter key. Do not press the Return or Enter key when an instruction simply says <i>type</i> .
Key names	Key names are written in boldface, for example Ctrl or Esc . If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: Press Ctrl+Alt+Del
<i>Words in italicized type</i>	Italics emphasize a point or denote new terms at the place where they are defined in the text. Italics are also used when referring to publication titles.
NEW!	New information. In a PDF, this is searchable text.

Table 3: Command syntax

Convention	Description
bold text	Bold text indicates command names, keywords, and command options.
<i>italic text</i>	Italic text indicates variable content.
[]	Syntax components displayed within square brackets are optional. Default responses to system prompts are enclosed in square brackets.
{ x y z }	A choice of required parameters is enclosed in curly brackets separated by vertical bars. You must select one of the options.
x y	A vertical bar separates mutually exclusive elements.
< >	Nonprinting characters, such as passwords, are enclosed in angle brackets.
...	Repeat the previous element, for example, <i>member [member...]</i> .
\	In command examples, the backslash indicates a “soft” line break. When a backslash separates two lines of a command input, enter the entire command at the prompt without the backslash.

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- A description of any actions already taken to resolve the problem
- A description of your network environment (such as layout, cable type, other relevant environmental information)
- Network load at the time of trouble (if known)
- The device history (for example, if you have returned the device before, or if this is a recurring problem)
- Any related RMA (Return Material Authorization) numbers

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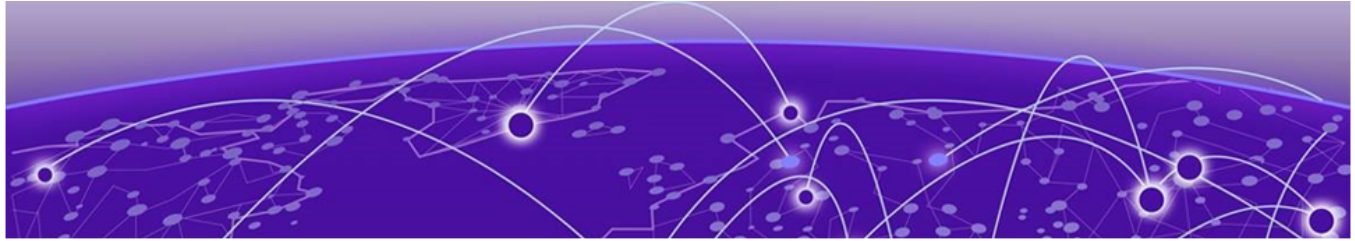
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- Improvements that would help you find relevant information.
- Broken links or usability issues.

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Provide as much detail as possible including the publication title, topic heading, and page number (if applicable), along with your comments and suggestions for improvement.



About This Document

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[Supported Platforms](#) on page 11

What's New in This Document

The following table describes information added to this guide for Extreme OS ONE Switching and Routing, release 22.2.2.0.

Feature	Description	Link
Drop Precedence (DP) and ACL based QoS	Updated the existing topic "Configure Access QoS" describing that Extreme OS ONE Switching and Routing supports ACL-based QoS configuration.	Configure Access QoS on page 17
	Updated the existing topic "Create a Traffic Class Map" with an example of creating a default traffic class map with drop-precedence.	Create a Traffic Class Map on page 17
	Updated the existing topic "Create a Remark Map" with an example of creating a default remark map with drop-precedence.	Create a Remark Map on page 19
Traffic-Class Map and Remark Map configuration using gNMI	New topic "gNMI Commands" for configuring the Traffic-Class Map and Remark Map.	gNMI Commands on page 23

For additional information, see the *Extreme OS ONE SR Release Notes*.

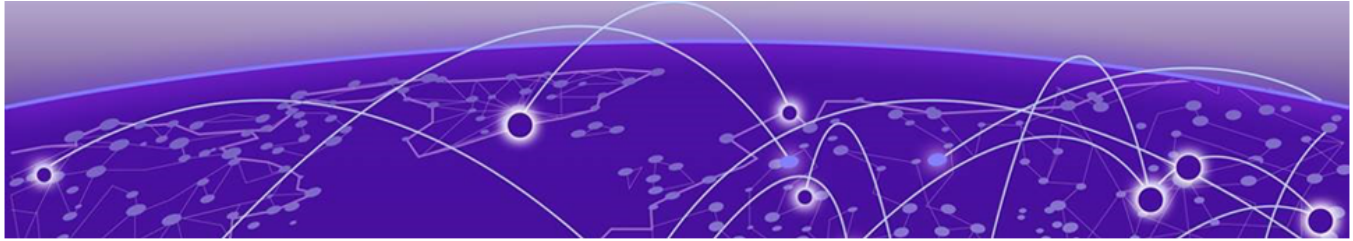
Supported Platforms

Extreme OS ONE Switching and Routing 22.2.1.0 and later releases support Extreme 8520, Extreme 8720, Extreme 8730, and Extreme 8820 hardware platforms.

**Note**

Although many software and hardware configurations are tested and supported for this release, all possible configurations and scenarios are beyond this document's scope.

For information about other releases, see the documentation for those releases.



Fabric QoS

- [Fabric QoS Overview](#) on page 12
- [Key Capabilities](#) on page 12
- [Access QoS and Fabric QoS Limitations](#) on page 13
- [Traffic Flow Processing](#) on page 16
- [Prerequisites](#) on page 16
- [Planning Considerations](#) on page 16
- [Best Practices](#) on page 16
- [CLI Commands](#) on page 17
- [Display Mappings in a Traffic Class Map](#) on page 28
- [Display Traffic Class Mappings for Remarking](#) on page 30

This chapter explains how to configure and manage Quality of Service (QoS) for both access and fabric traffic in your Extreme Networks environment. The Fabric QoS feature has comprehensive traffic classification, marking, and prioritization capabilities for both traditional access traffic and Virtual Extensible LAN (VxLAN) fabric traffic.

This feature supports QoS configuration for Multi-Chassis Link Aggregation Group (MLAG) tunnels using the same NVO level configuration. MLAG tunnel QoS follows the same uniform and pipe mode behaviors as standard VxLAN tunnels.

Fabric QoS Overview

Use this feature to perform the following tasks:

- Control traffic prioritization based on packet content.
- Manage VxLAN tunnel QoS behavior.
- Ensure proper traffic class derivation and packet remarking.



Note

QoS actions such as traffic class, DSCP, PCP, and drop precedence modification can also be applied through Access Control Lists (ACLs). See the *Extreme OS ONE SR Security Configuration Guide* for details.

Key Capabilities

The Fabric QoS implementation delivers three core functionalities.

Internal Traffic Class Derivation

The internal traffic class (TC) derivation feature delivers the following core functionality:

- Derives internal traffic classes and Drop Precedence (DP) from packet headers automatically.
- Supports both Layer 2 (CoS or PCP) and Layer 3 (DSCP) classification.
- Has flexible mapping options for different traffic types.

Egress Packet Remarking

The egress packet remarking feature delivers the following core functionality:

- Modifies VLAN Priority Code Point (PCP) values on outgoing packets.
- Updates IP Differentiated Services Code Point (DSCP) values.
- Maintains QoS markings consistent with your network policies.

VxLAN Tunnel QoS

The VxLAN tunnel QoS feature delivers the following core functionality:

- Controls QoS behavior during VxLAN encapsulation and decapsulation.
- Supports both uniform and pipe tunnel modes.
- Manages outer header DSCP marking for fabric traffic.

Access QoS and Fabric QoS Limitations

This feature has the following platform related limitations, feature related limitations, and scope.

Access QoS and Fabric QoS Platform Limitations

Access QoS (which is the foundation for fabric QoS) and fabric QoS have the following platform related limitations.

Extreme 8520 and Extreme 8720

The Extreme 8520 and Extreme 8720 platforms have the following limitations:

- Egress Layer 2 remarking is always enabled in hardware.
- DSCP remarking (in egress) in switched IP packets must be configured only at the interface level, not at the logical interface (subinterface) level.
- Trust DSCP without Trust CoS on a Layer 2 logical interface use the hardware default map (traffic class = PCP) for Layer 2 tagged packets without IP headers.
- Tunnel decapsulation traffic class derivation is applied at the physical interface level, so any routed packets on this interface have traffic classes derived using this map.

- After tunnel decapsulation, if a packet undergoes routing, then traffic class derivation is done from the ingress QoS map applied on the ingress Layer 3 interface on the tunnel terminating node.
- Untagged routed traffic with Trust DSCP on untagged logical interfaces without a user configured map derive the traffic class as 1 instead of basing it on IP packet DSCP. The workaround enables Trust DSCP on a Layer 2 logical interface.

Extreme 8730TD4

The Extreme 8730 platform has the following limitations:

- The following table shows how classes are mapped (because the hardware is limited to only four multicast queues) for unknown unicast and multicast traffic.

Traffic Class	Queue Number
0	0
1	0
2	1
3	1
4	2
5	2
6	3
7	3

- Updating the default traffic class value overwrites the CoS 0 (default or best effort) to traffic class mapping in hardware for default mode bridge domain members.
- Egress Layer 2 remarking is always enabled in hardware.
- For IP packet forwarding in a bridge domain, the Layer 2 logical interface QoS configuration is not applied to packets. Instead, it uses the Virtual Ethernet (VE) interface QoS configuration (if the VE interface is present).

Extreme 8820

The Extreme 8820 platform has the following limitations:

- Broadcast, unknown unicast, and multicast (BUM) traffic shows per queue statistics on source ports.
- Egress packet remarking is not supported because of hardware limitations.
- Shared user QoS maps affect all associated interfaces.
- User configuration of tunnel decapsulation mode is not supported.
- After tunnel decapsulation, if a packet undergoes routing, then the traffic class derivation is done from the ingress QoS map applied on the ingress Layer 3 interface on the tunnel terminating node.

Feature Limitations

Fabric QoS does not support the following features:

- User configurable maps for fabric (VxLAN) QoS.
- Policers, schedulers, shapers, and rate limiters.
- Pause frames and flow control.

Other Limitations

Access QoS and fabric QoS have the following additional limitations:

- (Non Extreme 8730 platforms only) Configuration for egress packet remarking is not supported for VLAN mode bridge domains. For logical interfaces (LIFs) associated to a VLAN mode bridge domain, a shared LIF is created internally. So specific LIF level behavior is shared across such LIFs on a port and cannot be controlled individually per LIF.
- To check the functionality of ingress maps on a VLAN mode bridge domain, configure QoS maps under the Ethernet or port channel interface (this loops through all LIFs under this interface and apply the same QoS configuration as that of the Ethernet or port channel interface to the LIFs).
- Any QoS configuration on VLAN mode bridge domain LIFs is ignored and is replayed if the same LIF is moved to a default mode bridge domain.
- Trust and remark DSCP settings on a Layer 2 LIF is not effective until a user map is configured and attached to the Layer 2 LIF.
- If any specific QoS configuration exists under a specific LIF that belongs to an Ethernet or port channel interface, then the QoS map applied on the Ethernet or port channel interface is not applied to this LIF until the specific configuration is deleted from the LIF.
- When QoS configuration is deleted on a LIF, configurations on Ethernet or port channel interfaces are applied to the LIF.
- (Extreme 8730 and Extreme 8820 platforms only) User configuration of tunnel decapsulation mode is not supported.

Scope

The fabric QoS implementation in this release focuses on per hop behavior (PHB) including:

- Packet classification and marking.
- Traffic class and drop precedence derivation.
- Basic remarking functionality.

Traffic Flow Processing

The system processes packets through these stages:

1. Ingress classification: Analyzes incoming packets and assigns internal traffic classes and drop precedence.
2. Internal processing: Routes or switches packets while preserving QoS information.
3. Egress processing: Applies remarking policies and queue assignments before transmission.
4. Tunnel processing: Handles VxLAN encapsulation and decapsulation with appropriate QoS treatment.

Prerequisites

Before configuring fabric QoS, make sure that you have:

- Administrative access to the switch management interface.
- An understanding of your network's QoS requirements.
- Existing VLAN and interface configurations (for access QoS).
- VxLAN tunnel configurations (for fabric QoS).

Planning Considerations

Before configuring fabric QoS, make sure to:

- Identify traffic types requiring specific QoS treatment.
- Determine appropriate traffic class mappings for your environment.
- Plan DSCP and CoS marking strategies.
- Consider bandwidth and latency requirements for different traffic classes.

Best Practices

Configuration Management

Use the following practices to manage your fabric QoS configuration:

- Document your QoS policies and mappings.
- Test configurations in a lab environment before deployment.
- Use consistent naming conventions for maps and policies.
- Regularly review and validate QoS behavior.

Performance Optimization

Use the following practices to optimize the performance of your fabric QoS configuration:

- Monitor traffic patterns and adjust classifications as needed.
- Consider platform specific queue limitations.
- Balance QoS granularity with operational simplicity.
- Plan for growth in traffic volumes and types.

Troubleshooting Preparation

Use the following practices to prepare for troubleshooting your fabric QoS configuration:

- Establish baseline QoS statistics before making changes.
- Keep configuration backups for quick restoration.
- Document known platform limitations for your environment.
- Train operations staff on QoS verification procedures.

CLI Commands

To enable fabric QoS, use the CLI to configure access QoS and then to configure fabric QoS. Access QoS and fabric QoS are different but related levels of QoS enforcement.

Access QoS is the foundation for fabric QoS. Access QoS sets the traffic classification and markings, and fabric QoS depends on those markings to enforce the correct forwarding behavior.

If traffic is not classified or marked properly at the access level, the fabric cannot give it the intended priority. Access QoS defines and enforces the contract at the edge, and fabric QoS honors that contract across the network.

Configure Access QoS

Access QoS controls how the system classifies and marks traffic on traditional Layer 2 and Layer 3 interfaces.

Extreme OS ONE Switching and Routing supports ACL-based QoS configuration. For detailed information, see the *Extreme OS ONE SR Security Configuration Guide* and the *Extreme OS ONE SR Command Reference Guide*.

Create a Traffic Class Map

Traffic class maps define how incoming packet markings translate to internal traffic classes.

You can define a nondefault drop precedence in a CoS-to-traffic-class map and in a DSCP-to-traffic-class map. This defines the likelihood of the device dropping a packet during congestion to discard less critical traffic selectively.

Drop precedence is a subclassification in a traffic class to manage queue congestion. When buffers are full, the device drops packets with higher precedence first, even if they occupy the same traffic class or queue as others.

1. From privileged EXEC mode, access global configuration mode.

```
device# configure terminal
```

2. Enter QoS configuration mode.

```
device(config)# qos
```

3. Configure a QoS map for packet classification.

```
device(config-qos)# traffic-class-map tcmapl
```

4. Define the CoS to traffic class entries in the QoS traffic class map.

```
device(config-qos-traffic-class-map-tcmapl)# cos 2 traffic-class 6 drop-precedence 2
```

Specifying a drop precedence value is optional. Use an integer of 0 (lowest drop probability) to 2 (highest). The default value is 0 if you do not specify this keyword.

5. Define the DSCP to traffic class entries in the QoS traffic class map.

```
device(config-qos-traffic-class-map-tcmapl)# dscp 24 traffic-class 6 drop-precedence 2
```

Specifying a drop precedence value is optional. Use an integer of 0 (lowest drop probability) to 2 (highest). The default value is 0 if you do not specify this keyword.

6. (Optional) Verify the traffic class map configuration.

```
device(config-qos-traffic-class-map-tcmapl)# do show running-config qos

qos
  traffic-class-map tcmapl
    cos 2 traffic-class 6 drop-precedence 2
    dscp 24 traffic-class 6 drop-precedence 2
  !
!
device#
```

- The following example creates a traffic class map named tcmapl:

```
device# configure terminal
device(config)# qos
device(config-qos)# traffic-class-map tcmapl
device(config-qos-traffic-class-map-tcmapl)# cos 2 traffic-class 6 drop-precedence 2
device(config-qos-traffic-class-map-tcmapl)# dscp 24 traffic-class 6 drop-precedence 2
device(config-qos-traffic-class-map-tcmapl)#
```

- The following example shows how to display a QoS configuration. In this example, two traffic class maps (tcmapl and tcl3map) are configured:

```
device(config-qos-traffic-class-map-tcmapl)# do show running-config qos

qos
  traffic-class-map tcmapl
    cos 2 traffic-class 6 drop-precedence 2
    dscp 24 traffic-class 6 drop-precedence 2
  !
  traffic-class-map tcl3map
    dscp 10 traffic-class 7
```

```

!
interface ethernet 0/3
  input
  trust dscp
  traffic-class-map tcl3map
!
!
interface ethernet 0/1 subinterface vlan 100
  input
  trust cos
  traffic-class-map tcmmap1
!
!
!
device#

```

- The following example displays a default traffic class map that is configured with drop precedence:

```

device# show qos traffic-class-map default

Default Traffic Class for map default: 1
COS-to-Traffic-Class Map: default
  COS           : 0 1 2 3 4 5 6 7
-----
Traffic-Class   : 1 0 2 3 4 5 6 7
Drop-Precedence : 0 0 0 0 0 0 0 0

DSCP-to-Traffic-Class Map: default (DSCP = d1d2)
d1: d2 0 1 2 3 4 5 6 7 8 9
-----
-----
0: 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 0/0 0/0
1: 0/0 0/0 0/0 0/0 0/0 0/0 2/0 2/0 2/0 2/0
2: 2/0 2/0 2/0 2/0 3/0 3/0 3/0 3/0 3/0 3/0
3: 3/0 3/0 4/0 4/0 4/0 4/0 4/0 4/0 4/0 4/0
4: 5/0 5/0 5/0 5/0 5/0 5/0 5/0 5/0 6/0 6/0
5: 6/0 6/0 6/0 6/0 6/0 6/0 7/0 7/0 7/0 7/0
6: 7/0 7/0 7/0 7/0
device#

```

Create a Remark Map

Remark maps specify how internal traffic classes map to outgoing packet markings.

- From privileged EXEC mode, access global configuration mode.

```
device# configure terminal
```

- Enter QoS configuration mode.

```
device(config)# qos
```

- Configure a map for remarking the QoS markings on packets.

```
device(config-qos)# remark-map rmrkmap1
```

- Define the traffic class to CoS entries for remarking.

```
device(config-qos-remark-map-rmrkmap1)# traffic-class 6 drop-precedence 2 cos 2
```

Specifying a drop precedence value is optional. Use an integer of 0 (lowest drop probability) to 2 (highest). The default value is 0 if you do not specify this keyword.

5. Define the traffic class to DSCP entries for remarking

```
device(config-qos-remark-map-rmrkmap1)# traffic-class 6 drop-precedence 2 dscp 1
```

Specifying a drop precedence value is optional. Use an integer of 0 (lowest drop probability) to 2 (highest). The default value is 0 if you do not specify this keyword.

6. (Optional) Verify the remark map configuration.

```
device(config-qos-remark-map-rmrkmap1)# do show running-config qos

qos
  remark-map rmrkmap1
    traffic-class 6 drop-precedence 2 cos 2
    traffic-class 6 drop-precedence 2 dscp 1
  !
!
device#
```

- The following example creates a remark map named `rmrkmap1` with drop-precedence:

```
device# configure terminal
device(config)# qos
device(config-qos)# remark-map rmrkmap1
device(config-qos-remark-map-rmrkmap1)# traffic-class 6 drop-precedence 2 cos 2
device(config-qos-remark-map-rmrkmap1)# traffic-class 6 drop-precedence 2 dscp 1
device(config-qos-remark-map-rmrkmap1)#
```

- The following example shows how to display a QoS configuration. In this example, a remark map named `rmrkmap1` is configured with drop-precedence:

```
device(config-qos-remark-map-rmrkmap1)# do show running-config qos

qos
  remark-map rmrkmap1
    traffic-class 6 drop-precedence 2 cos 2
    traffic-class 6 drop-precedence 2 dscp 1
  !
  interface ethernet 0/2
    output
      remark cos
      remark-map rmrkmap1
    !
  !
!
device#
```

- The following example displays a default remark map that is configured with drop precedence:

```
device# show qos remark-map

Traffic-Class-to-COS Map: default
Traffic-Class : 0 1 2 3 4 5 6 7
-----
COS (DP=0)    : 1 @ 2 3 4 5 6 7
COS (DP=1)    : 1 @ 2 3 4 5 6 7
COS (DP=2)    : 1 @ 2 3 4 5 6 7

Traffic-Class-to-DSCP Map: default
Traffic-Class : 0 1 2 3 4 5 6 7
-----
DSCP (DP=0)   : 8 0 16 24 32 40 48 56
DSCP (DP=1)   : 8 0 16 24 32 40 48 56
DSCP (DP=2)   : 8 0 16 24 32 40 48 56
device#
```

Apply a Traffic Class Map to an Interface

You can attach a QoS traffic class map to an interface under the input or output directions.

1. From privileged EXEC mode, access global configuration mode.

```
device# configure terminal
```

2. Enter QoS configuration mode.

```
device(config)# qos
```

3. Access the interface or subinterface to which you are assigning the traffic class map.

```
device(config-qos)# interface ethernet 0/3
```

4. Enter the mode for configuring access QoS in the input direction or the output direction on an interface.

```
device(config-qos-if-eth-0/3)# input
```

5. Enable the interface to trust the QoS CoS or QoS DSCP markings (using the **cos** or **dscp** keywords respectively) on ingress (incoming) packets for traffic class mapping. You can enable the interface to trust both marking types simultaneously.

```
device(config-qos-if-eth-0/3-input)# trust dscp
```

6. Attach the traffic-class map to the interface.

```
device(config-qos-if-eth-0/3-input)# traffic-class-map tcl3map
```

7. (Optional) Verify the interface configuration.

```
device(config-qos-if-eth-0/3-input)# do show running-config qos interface ethernet 0/3

qos
  interface ethernet 0/3
    input
      trust dscp
      traffic-class-map tcl3map
    !
  !
!
device#
```

The following example attaches a traffic class map named tcl3map to Ethernet interface 0/3.

```
device# configure terminal
device(config)# qos
device(config-qos)# interface ethernet 0/3
device(config-qos-if-eth-0/3)# input
device(config-qos-if-eth-0/3-input)# trust dscp
device(config-qos-if-eth-0/3-input)# traffic-class-map tcl3map
device(config-qos-if-eth-0/3-input)#
```

The following example shows how to display a QoS configuration. In this example, a traffic class map named tcl3map is attached to Ethernet interface 0/3 in the input direction.

```
device(config-qos-if-eth-0/3-input)# do show running-config qos

qos
  traffic-class-map tcl3map
    cos 2 traffic-class 6 drop-precedence 2
    dscp 24 traffic-class 6 drop-precedence 2
```

```

!
traffic-class-map tcl3map
  dscp 10 traffic-class 7
!
remark-map rmrkmap1
  traffic-class 6 drop-precedence 2 cos 2
  traffic-class 6 drop-precedence 2 dscp 1
!
interface ethernet 0/2
  output
    remark cos
    remark-map rmrkmap1
!
!
interface ethernet 0/3
  input
    trust dscp
    traffic-class-map tcl3map
!
!
interface ethernet 0/1 subinterface vlan 100
  input
    trust cos
    traffic-class-map tcmapp1
!
!
!
device#

```

Apply a Remark Map to an Interface

You can attach a QoS map to an interface for remarking the QoS markings on egress (outgoing) packets.

1. From privileged EXEC mode, access global configuration mode.

```
device# configure terminal
```

2. Enter QoS configuration mode.

```
device(config)# qos
```

3. Access the interface (or subinterface) to which you are assigning the remark map.

```
device(config-qos)# interface ethernet 0/2
```

4. Enter the mode for configuring access QoS in the output direction or the input direction on an interface.

```
device(config-qos-if-eth-0/2)# output
```

5. Enable the interface to remark the packet CoS or DSCP values (using the **cos** or **dscp** keyword respectively) on egress (outgoing) packets based on remark mapping.

```
device(config-qos-if-eth-0/2-output)# remark cos
```

6. Attach the remark map to the interface.

```
device(config-qos-if-eth-0/2-output)# remark-map rmrkmap1
```

7. (Optional) Verify the interface configuration.

```

device(config-qos-if-eth-0/2-output)# do show running-config qos interface ethernet 0/2

qos
  interface ethernet 0/2
    output
      remark cos

```

```

    remark-map rmrkmap1
    !
    !
    !
device#

```

The following example attaches a remark map named `rmrkmap1` to Ethernet interface `0/2`.

```

device# configure terminal
device(config)# qos
device(config-qos)# interface ethernet 0/2
device(config-qos-if-eth-0/2)# output
device(config-qos-if-eth-0/2-output)# remark cos
device(config-qos-if-eth-0/2-output)# remark-map rmrkmap1
device(config-qos-if-eth-0/2-output)#

```

The following example shows how to display a QoS configuration. In this example, a remark map named `rmrkmap1` is attached to Ethernet interface `0/2` in the output direction.

```

device(config-qos-if-eth-0/2-output)# do show running-config qos

qos
  traffic-class-map tcmmap1
    cos 2 traffic-class 6 drop-precedence 2
    dscp 24 traffic-class 6 drop-precedence 2
  !
  traffic-class-map tcl3map
    dscp 10 traffic-class 7
  !
  remark-map rmrkmap1
    traffic-class 6 drop-precedence 2 cos 2
    traffic-class 6 drop-precedence 2 dscp 1
  !
  interface ethernet 0/2
    output
      remark cos
      remark-map rmrkmap1
    !
  !
  interface ethernet 0/3
    input
      trust dscp
      traffic-class-map tcl3map
    !
  !
  interface ethernet 0/1 subinterface vlan 100
    input
      trust cos
      traffic-class-map tcmmap1
    !
  !
  !
device#

```

gNMI Commands

Use the gNMI commands for configuring a traffic class map and a remark map.

Traffic-Class Map Creation

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks --tls-ca /home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem set --update "/qos/maps/traffic-class-maps/traffic-class-map[name=tcmapl]/config/name::string:::tcmapl"
```

Traffic-Class Map Deletion

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks --tls-ca /home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem set --delete "/qos/maps/traffic-class-maps/traffic-class-map[name=tcmapl]"
```

Traffic-Class Map Default-Traffic-Class Configuration

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks --tls-ca /home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem set --update "/qos/maps/traffic-class-maps/traffic-class-map[name=csk]/config/default-traffic-class::uint:::5"
```

Traffic-Class Map Default-Traffic-Class Deletion

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks --tls-ca /home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem set --delete "/qos/maps/traffic-class-maps/traffic-class-map[name=csk]/config/default-traffic-class"
```

Traffic-Class Map COS-TC Configuration

- Without drop-precedence

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks --tls-ca /home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem set --update "/qos/maps/traffic-class-maps/traffic-class-map[name=tcmapl]/cos-maps/cos-map[cos=4]/config/cos::uint:::4" --update "/qos/maps/traffic-class-maps/traffic-class-map[name=tcmapl]/cos-maps/cos-map[cos=4]/config/traffic-class::uint:::1"
```

- With drop-precedence

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks --tls-ca /home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem set --update "/qos/maps/traffic-class-maps/traffic-class-map[name=tcmapl]/cos-maps/cos-map[cos=4]/config/cos::uint:::4" --update "/qos/maps/traffic-class-maps/traffic-class-map[name=tcmapl]/cos-maps/cos-map[cos=4]/config/traffic-class::uint:::1" --update "/qos/maps/traffic-class-maps/traffic-class-map[name=tcmapl]/cos-maps/cos-map[cos=4]/config/drop-precedence::uint:::2"
```

Traffic-Class Map COS-TC Deletion

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks --tls-ca /home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem set --delete "/qos/maps/traffic-class-maps/traffic-class-map[name=tcmapl]/cos-maps/cos-map[cos=4]"
```

Traffic-Class Map DSCP-TC Configuration

- Without drop-precedence

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks --tls-ca /home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem set --update "/qos/maps/traffic-class-maps/traffic-class-map[name=tcmapl]/dscp-maps/dscp-map[dscp=31]/config/dscp::uint:::31" --update "/qos/maps/traffic-class-maps/traffic-class-map[name=tcmapl]/dscp-maps/dscp-map[dscp=31]/config/traffic-class::uint:::6"
```

- With drop-precedence

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks --tls-ca /home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem set --update "/qos/maps/traffic-class-maps/traffic-class-map[name=tcmapl]/dscp-maps/dscp-map[dscp=31]/config/dscp::uint:::31" --update "/qos/maps/traffic-class-maps/traffic-
```

```
class-map[name=tcmap1]/dscp-maps/dscp-map[dscp=31]/config/traffic-class:::uint:::6"
--update "/qos/maps/traffic-class-maps/traffic-class-map[name=tcmap1]/dscp-maps/dscp-
map[dscp=31]/config/drop-precedence:::uint:::1"
```

Traffic-Class Map DSCP-TC Deletion

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks --tls-ca /home/user1/repo/latest/tierra-
os/mgmt-svc/gnmi_client/extreme-ca.cert.pem set --delete "/qos/maps/traffic-class-maps/
traffic-class-map[name=tcmap1]/dscp-maps/dscp-map[dscp=31]"
```

Remark Map Creation

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks --tls-ca /home/user1/repo/latest/tierra-
os/mgmt-svc/gnmi_client/extreme-ca.cert.pem set --update "/qos/maps/remark-maps/remark-
map[name=rmrkmap1]/config/name:::string:::rmrkmap1"
```

Remark Map Deletion

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks --tls-ca /home/user1/repo/latest/tierra-
os/mgmt-svc/gnmi_client/extreme-ca.cert.pem set --delete "/qos/maps/remark-maps/remark-
map[name=rmrkmap1]"
```

Remark Map TC-COS Configuration

- Without drop-precedence

Drop-precedence is set to 0 in the key.

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks
--tls-ca /home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem
set --update "/qos/maps/remark-maps/remark-map[name=rmrkmap1]/traffic-class-maps/
traffic-class-map[traffic-class=4][drop-precedence=0]/config/traffic-class:::uint:::4"
--update "/qos/maps/remark-maps/remark-map[name=rmrkmap1]/traffic-class-maps/traffic-
class-map[traffic-class=4][drop-precedence=0]/config/cos:::uint:::1"
```

- With drop-precedence

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks
--tls-ca /home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem
set --update "/qos/maps/remark-maps/remark-map[name=rmrkmap1]/traffic-class-maps/
traffic-class-map[traffic-class=4][drop-precedence=1]/config/traffic-class:::uint:::4"
--update "/qos/maps/remark-maps/remark-map[name=rmrkmap1]/traffic-class-maps/traffic-
class-map[traffic-class=4][drop-precedence=1]/config/drop-precedence:::uint:::1" --
update "/qos/maps/remark-maps/remark-map[name=rmrkmap1]/traffic-class-maps/traffic-
class-map[traffic-class=4][drop-precedence=1]/config/cos:::uint:::1"
```

Remark Map TC-COS Deletion

Drop-precedence is set to 0 in the key.

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks --tls-ca /
home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem set --
delete "/qos/maps/remark-maps/remark-map[name=rmrkmap1]/traffic-class-maps/traffic-class-
map[traffic-class=4][drop-precedence=0]/config/cos"
```

Remark Map TC-DSCP Configuration

- Without drop-precedence

Drop-precedence is set to 0 in the key.

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks
--tls-ca /home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem
set --update "/qos/maps/remark-maps/remark-map[name=rmrkmap1]/traffic-class-maps/
```

```
traffic-class-map[traffic-class=4] [drop-precedence=0]/config/traffic-class:::uint:::4"
--update "/qos/maps/remark-maps/remark-map[name=rmrkmap1]/traffic-class-maps/traffic-
class-map[traffic-class=4] [drop-precedence=0]/config/dscp:::uint:::33"
```

- With drop-precedence

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks
--tls-ca /home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem
set --update "/qos/maps/remark-maps/remark-map[name=rmrkmap1]/traffic-class-maps/
traffic-class-map[traffic-class=4] [drop-precedence=2]/config/traffic-class:::uint:::4"
--update "/qos/maps/remark-maps/remark-map[name=rmrkmap1]/traffic-class-maps/traffic-
class-map[traffic-class=4] [drop-precedence=2]/config/drop-precedence:::uint:::2" --
update "/qos/maps/remark-maps/remark-map[name=rmrkmap1]/traffic-class-maps/traffic-
class-map[traffic-class=4] [drop-precedence=2]/config/dscp:::uint:::33"
```

Remark Map TC-DSCP Deletion

Drop-precedence is set to 0 in the key.

```
gnmic -a DUT_IP:PORT_NUM -u admin -p rocks --tls-ca /
home/user1/repo/latest/tierra-os/mgmt-svc/gnmi_client/extreme-ca.cert.pem set --
delete "/qos/maps/remark-maps/remark-map[name=rmrkmap1]/traffic-class-maps/traffic-class-
map[traffic-class=4] [drop-precedence=0]/config/dscp"
```

Configure Fabric QoS

Fabric QoS manages QoS behavior for VxLAN tunnel traffic to control how the system handles encapsulation and decapsulation. Fabric QoS in Extreme OS ONE supports uniform tunnel mode and pipe tunnel mode.

Uniform Tunnel Mode

In uniform mode, the fabric honors and propagates host markings fabric-wide. Uniform mode has the following functionality:

- Copies QoS markings between inner and outer headers.
- Maintains end-to-end QoS visibility.
- Modifies customer packet markings based on fabric treatment.

Pipe Tunnel Mode

In pipe mode, the fabric uses its own QoS policies, independent of the original packet's markings. The fabric applies its own markings internally, and host markings pass through untouched.

Pipe mode has the following functionality:

- Isolates customer traffic QoS from fabric QoS.
- Preserves original customer packet markings.
- Uses fixed or mapped values for outer header markings.

Configure Tunnel QoS on an NVO Endpoint

You configure QoS behavior at the Network Virtualization Overlay (NVO) level, which applies to all tunnels under that NVO.

1. From privileged EXEC mode, access global configuration mode.

```
device# configure terminal
```

2. Enter QoS configuration mode.

```
device(config)# qos
```

3. Associate an NVO instance with the QoS node.

```
device(config-qos)# nvo nvo1
```

4. Enter QoS NVO tunnel configuration mode.

```
device(config-qos-nvo1)# tunnel-mode
```

5. Set the fabric QoS tunnel encapsulation mode for the NVO endpoint (using the **encapsulation pipe uniform** or **encapsulation pipe [dscp [dscp_value]]** commands).

```
device(config-qos-nvo-nvo1-tunnel-mode)# encapsulation pipe dscp 44
```

6. Set the fabric QoS tunnel decapsulation mode for the NVO endpoint (using the **uniform** or **pipe** keywords).

```
device(config-qos-nvo-nvo1-tunnel-mode)# decapsulation uniform
```



Note

Tunnel decapsulation on the Extreme 8730 and Extreme 8820 platforms supports only the default mode (pipe) and is not configurable.

7. (Optional) Verify the fabric tunnel QoS configuration.

```
device(config-qos-nvo-nvo1-tunnel-mode)# do show qos nvo

nvo nvo1
  tunnel-mode:
    encapsulation pipe dscp 44
    decapsulation uniform
  !
!
device#
```

The following example configures fabric tunnel QoS encapsulation and decapsulation for an NVO named `nvo1`.

```
device# configure terminal
device(config)# qos
device(config-qos)# nvo nvo1
device(config-qos-nvo1)# tunnel-mode
device(config-qos-nvo-nvo1-tunnel-mode)# encapsulation pipe dscp 44
device(config-qos-nvo-nvo1-tunnel-mode)# decapsulation uniform
device(config-qos-nvo-nvo1-tunnel-mode)#
```

The following example shows how to display a QoS configuration. In this example, fabric tunnel QoS encapsulation and decapsulation for an NVO named `nvo1` are configured.

```
device(config-qos-nvo-nvo1-tunnel-mode)# do show running-config qos

qos
  traffic-class-map tcmapl
```

```

    cos 2 traffic-class 6 drop-precedence 2
    dscp 24 traffic-class 6 drop-precedence 2
    !
traffic-class-map tcl3map
    dscp 10 traffic-class 7
    !
remark-map rmrkmap1
    traffic-class 6 drop-precedence 2 cos 2
    traffic-class 6 drop-precedence 2 dscp 1
    !
interface ethernet 0/2
    output
        remark cos
        remark-map rmrkmap1
    !
    !
interface ethernet 0/3
    input
        trust dscp
        traffic-class-map tcl3map
    !
    !
interface ethernet 0/1 subinterface vlan 100
    input
        trust cos
        traffic-class-map tcmmap1
    !
    !
nvo nvo1
    tunnel-mode
        encapsulation pipe dscp 44
        decapsulation uniform
    !
    !
device#

```

Display Mappings in a Traffic Class Map

To display the CoS to traffic-class and DSCP to traffic-class mappings in a traffic class map, use the **show qos traffic-class-map** command.

The following example displays the CoS to traffic class and DSCP to traffic class mappings in a traffic class map named `ing_l2_map` on the device.

```

device# show qos traffic-class-map ing_l2_map

Default Traffic Class for map ing_l2_map: 3
COS-to-Traffic-Class Map: ing_l2_map
  COS           : 0 1 2 3 4 5 6 7
  -----
  Traffic-Class : 1 3 4 3 4 5 6 7
  Drop-Precedence : 0 0 2 0 0 0 0 0

DSCP-to-Traffic-Class Map: ing_l2_map (x/y: TC = x, DP = y, DSCP = d1d2)
d1 : d2 0 1 2 3 4 5 6 7 8 9
-----
0 : 1/0 2/0 4/2 1/0 1/0 1/0 1/0 1/0 0/0 0/0
1 : 0/0 0/0 0/0 0/0 0/0 0/0 2/0 2/0 2/0 2/0
2 : 2/0 2/0 2/0 2/0 3/0 3/0 3/0 3/0 3/0 3/0

```

```

3 :    3/0 3/0    4/0    4/0    4/0    4/0    4/0    4/0    4/0    4/0
4 :    5/0 5/0    5/0    5/0    5/0    5/0    5/0    5/0    6/0    6/0
5 :    6/0 6/0    6/0    6/0    6/0    6/0    7/0    7/0    7/0    7/0
6 :    7/0 7/0    7/0    7/0
device#

```

The following example displays all CoS to traffic class and DSCP to traffic class mappings on the device.

```

device# show qos traffic-class-map

Default Traffic Class for map default: 1
COS-to-Traffic-Class Map: default
COS          : 0 1 2 3 4 5 6 7
-----
Traffic-Class : 1 0 2 3 4 5 6 7
Drop-Precedence : 0 0 0 0 0 0 0 0

DSCP-to-Traffic-Class Map: default (x/y: TC = x, DP = y, DSCP = d1d2)
d1 : d2 0 1 2 3 4 5 6 7
8 9

-----

0 :    0/0 0/0    0/0    0/0    0/0    0/0    0/0    0/0
1/0 1/0
1 :    1/0 1/0    1/0    1/0    1/0    1/0    2/0    2/0
2/0 2/0
2 :    2/0 2/0    2/0    2/0    3/0    3/0    3/0    3/0
3/0 3/0
3 :    3/0 3/0    4/0    4/0    4/0    4/0    4/0    4/0
4/0 4/0
4 :    5/0 5/0    5/0    5/0    5/0    5/0    5/0    5/0
6/0 6/0
5 :    6/0 6/0    6/0    6/0    6/0    6/0    7/0    7/0
7/0 7/0
6 :    7/0 7/0    7/0    7/0

Default Traffic Class for map ing_l2_map: 3
COS-to-Traffic-Class Map: ing_l2_map
COS          : 0 1 2 3 4 5 6 7
-----
Traffic-Class : 1 3 4 3 4 5 6 7
Drop-Precedence : 0 0 2 0 0 0 0 0

DSCP-to-Traffic-Class Map: ing_l2_map (x/y: TC = x, DP = y, DSCP = d1d2)
d1 : d2 0 1 2 3 4 5 6 7 8 9
-----

0 :    1/0 2/0    4/2    1/0    1/0    1/0    1/0    1/0    0/0    0/0
1 :    0/0 0/0    0/0    0/0    0/0    0/0    2/0    2/0    2/0    2/0
2 :    2/0 2/0    2/0    2/0    3/0    3/0    3/0    3/0    3/0    3/0
3 :    3/0 3/0    4/0    4/0    4/0    4/0    4/0    4/0    4/0    4/0
4 :    5/0 5/0    5/0    5/0    5/0    5/0    5/0    5/0    6/0    6/0
5 :    6/0 6/0    6/0    6/0    6/0    6/0    7/0    7/0    7/0    7/0
6 :    7/0 7/0    7/0    7/0
device#

```

Display Traffic Class Mappings for Remarking

To display the traffic class to COS and traffic class to DSCP mappings for remarking the QoS markings on packets, use the **show qos remark-map** command.

The following example displays the mappings within a QoS remark map named `rmrkmap1` on the device.

```
device# show qos remark-map rmrkmap1

Traffic-Class-to-COS Map: rmrkmap1
Traffic-Class : 0 1 2 3 4 5 6 7
-----
COS(DP=0) : 1 @ 2 3 4 5 6 7
COS(DP=1) : 1 @ 2 3 4 5 6 7
COS(DP=2) : 1 @ 2 3 4 5 6 7

Traffic-Class-to-DSCP Map: rmrkmap1
Traffic-Class : 0 1 2 3 4 5 6 7
-----
DSCP(DP=0) : 8 0 16 24 32 40 48 56
DSCP(DP=1) : 8 0 16 24 32 40 48 56
DSCP(DP=2) : 8 0 16 24 32 40 48 56
device#
```

The following example displays the mappings within all QoS remark maps on the device.

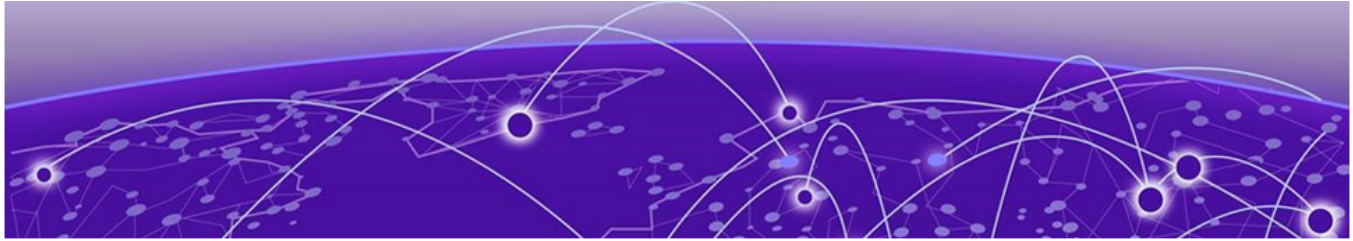
```
device# show qos remark-map

Traffic-Class-to-COS Map: default
Traffic-Class : 0 1 2 3 4 5 6 7
-----
COS(DP=0) : 1 @ 2 3 4 5 6 7
COS(DP=1) : 1 @ 2 3 4 5 6 7
COS(DP=2) : 1 @ 2 3 4 5 6 7

Traffic-Class-to-DSCP Map: default
Traffic-Class : 0 1 2 3 4 5 6 7
-----
DSCP(DP=0) : 8 0 16 24 32 40 48 56
DSCP(DP=1) : 8 0 16 24 32 40 48 56
DSCP(DP=2) : 8 0 16 24 32 40 48 56

Traffic-Class-to-COS Map: rmrkmap1
Traffic-Class : 0 1 2 3 4 5 6 7
-----
COS(DP=0) : 1 @ 2 3 4 5 6 7
COS(DP=1) : 1 @ 2 3 4 5 6 7
COS(DP=2) : 1 @ 2 3 4 5 6 7

Traffic-Class-to-DSCP Map: rmrkmap1
Traffic-Class : 0 1 2 3 4 5 6 7
-----
DSCP(DP=0) : 8 0 16 24 32 40 48 56
DSCP(DP=1) : 8 0 16 24 32 40 48 56
DSCP(DP=2) : 8 0 16 24 32 40 48 56
device#
```



Egress Port Scheduler

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The following topics describe the egress port scheduling functionality in Extreme OS ONE Switching and Routing.

Egress Port Scheduler Overview

The Egress Port Scheduler provides essential Quality of Service (QoS) capabilities for your Extreme OS ONE network infrastructure by managing network traffic. By understanding the queue architecture, traffic mapping, and scheduling behaviors described in this guide, you can effectively manage network traffic priorities and ensure optimal performance for your applications.

This feature intelligently prioritizes and schedules packet transmission at egress ports, ensuring optimal network performance and traffic flow management. When packets arrive at the network switch, the system routes them to specific output ports and assigns them to priority queues. The Egress Port Scheduler determines which packets transmit first based on configured scheduling disciplines for precise control over traffic prioritization.

Key Benefits

The Egress Port Scheduler delivers several important advantages:

- **Traffic Prioritization:** The system ensures that critical traffic receives higher priority over less important data flows.
- **Bandwidth Management:** The system efficiently allocates available bandwidth across different traffic classes.

- **Performance Optimization:** The network maintains consistent performance even under heavy traffic loads.
- **Hardware-Based Processing:** The feature leverages dedicated hardware acceleration for maximum throughput

Queue Architecture

The system implements a hierarchical queue structure with the following characteristics.

Queue Distribution

Traffic is distributed among twelve total hardware queues that are split between unicast and multicast traffic types:

- Eight unicast queues that handle known unicast traffic (destinations with learned MAC addresses).
- Four multicast queues that process broadcast, unknown unicast, and multicast (BUM) traffic.

Scheduling Modes

The scheduler operates using two distinct modes. These modes are deficit weighted round robin (DWRR) and strict priority (SP) as follows:

- Queues 0-5 use DWRR scheduling: This enables proportional bandwidth allocation based on configured weights. This ensures fair access to network resources.
- Queues 6-7 use strict priority scheduling: Higher priority traffic always transmits before lower priority traffic. This guarantees minimal latency for critical applications.

Default Traffic Class Mapping

The system maps traffic classes to queues according to the following configuration.

Traffic Class	Unicast Queue	Multicast Queue	Scheduling Mode	Weight
0	0	0	DWRR	5
1	1	0	DWRR	20
2	2	1	DWRR	30
3	3	1	DWRR	40
4	4	2	DWRR	50
5	5	2	DWRR	50 (highest priority traffic)
6	6	3	SP	None
7	7	3	SP	None

Architecture and Operation

The system implements a two-level hierarchical scheduler. The scheduler processes traffic through a four step process as described in this section.

Scheduler Hierarchy

The scheduler hierarchy consists of level 1 (L1) and level 0 (L0) nodes:

- For the L1 nodes, 12 L1 scheduler nodes are split into 8 unicast and 4 multicast queues. Each L1 node connects to specific traffic classes.
- For the L0 nodes, 8 L0 nodes apply weights and scheduling disciplines. These nodes aggregate traffic from L1 nodes before final port transmission.

Traffic Flow Process

The scheduler processes traffic through the following steps:

1. Classification: The system classifies incoming packets into traffic classes.
2. Queue Assignment: Packets route to appropriate unicast or multicast queues.
3. Scheduling Decision: The scheduler selects the next packet for transmission based on strict priority for queues 6–7 and deficit weighted round robin for queues 0–5.
4. Transmission: Selected packets transmit through the egress port.

Egress Port Scheduler Limitations

Be aware of the following egress port scheduler limitations.

Unsupported Features

The following features are not supported:

- Dynamic Scheduler Profiles: You cannot configure custom scheduler profiles.
- Additional Platforms: Only the Extreme 8730 platform supports this feature. Other platforms (Extreme 8520, Extreme 8720, and Extreme 8820), do not support this feature in this release.
- Traffic Shaping: Egress queue shaping and port shaping are not available.

Hardware Constraints

Be aware of the following hardware constraints:

- Multicast Queue Sharing: Traffic classes 6-7 share multicast queues, which might affect strict priority behavior for multicast traffic.
- DWRR Multicast Behavior: Multicast traffic in DWRR queues might not follow configured weights exactly.

Monitor Queue Statistics

You can monitor queue performance as well as QoS queue performance by examining packet statistics per interface and packet statistics per interface subject to the QoS policy respectively.

Monitor Queue Performance

You can monitor queue performance by using the **show counters interface ethernet** { *interface-name* | **all** | **brief** } command. For details, see the *Extreme OS ONE SR Command Reference Guide*.

For each interface, this command displays the following statistics:

- Packet counts per queue.
- Byte counts per queue.
- Drop statistics (if applicable).

The following example displays statistics for Ethernet interface 0/80.

```
device# show counters interface ethernet 0/80

Interface Statistics: ethernet 0/80
  Carrier Transitions: 2
    LastClear: 0s
Input:
  Total pkts: 24832
  Broadcast pkts: 24101
  Discard pkts: 505
  Errors pkts: 503
  FCS Errors: 0
  MCast pkts: 413
    Octets: 3104
  UCast pkts: 1922
  Runt pkts: 502
  CRC Errors: 0
Input Distribution:
  64 byte pkts: 24002
  65-127 byte pkts: 131
  128-255 byte pkts: 232
  256-511 byte pkts: 396
  512-1023 byte pkts: 29
  1024-1518 byte pkts: 42
  Jumbo pkts: 0
Out:
  Total pkts: 2746
  Broadcast pkts: 2002
  Discard pkts: 101
  Errors pkts: 21
  MCast pkts: 42
    Octets: 343
  UCast pkts: 237
Rate Info:
  Input: 301.000000 Mbits/sec, 25402 pkts/sec 91.00% of line-rate
  Output: 322.000000 Mbits/sec, 26312 pkts/sec 93.00% of line-rate
device#
```

The following example displays statistics for all Ethernet interfaces on the device.

```
device# show counters interface ethernet all

Interface Statistics: ethernet 0/80
  Carrier Transitions: 2
    LastClear: 0s
Input:
  Total pkts: 24832
  Broadcast pkts: 24101
  Discard pkts: 505
  Errors pkts: 503
  FCS Errors: 0
  MCast pkts: 413
    Octets: 3104
  UCast pkts: 1922
  Runt pkts: 502
  CRC Errors: 0
Input Distribution:
  64 byte pkts: 24002
  65-127 byte pkts: 131
  128-255 byte pkts: 232
  256-511 byte pkts: 396
  512-1023 byte pkts: 29
  1024-1518 byte pkts: 42
  Jumbo pkts: 0
Out:
  Total pkts: 2746
  Broadcast pkts: 2002
  Discard pkts: 101
  Errors pkts: 21
  MCast pkts: 42
    Octets: 343
  UCast pkts: 237
Rate Info:
  Input: 301.000000 Mbits/sec, 25402 pkts/sec 91.00% of line-rate
  Output: 322.000000 Mbits/sec, 26312 pkts/sec 93.00% of line-rate

Interface Statistics: ethernet 0/90
  Carrier Transitions: 2
    LastClear: 0s
Input:
  Total pkts: 24822
  Broadcast pkts: 24099
  Discard pkts: 503
  Errors pkts: 501
  FCS Errors: 0
  MCast pkts: 411
    Octets: 3104
  UCast pkts: 1920
  Runt pkts: 502
  CRC Errors: 0
Input Distribution:
  64 byte pkts: 23992
  65-127 byte pkts: 129
  128-255 byte pkts: 230
  256-511 byte pkts: 394
  512-1023 byte pkts: 27
  1024-1518 byte pkts: 40
  Jumbo pkts: 0
Out:
  Total pkts: 2736
  Broadcast pkts: 2000
  Discard pkts: 91
```

```

Errors pkts: 19
MCast pkts: 40
Octets: 343
UCast pkts: 235
Rate Info:
      Input: 319.000000 Mbits/sec, 25702 pkts/sec 92.00% of line-rate
      Output: 344.000000 Mbits/sec, 26912 pkts/sec 94.00% of line-rate
device#

```

Monitor QoS Queue Performance

You can validate QoS queue statistics by using the **show counters qos interface ethernet** { *interface-name* | **all** } **queue** { *queue-name* | **all** } command. For details, see the *Extreme OS ONE SR Command Reference Guide*.

For each interface, this command displays the following statistics:

- Received (Rx) packets per queue.
- Received (Rx) octets per queue.
- Packets that were dropped per queue according to the QoS policy.
- Octets (bytes) that were dropped per queue according to the QoS policy.

The following example displays statistics for Ethernet interface 0/1:1 QoS queue q0.

```

device# show counters qos interface ethernet 0/1:1 queue q0
-----
interface-id := ethernet 0/1:1
-----
Queue      Tx Packets Tx Octets  Drop Packets Drop Octets
=====
q0         1120      77818     0             0
device#

```

The following example displays statistics for Ethernet interface 0/1:1 and all QoS queues.

```

device# show counters qos interface ethernet 0/1:1 queue all
-----
interface-id := ethernet 0/1:1
-----
Queue      Rx Packets      Rx Octets      Drop Packets      Drop Octets
=====
q0         1120            182560           0                 0
q1          0                0                0                 0
q2          6                564              0                 0
q3          0                0                0                 0
q4          0                0                0                 0
q5          0                0                0                 0
q6         949            77818            0                 0
q7          0                0                0                 0
device#

```

Verification Methods

To verify proper scheduler operation, use the following practices:

1. Traffic Pattern Analysis: Monitor queue utilization during different traffic loads.
2. Performance Testing: Measure latency and throughput for different traffic classes.
3. Priority Verification: Confirm that strict priority queues receive preference during congestion.

Implementation Recommendations

Traffic Classification

Use the following practices to classify traffic:

- Map Critical Applications: Assign mission-critical traffic to strict priority queues (6-7).
- Balance DWRR Weights: Configure DWRR weights based on application requirements and expected traffic volumes.
- Monitor Utilization: Regularly check queue utilization to identify potential bottlenecks.

Network Design

Use the following practices to design a network that plans for intelligent prioritization and scheduling of packet transmission at egress ports, ensuring optimal network performance and traffic flow management.

- Plan for Growth: Consider future traffic growth when designing QoS policies.
- Test Thoroughly: Validate scheduler behavior under various traffic conditions.
- Document Configuration: Maintain clear documentation of traffic class assignments.