

# QoS Setup Guide

## Application Note 306 – QoS Setup Procedure

### QoS Set-up Guide

This application note describes how to set-up QoS on Transition Networks ION modules that support Layer-2 switch QoS functions of priority classification, queuing and remarking.

#### 1. Port Priority Queues:

Each port contains 4 different classes of output priority queues.

Priority Queue	Frame Type	Weights
0	Best Effort	1
1	Background	2
2	Excellent Effort	4
3	Critical Applications	8

The packets will be transmitted from these queues in the weighted round-robin fashion with the weights of 8:4:2:1 for the class queues 3, 2, 1 and 0.

#### 2. Classification:

Incoming Packets to a port can be classified based on L2 CoS (IEEE 802.1p) or L3 IP DiffServ (IPv4/IPv6) priority field or port default priority. Section-5 details how port/L2/L3 classification can be configured per port.

#### IEEE priority re-mapping:

When a packet is classified by L2 CoS priority, it will be re-mapped to another L2 priority value as defined in the per-port priority re-mapping table in Figure-3.

#### IP priority re-mapping:

When a packet is classified by IP priority, it will be re-mapped by the global IP remapping table in Figure-2. The re-mapped 2 bit priority value would be used for 2 purposes:

- 1) These 2 bit class values would directly map to the output queue of the egress port
- 2) Egress priority re-marking of the frame. When the packet is eligible for remarking, it would be scaled-up to 3-bits, by borrowing the least significant bit of the port default priority.



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### 3. Queuing:

Once the incoming packet is classified/re-mapped based on port/L2/L3 priority, the packet would be queued to the egress port queue based on the global system queue remapping table.

#### 3.1) L2 priority

Packet classified by port L2 default or frame L2 priority will be queued based on the “IEEE Priority Class” re-mapping table in Figure-1.

#### 3.2) IP priority

Packet classified by IP priority will be queued based on the “IP Traffic Class” remapping table in Figure-2.

### 4. Classification and Queuing configuration options:

The following classification/queuing options are available and this is configured per port.

#### 4.1) port default priority

This can be enabled per port by disabling “IEEE Priority Class” and “IP Traffic Class”. All the frames would be assigned to the port default priority. In the following example, port default priority has been set to “4”.

Priority Forwarding Rules

Default Priority 4	IEEE Priority Class Disabled	IP Traffic Class Disabled	Priority Precedence Use IP
-----------------------	---------------------------------	------------------------------	-------------------------------

#### 4.2) IEEE priority only

This can be configured per port by enabling “IEEE Priority Class” and disabling “IP Traffic Class”. All untagged frames (including IP) would be assigned to the port default priority.

Priority Forwarding Rules

Default Priority 4	IEEE Priority Class Enabled	IP Traffic Class Disabled	Priority Precedence Use IP
-----------------------	--------------------------------	------------------------------	-------------------------------

#### 4.3) IP priority only

This can be configured per port by enabling “IP Traffic Class” and disabling “IEEE Priority Class”. Tagged and non-IP frames would be assigned to the port default priority.



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### Priority Forwarding Rules

Default Priority 4	IEEE Priority Class Disabled	IP Traffic Class Enabled	Priority Precedence Use IP
-----------------------	---------------------------------	-----------------------------	-------------------------------

#### 4.4) IP and IEEE priority with the precedence of IP

This can be configured per port by enabling both “IEEE Priority Class” and “IP Traffic Class” and “Priority Precedence” set to “Use IP”.

Note: The Tagged IP packet would get queued to one of the egress port priority queues as per the global IP-remapping table. However, the remapped IEEE priority value will be used for re-marking the packet.

### Priority Forwarding Rules

Default Priority 4	IEEE Priority Class Enabled	IP Traffic Class Enabled	Priority Precedence Use IP
-----------------------	--------------------------------	-----------------------------	-------------------------------

#### 4.5) IP and IEEE priority with the precedence of IEEE

This can be configured per port by enabling both “IEEE Priority Class” and “IP Traffic Class” and “Priority Precedence” set to “Use IEEE.”

Note: Tagged IP packet would get queued on the egress port as per the global IEEE remapping table.

### Priority Forwarding Rules

Default Priority 4	IEEE Priority Class Enabled	IP Traffic Class Enabled	Priority Precedence Use IEEE
-----------------------	--------------------------------	-----------------------------	---------------------------------

Option (4) and (5) differs only in which how a packet gets queued. The frame re-marking priority would work in the same way for both options.

#### 5. Priority Override:

The initial re-mapped priority value can be further over-ridden by VLAN or per frame SA/DA.



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The screenshot shows the ION System Web Interface for port S3231-1040. The 'ADVANCED' tab is selected. The 'Priority Forwarding Rules' section is highlighted with a red box, showing the following configuration:

SA Priority Override	DA Priority Override	VID Priority Override
Disabled	Disabled	Enabled

The following one or more overrides can be enabled per port. Should more than one override match, the following order of priority is applied (i.e., DA would override all other)

- 1) VID Priority Override
- 2) SA Priority Override
- 3) DA Priority Override

The higher order 2 bits of the VID/MAC priority will be used as the queue re-mapped priority.

### 6.1) VID Priority Override

This requires the VLAN entry to be configured with the desired priority in the VLAN database.



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ION System Web Interface

http://172.16.47.9/web.html

TRANSITION NETWORKS®

System View Help

ION System

ION Stack

S3231-1040

Port 1

Port 2

Port 3

MAIN ADVANCED SNTP HTTPS SSH RADIUS ACL MAC **VLAN** SOAM PROVISIONING

VLANs

VLAN ID	FDB ID	Priority Override	Priority	Member Tag Port 1	Member Tag Port 2	Member Tag Port 3
1	0	Disabled	0	memEgressNoMod	memEgressNoMod	memEgressNoMod
100	0	Enabled	7	memEgressUnTag	memEgressUnTag	memEgressTag

VLAN ID: 100 FDB ID: 0 Priority Override: Enabled Priority: 7

Member Tag Port 1: memEgressUnTag Member Tag Port 2: memEgressUnTag Member Tag Port 3: memEgressTag

Refresh Add Edit Delete Help

In the above example, the VLAN 100 packets egress on port with the priority marked/remarked to priority “7”. The higher 2 bits of the VID priority (0x7) will be used as the queue priority. Hence, the packets will get queued to the output queue “3”

### 6.2) SA/DA Priority Override

Priority override for SA/DA must be added to the MAC table as a static entry with the desired priority.



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The screenshot shows the ION System Web Interface. The browser address bar displays <http://172.16.47.9/web.html>. The page title is "ION System Web Interface". The navigation menu includes tabs for MAIN, ADVANCED, SNTP, HTTPS, SSH, RADIUS, ACL, MAC, VLAN, SOAM, and PROVISIONING. The MACs table is displayed with the following data:

FDB ID	MAC Address	Conn Port	Priority	Entry Type
0	00-C0-F2-00-72-DA	1	0	dynamic
0	00-C0-F2-00-7E-1D	1	0	dynamic
0	00-C0-F2-00-7E-2C	1	0	dynamic
0	00-C0-F2-00-7E-49	1	0	dynamic
0	00-C0-F2-00-98-1B	1	0	dynamic
0	00-C0-F2-00-99-DC	1	0	dynamic
0	00-C0-F2-00-BC-28	1	0	dynamic
0	00-C0-F2-00-DB-5E	1	0	dynamic
0	18-A9-05-CC-04-2E	1	0	dynamic
0	1E-00-76-23-1D-00	1	0	dynamic

Below the table, there is a form for adding a new entry. The fields are:

- FDB ID: 0
- MAC Address: 00-11-22-33-44-55
- Conn Port: Port 1
- Priority: 7
- Entry Type: static

Buttons: Refresh, Add, Edit, Delete, Help

### 7. Remarkings:

Packet IEEE priority could be re-marked with the value assigned during the ingress classification/priority override. This would require proper VLAN configuration with the egress port defined as "**memEgressTag**" in the VLAN DB. Please refer to the VLAN configuration application note (App Note 302) for VLAN configuration details.



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### 8. Appendix – Figures

Figure (1) – “IEEE Priority Class” – System level queue priority remapping table.

The screenshot shows the ION System Web Interface for system S3231-1040. The 'IEEE Priority Class' section is highlighted with a red box. It contains the following configuration options:

Remap X to:	Remap Y to:	Remap Z to:	Remap W to:
Remap 0 to: 0	Remap 1 to: 0	Remap 2 to: 0	Remap 3 to: 0
Remap 4 to: 0	Remap 5 to: 0	Remap 6 to: 0	Remap 7 to: 3

Below the IEEE Priority Class section is the IP Traffic Class section, which also contains a table of remapping options:

Remap X to:	Remap Y to:	Remap Z to:	Remap W to:
Remap 0 to: 0	Remap 1 to: 0	Remap 2 to: 0	Remap 3 to: 0
Remap 4 to: 0	Remap 5 to: 0	Remap 6 to: 0	Remap 7 to: 0
Remap 8 to: 0	Remap 9 to: 0	Remap 10 to: 0	Remap 11 to: 0



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Figure(2) – “IP Traffic Class” – System Level IP Traffic class remapping table

The screenshot shows the ION System Web Interface for system S3231-1040. The 'ADVANCED' tab is selected, and the 'IP Traffic Class' section is highlighted with a red border. This section contains a grid of remapping options for various traffic classes.

Remap X to:	Remap Y to:	Remap Z to:	Remap W to:
Remap 0 to: 0	Remap 1 to: 0	Remap 2 to: 0	Remap 3 to: 0
Remap 4 to: 0	Remap 5 to: 0	Remap 6 to: 0	Remap 7 to: 3
Remap 8 to: 0	Remap 9 to: 0	Remap 10 to: 0	Remap 11 to: 0
Remap 12 to: 0	Remap 13 to: 0	Remap 14 to: 0	Remap 15 to: 0
Remap 16 to: 1	Remap 17 to: 1	Remap 18 to: 1	Remap 19 to: 1
Remap 20 to: 1	Remap 21 to: 1	Remap 22 to: 1	Remap 23 to: 1
Remap 24 to:	Remap 25 to:	Remap 26 to:	Remap 27 to:



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Figure(3) – “User Priority” – Port level IEEE priority remapping table

The screenshot shows the ION System Web Interface for a device with IP 172.16.47.9. The 'ADVANCED' tab is selected, and the 'User Priority' section is highlighted with a red box. The configuration is as follows:

IEEE Priority Class	Remap 0 to:	Remap 1 to:	Remap 2 to:	Remap 3 to:
0	0	1	2	3
1	4	5	6	7

Other visible settings include:

- Bandwidth Allocation:** Rate Limiting Mode: Counts All Layer 1; Egress Rate Limit: Unlimited; Ingress Rate Limit: Unlimited.
- MAC Security:** SA Lock: Disabled; SA Lock Action: Discard and Notify; Filter Unknown Unicast: Disabled; Filter Unknown Multicast: Disabled.
- VLAN Forwarding Rules:** VLAN Status: Disabled; Discard Tagged: Disabled; Discard Untagged: Disabled; Force Default VLAN: Disabled; Default VLAN ID: 1.
- Priority Forwarding Rules:** Default Priority: 1; IEEE Priority Class: Enabled; IP Traffic Class: Enabled; Priority Precedence: Use IP; SA Priority Override: Disabled; DA Priority Override: Disabled; VID Priority Override: Disabled.
- VLAN Tag Management:** Frame Tag Mode: Customer; Provider Ether Type: X88A8.
- Control Frames Management:** Pause Admin Mode: Disabled; Pause Oper Mode: Disabled; Control Functions Supported: None.

Buttons at the bottom: Refresh, Save, Help.



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