Quality of Service

Overview of Quality of Service

Quality of Service (QoS) helps to prioritize certain types of network traffic over others. It maintains the quality and performance of critical applications, safety protocols such as, voice and video, which are sensitive to delays and packet loss. It involves classifying, marking, and managing data packets to provide different levels of service quality.

Traffic classification based on QoS

Traffic classification is the process of distinguishing different types of traffic by examining packet fields. During classification, the device performs a lookup and assigns a QoS label to the packet. This label indicates all QoS actions to be performed on the packet and identifies the queue from which the packet is sent. When QoS is enabled, the device can classify the priority of the packet. URWB devices do not apply QoS labels for incoming or outgoing data traffic on the URWB network. Instead, it recognizes existing QoS markings assigned by the traffic source or at other points in the network. URWB devices accept the markings applied at Layer 2 (PCP/VLAN) or Layer 3 (DSCP).

Advantages of QoS

- Prioritization: Manages traffic according to the QoS priority marked in the packet IP header.
- Bandwidth Management: Allocates network resources to ensure that high-priority applications have sufficient bandwidth.
- Latency Management: Minimizes delays in packet arrival time to maintain quality for time-sensitive applications.

QoS marking

QoS marking enables network devices to identify and handle packets according to their assigned priority. This process ensures that high-priority traffic is transmitted promptly and efficiently. QoS marking often uses the Differentiated Services Code Point (DSCP) or type of service (ToS) field in the IP header or the Priority Code Point (PCP) field in the VLAN header of an ethernet packet. These fields provide various priority levels. IW devices support eight priority levels, with 0 being the lowest priority and 7 being the highest. These 0 to 7 range is extracted from bits B5-B7 of the ToS value. ToS is the name for the complete 8-bit value found in an IP packet.

B7	B6	B5	B4	B3	B2	B1	B0
Priority			X	X	X	X	X

802.1p

802.1p is a standard developed by the IEEE as part of the broader 802.1Q specification. It addresses network traffic prioritization and QoS in Ethernet networks. This standard uses a 3-bit Priority Code Point (PCP) in the 802.1Q VLAN header to prioritize traffic.

QoS shaping

QoS shaping, also known as traffic shaping, is a network management technique used to control the flow of data across a network. It involves regulating the bandwidth available to different types of network traffic. This ensures that critical applications receive the necessary resources and prevents network congestion.

QoS configuration using CLI

By default, QoS feature is disabled on the device.

Enable or disable QoS using CLI

Use the **configure qos status enabled** command to enable the QoS processing on the device.

```
Device#configure qos status enabled
```

Note Use the **configure qos status disabled** command to disable the QoS configuration on the device.

Verify QoS configuration using CLI

Use the **show qos** command to verify the QoS configuration on the device.

Enabled:

```
Device#show qos
QoS: enabled
CoS map:
  0 1 2 3 4 5 6 7
  | | | | | | | |
[ 0 1 2 3 4 5 6 7 ]
```

```
qos-shaping disabled
qos-8021p disabled
```

Disabled:

```
Device#show qos
QoS: disabled
```

802.1p VLAN priority preference configuration using CLI

Enable or disable 802.1p VLAN priority preference using CLI

Use the **configure qos 8021p enabled** command to enable the 802.1p VLAN priority preference over DSCP for IP packets.

```
Device#configure qos 8021p enabled
```

Note Use the **configure qos 8021p disabled** command to disable the 802.1p on the device.

- If QoS 802.1p option is disabled, a URWB device first examines the QoS marking in the L3 header. If no marking is found there, it then checks the L2-VLAN header.
- If the QoS 802.1p option is enabled, an URWB device only considers the CoS value in the PCP field of the VLAN tag.

Verify 802.1p VLAN priority preference configuration using CLI

Use the **show qos** command to verify the QoS 802.1p configuration on the device.

```
Device#show qos
QoS: enabled
CoS map:
  0 1 2 3 4 5 6 7
  | | | | | | | |
[ 0 1 2 3 4 5 6 7 ]
qos-shaping disabled
qos-8021p enabled
```

Configure CoS remapping using CLI

The URWB system allows remapping of the QoS priority marks based on a network administrator's design. With this configuration you can change the priorities for one or more CoS values.

Use the **configure qos cos-map** *values* command to map CoS values of incoming packets to different CoS values.

```
Device#configure qos cos-map 0 1 2 3 4 4 4 4
```

In the CLI command example, CoS remapping is done as follows:

- CoS 0 remains 0

- CoS 1 remains 1
- CoS 2 remains 2
- CoS 3 remains 3
- CoS 4 remains 4
- CoS 5, 6 7 is remapped to 4

Here the packets with CoS values of 5, 6, and 7 are remapped to 4, effectively giving them the same priority as packets originally marked with CoS 4.

With this command you can adjust the prioritization of network traffic by changing the CoS value of packets as they enter the network. This can help in managing bandwidth and ensuring that higher priority traffic is delivered more efficiently.

Important The URWB system manages the remapping process without altering the original marking. The remapped QoS priorities are only significant and valid within the URWB network.

Verify CoS remapping using CLI

Use the **show qos** command to verify the CoS remapping configuration on the device.

```
Device#show qos
QoS: enabled
CoS map:
  0 1 2 3 4 5 6 7
  | | | | | | | |
[ 0 1 2 3 4 4 4 4 ]
qos-shaping disabled
qos-8021p disabled
```

Configure QoS shaping using CLI

Configure per-CoS rates

Use the **configure qos shaper-rates** *bandwidths* command to allocate and control bandwidth for different CoS on a network device.

```
Device#configure qos shaper-rates <eigth traffic rates, one for each CoS>
```

Note All eight bandwidths cannot be with zero.

Example:

```
Device#configure qos shaper-rates 30000 50000 50000 50000 0 0 0 0
```

In this example, configure bandwidth for each CoS value.

- CoS 0 is assigned with a rate of 30,000 kbps,

- CoS 1 to 3 is assigned with a rate of 50,000 kbps, and
- CoS 4 to 7 are set to 0 kbps, 0 means unlimited rate (no bandwidth restriction).

Enable or disable QoS shaping

Use the **configure qos shaping enabled** command to enable the QoS shaping on the device.

```
Device#configure qos shaping enabled
```

Note

- Use the **configure qos shaping disabled** command to disable the QoS Shaping on the device.
- If the network is running a throughput-restricted license, the sum of the bandwidths of all classes must not exceed the licensed throughput limit.

Verify QoS shaping using CLI

Use the **show qos** command to verify the QoS shaping configuration on the device.

```
Device#show qos
QoS: enabled
CoS map:
  0 1 2 3 4 5 6 7
  | | | | | | | |
[ 0 1 2 3 4 5 6 7 ]
qos-shaping enabled
Shaper rates (Kbps): 30000 50000 50000 50000 0 0 0 0
qos-8021p disabled
```