

Local Quality of Service Configuration (QoS)

For Mediatrix units

DGW 49.2.2941

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Basic Concepts

Quality of Service (QoS)

QoS (Quality of Service) features enable network managers to decide on packet priority queuing.

DGW supports:

- Differentiated Services (DS) Field (for IPv4)
- Traffic Class Field (for IPv6)
- 802.1Q taggings

Differentiated Services (DS) Field (for IPv4 only)

Differentiated Services (DiffServ, or DS) is a protocol for specifying and controlling network traffic by class so that certain types of traffic (for example voice traffic which requires a relatively uninterrupted flow of data) might get precedence over other kinds of traffic.

DiffServ replaces the first bits in the ToS byte with a differentiated services code point (DSCP). It uses the existing IPv4 Type of Service byte. In DGW the entire ToS byte is currently configurable, thus the ToS decimal value is used. Please refer to:

- <https://tools.ietf.org/html/rfc2474> for the definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers.
- https://en.wikipedia.org/wiki/Differentiated_services for the differentiated services.

For example, for a DSCP value of 46, the ToS value of 184 should be used. For DSCP and ToS mappings, please refer to the following table:

TOS (Dec)	TOS (Hex)	TOS (Bin)	TOS Precedence (Bin)	TOS Precedence (Dec)	TOS Precedence Name	TOS Delay flag	TOS Throughput flag	TOS Reliability flag	DSCP (Bin)	DSCP (Hex)	DSCP (Dec)	DSCP/PHB Class
0	0x00	00000000	000	0	Routine	0	0	0	000000	0x00	0	none
4	0x04	00000100	000	0	Routine	0	0	1	000001	0x01	1	none
8	0x08	00001000	000	0	Routine	0	1	0	000010	0x02	2	none
12	0x0C	00001100	000	0	Routine	0	1	1	000011	0x03	3	none
16	0x10	00010000	000	0	Routine	1	0	0	000100	0x04	4	none
32	0x20	00100000	001	1	Priority	0	0	0	001000	0x08	8	cs1
40	0x28	00101000	001	1	Priority	0	1	0	001010	0x0A	10	af11
48	0x30	00110000	001	1	Priority	1	0	0	001100	0x0C	12	af12
56	0x38	00111000	001	1	Priority	1	1	0	001110	0x0E	14	af13
64	0x40	01000000	010	2	Immediate	0	0	0	010000	0x10	16	cs2
72	0x48	01001000	010	2	Immediate	0	1	0	010010	0x12	18	af21
80	0x50	01010000	010	2	Immediate	1	0	0	010100	0x14	20	af22
88	0x58	01011000	010	2	Immediate	1	1	0	010110	0x16	22	af23
96	0x60	01100000	011	3	Flash	0	0	0	011000	0x18	24	cs3
104	0x68	01101000	011	3	Flash	0	1	0	011010	0x1A	26	af31
112	0x70	01110000	011	3	Flash	1	0	0	011100	0x1C	28	af32
120	0x78	01111000	011	3	Flash	1	1	0	011110	0x1E	30	af33
128	0x80	10000000	100	4	FlashOverride	0	0	0	100000	0x20	32	cs4
136	0x88	10001000	100	4	FlashOverride	0	1	0	100010	0x22	34	af41
144	0x90	10010000	100	4	FlashOverride	1	0	0	100100	0x24	36	af42
152	0x98	10011000	100	4	FlashOverride	1	1	0	100110	0x26	38	af43
160	0xA0	10100000	101	5	Critical	0	0	0	101000	0x28	40	cs5
176	0xB0	10110000	101	5	Critical	1	0	0	101100	0x2C	44	voice-admit
184	0xB8	10111000	101	5	Critical	1	1	0	101110	0x2E	46	ef
192	0xC0	11000000	110	6	InterNetwork Control	0	0	0	110000	0x30	48	cs6
224	0xE0	11100000	111	7	Network Control	0	0	0	111000	0x38	56	cs7

Network Traffic Control

It is possible to apply bandwidth limitations to the network interfaces.

The limitations are applied on the raw data of the physical link and not only on the payload of the packets. All headers, checksums and control bits (TCP, IP, CRC, etc.) are considered in the actual bandwidth. A bandwidth limitation is applied on a physical link and not on a virtual network interface. All high-level network interfaces (including VLANs) using the same physical link are affected by a configured limitation. This limitation is applied to outgoing traffic only (egress). Bandwidth limitation is an average of the amount of data sent per second. Thus, it is normal that the unit sends a small burst of data after a period of silence.

Basic Tasks

Creating the Default Unit QoS

Before you start

You must have a Network Interface created.

Steps

- 1) Go to **Network/QoS**.
- 2) In the **Differentiated Services Field Configuration** table, complete the fields as required, in order to define the default Differentiated Services value for all generated IPv4 packets and the default Traffic Class value for all generated IPv6 packets.

IMPORTANT: For specific services (Signaling, Voice, T.38) above values can be overridden by setting the specific service class values. Refer to [Overriding the DiffServ and QoS Service Class Default Values](#) (p.7).

- 3) Click **Apply**.

Result

The unit will apply the specified values as default values for all generated IPv4 and IPv6 packets respectively.

Configuring the Default User Priority on Physical Links (802.1Q Tagging)

Information

The 802.1Q standard recommends the use of the 802.1Q VLAN tags for Ethernet frames traffic prioritisation. VLAN tags are 4-byte headers in which three bits are reserved for priority indication. The values of the priority bits shall be provisioned. The VLAN ID part of the 802.1Q tag is always set to 0.

Steps

- 1) Go to **Network/QoS**.
- 2) In the **Ethernet 802.1Q Tagging Configuration** table, select **Enable** for each interface on which you want to enable user priority tagging.

- 3) Set the **Default User Priority** value each interface uses when tagging packets in the **Default User Priority** column.

Note: For specific services (Signaling, Voice, T.38) you can override the values above by setting specific service class values. Refer to [Overriding the DiffServ and QoS Service Class Default Values](#) (p.7).

- 4) Click **Apply**.

Result

The selected **Default User Priority** values will be applied to the Physical Links (VLAN ID = 0) for which the 802.1Q tagging is set to **Enable**.

Configuring the Default User Priority on a New VLAN

Steps

- 1) Go to **Network/VLAN**.
- 2) Under the **Link** column, select the physical link to which you want to add a VLAN.
- 3) Under the **VlanId** column, define the number of the VLAN you wish to create.
- 4) Click **+** located on the right hand side of the screen.
- 5) Under the **Default User Priority** column, set the User Priority for the respective VLAN.

Note: For specific services (Signaling, Voice, T.38) you can override the above values by setting specific service class values. Refer to [Overriding the DiffServ and QoS Service Class Default Values](#) (p.7).

- 6) Click **Apply**.

Result

The value of the **Default User Priority** column will be applied to the newly created VLAN.

Configuring the Default User Priority on an Existing VLAN

Steps

- 1) Go to **Network/VLAN**.
- 2) Under the **Default User Priority** column, set the User Priority to the respective VLAN.

Note: For specific services (Signaling, Voice, T.38) you can override the values above by setting specific service class values. Refer to [Overriding the DiffServ and QoS Service Class Default Values](#) (p.7).

- 3) Click **Apply**.

Result

The value of the **Default User Priority** column will be applied to the existing VLAN.

Overriding the DiffServ and QoS Service Class Default Values

Steps

- 1) Go to **Network/QoS**.
- 2) In the **Service Class Configuration** table, for each service class, set for IPv4 packets the **DiffServ** value or the **Traffic Class** value for IPv6 packets, .
- 3) Set a specific **User Priority** for each class under the **User Priority** column.
- 4) Click **Apply**.
- 5) Click **restart required services**, located at the top of the page.

Result

The values set for the **DiffServ** or the **Traffic Class** parameters will override any value already specified for the service class (Signaling, Voice, T.38).

Enabling the Network Traffic Control (NTC) Service

Steps

- 1) Go to **System/Services**.

Note: Starting the NTC service enables Traffic Shaping even if bandwidth limitation is disabled.

Note: The NTC service sends packets on the physical link according to their respective priorities. The lower the value, the higher the priority. Packets with lower priority are dropped first.

- 2) In the **User Service** table, click  located on the same line as Network Traffic Control (NTC).

Result

The Network Traffic control (NTC) line will turn to blue, and the **Status** field will indicate **Started**.

Configuring Network Traffic Control

Before you start

The Network Traffic Control (NTC) service must be enabled. Refer to [Enabling the Network Traffic Control \(NTC\) Service](#) (p.7).

Steps

- 1) Go to **Network/QoS**.

- 2) In the **Network Traffic Control Configuration**, set the **Egress Limit** field for the selected link interface.

IMPORTANT:

The range is from 64 to 1,000,000 kilobits per second. The value 0 means no bandwidth limitation and no prioritisation. This value must be set according to the upstream bandwidth limit of the network on this link. Set to 0 (disable) if the network bandwidth exceeds 1,000,000 kbps or the effective limit of this device. NTC service sends packets on the physical link according to their respective priorities. The lower the value, the higher the priority. Packets with lower priority are dropped first. The maximum value of the HiddenMaxEgressLimit is :

- 1,000,000 kilobits on the Sentinel 400
- 500,000 kilobits on the Sentinel 100, Mediatix G7 series, and Mediatix S7 series
- 40,960 kilobits (5MB/s) on all other platforms

- 3) Click **Apply**.

Result

The defined egress limit is applied on the respective ETH interface.

Examples

Default Unit QoS and Service Class Configuration for IPv4

Any IPv4 packet sent from the unit has the value applied in the **Default DiffServ (IPv4)** field of the **Differentiated Services Field Configuration** table under **Network/QoS** tab. This default value is overridden on what concerns the specific service classes defined under the same area and in the **Service Class Configuration** table.

In the following example, the ToS decimal value for the default egress IPv4 traffic is 120 (which corresponds to DSCP=30 or AF, Assured Forwarding), while for the Signaling service class, the DiffServ value is equal to 184 (DSCP=46 or EF, Expedited Forwarding)

QoS

Differentiated Services Field Configuration			
Default DiffServ (IPv4):	120		
Default Traffic Class (IPv6):	0		

Ethernet 802.1Q Tagging Configuration			
Physical Link	Enable	Default User Priority	
eth1	Disable	0	
eth2-5	Disable	0	

Service Class Configuration			
Name	DiffServ (IPv4)	Traffic Class (IPv6)	User Priority
Signaling	184	0	6
Voice	184	0	6
T.38	184	0	6

When the unit generates a DNS query (which does not belong to the Signaling service class) the default unit IPv4 DiffServ value is applied (ToS=120 or DSCP=30), as shown in the trace below:

```

4 Internet Protocol Version 4, Src: 192.168.1.102, Dst: 192.168.1.1
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
  4 Differentiated Services Field: 0x78 (DSCP: AF33, ECN: Not-ECT)
    0111 10.. = Differentiated Services Codepoint: Assured Forwarding 33 (30)
    .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
  Total Length: 72
  Identification: 0x2068 (8296)
  ▸ Flags: 0x02 (Don't Fragment)
  Fragment offset: 0
  Time to live: 64
  Protocol: UDP (17)
  Header checksum: 0x960d [validation disabled]
  [Header checksum status: Unverified]
  Source: 192.168.1.102
  Destination: 192.168.1.1
  [Source GeoIP: Unknown]
  [Destination GeoIP: Unknown]
  ▸ User Datagram Protocol, Src Port: 24449, Dst Port: 53
  ▸ Domain Name System (query)

```

When the unit generates a SIP packet (which belongs to the Signaling service class) the Signaling-specific DiffServ value is applied (ToS=184 or DSCP=46) as shown in the trace below:

```
Internet Protocol Version 4, Src: 192.168.1.102, Dst: 188.40.86.131
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
  Differentiated Services Field: 0xb8 (DSCP: EF PHB, ECN: Not-ECT)
    1011 10.. = Differentiated Services Codepoint: Expedited Forwarding (46)
    .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
  Total Length: 441
  Identification: 0xa6e7 (42727)
  Flags: 0x02 (Don't Fragment)
  Fragment offset: 0
  Time to live: 64
  Protocol: UDP (17)
  Header checksum: 0xbcda [validation disabled]
  [Header checksum status: Unverified]
  Source: 192.168.1.102
  Destination: 188.40.86.131
  [Source GeoIP: Unknown]
  [Destination GeoIP: Unknown]
  User Datagram Protocol, Src Port: 5060, Dst Port: 5060
  Session Initiation Protocol (REGISTER)
```

Online Help

If you are not familiar with the meaning of the fields and buttons, click **Show Help**, located at the upper right corner of the Web page. When activated, the fields and buttons that offer online help will change to green and if you hover over them, the description will be displayed.

DGW Documentation

Mediatrix devices are supplied with an exhaustive set of documentation.

Mediatrix user documentation is available on the [Media5 Documentation Portal](#).

Several types of documents were created to clearly present the information you are looking for. Our documentation includes:

- **Release notes:** Generated at each GA release, this document includes the known and solved issues of the software. It also outlines the changes and the new features the release includes.
- **Configuration notes:** These documents are created to facilitate the configuration of a specific use case. They address a configuration aspect we consider that most users will need to perform. However, in some cases, a configuration note is created after receiving a question from a customer. They provide standard step-by-step procedures detailing the values of the parameters to use. They provide a means of validation and present some conceptual information. The configuration notes are specifically created to guide the user through an aspect of the configuration.
- **Technical bulletins:** These documents are created to facilitate the configuration of a specific technical action, such as performing a firmware upgrade.
- **Hardware installation guide:** They provide the detailed procedure on how to safely and adequately install the unit. It provides information on card installation, cable connections, and how to access for the first time the Management interface.
- **User guide:** The user guide explains how to customise to your needs the configuration of the unit. Although this document is task oriented, it provides conceptual information to help the user understand the purpose and impact of each task. The User Guide will provide information such as where and how TR-069 can be configured in the Management Interface, how to set firewalls, or how to use the CLI to configure parameters that are not available in the Management Interface.
- **Reference guide:** This exhaustive document has been created for advanced users. It includes a description of all the parameters used by all the services of the Mediatrix units. You will find, for example, scripts to configure a specific parameter, notification messages sent by a service, or an action description used to create Rulesets. This document includes reference information such as a dictionary, and it does not include any step-by-step procedures.

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