DSCP Marking Support

Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product(s) or Functional Area	cnSGW-C
Applicable Platform(s)	SMI
Feature Default Setting	DSCP Marking for Data packets: Disabled – Configuration required to enable DSCP Marking for CP Signaling Messages: Enabled – Always-on
Related Documentation	Not Applicable

Revision History

Table 2: Revision History

Revision Details	Release
Validated support for Extended and Non-Standard (Operator-defined) QCI Values.	2021.02.3
Added support for DSCP Marking for CP Signaling Messages.	2021.02.0

Revision Details	Release
First introduced.	2021.01.0

Feature Description

Differentiated Services Code Point (DSCP) is a means of classifying and managing network traffic. It provides quality of service (QoS) in modern Layer 3 IP networks.

This feature supports the following:

- DSCP Marking for Data Packets
- DSCP Marking for CP Signaling Messages

DSCP Marking for Data Packets

Feature Description

This feature supports marking of DSCP with the combination of QCI and ARP.

It also supports the programming of the DSCP marking value to the User Plane (UP) for data packets.

How it Works

This section describes how this feature works.

DSCP Marking IEs

DSCP marking IEs are sent in the Sx Establishment Request or the Sx Modification Request message. These IEs are a part of Forwarding Action Rule (FAR) IE. The following are the supported IEs and their functions:

- Inner Packet Marking (Private Extension IE): Sends the user-datagram DSCP marking values to the UP.
- Transport Packet Marking (3GPP Spec-defined IE): Sends the encaps-header DSCP values to the UP.
- Transport Packet Marking Options (Private Extension IE): Sends copy-inner and copy-outer options of encaps-header marking to the UP.

Feature Configuration

To configure this feature, use the following configuration:

```
config
   profile
      sgw-qos-profile qos_profile_name
         dscp-map
            operator-defined-qci non_standard_qos_class_id
```

```
qci qci_value
    downlink downlink_value
        user-datagram
            dscp-marking dscp_marking_value
        encaps-header
            dscp-marking dscp_marking_value
        encsp-header enscp_header_value
            dscp-marking dscp_marking_value
    uplink uplink_value
        user-datagram
            dscp-marking dscp_marking_value
        encaps-header
            dscp-marking dscp_marking_value
        encsp-header enscp_header_value
arp-priority-level arp_priority_level_value
    uplink
        user-datagram
            dscp-marking dscp_marking_value
        encaps-header
            dscp-marking dscp_marking_value
    downlink
        user-datagram
            dscp-marking dscp_marking_value
        encaps-header
            dscp-marking dscp_marking_value
            end
```

NOTES:

- **sgw-qos-profile** *qos_profile_name*—Specify the QoS profile configuration name for SGW.
- **dscp-map**—Configures QCI to DSCP-Marking mapping.
- **operator-defined-qci** *non_standard_qos_class_id*—Specify the non-standard QoS class identifier. Must be an integer in the range of 128-254.
- **qci** *qci_value*—Specify the standard QCI value. Must be an integer from the following options: 1-9, 65, 66, 69, 70, 80, 82, 83.
- **arp-priority-level** *arp_priority_value*—Specify the ARP Priority Level. Must be an integer in the range of 1-15.
- **uplink** *uplink_value*—Specify the uplink QCI value.
- **downlink** *downlink_value*—Specify the downlink QCI value.
- **gbr**—Specify the type of the QCI to GBR.
- **non-gbr**—Specify the type of the QCI to non-GBR.
- **encaps-header**—Specify the DSCP value to be applied to the encaps header.
- **user-datagram**—Specify the DSCP value to be applied to the user datagram.
- **copy-inner**—Starts copying the inner DSCP to outer value.
- **copy-outer**—Starts copying the outer DSCP to inner value.

- **dscp-marking** *dscp_marking_value*—Specify the DSCP value to be applied to packets. (A hexadecimal string value, starting with 0x. For example: 0x3F)
- **qci**—The QCI uplink and downlink options are the same. Similarly, the commands for **operator-defined-qci** and standard QCI are the same, the only difference is the mandatory selection of *bearer-type* in **operator-defined-qci**. You can also specify ARP along with the type of the bearer.

Configuration Example

The following is an example configuration.

```
config
  profile sgw-qos-profile q
    dscp-map qci 1 uplink encaps-header copy-inner user-datagram dscp-marking 0x1
    dscp-map qci 1 downlink user-datagram dscp-marking 0x2 encaps-header dscp-marking 0x3
   dscp-map qci 2 gbr uplink user-datagram dscp-marking 0x5 encaps-header dscp-marking 0x6

    dscp-map operator-defined-qci 128 gbr arp-priority-level 1 uplink user-datagram
dscp-marking 0x7
    end
```

Configuration Verification

To verify the configuration:

```
show running-config profile sgw-qos-profile q
  profile sgw-qos-profile q
    dscp-map qci 1 uplink encaps-header copy-inner user-datagram dscp-marking 0x1
    dscp-map qci 1 downlink user-datagram dscp-marking 0x2 encaps-header dscp-marking 0x3
   dscp-map qci 2 gbr uplink user-datagram dscp-marking 0x5 encaps-header dscp-marking 0x6

    dscp-map operator-defined-qci 128 gbr arp-priority-level 1 uplink user-datagram
dscp-marking 0x7
    end
```

DSCP Marking for CP Signaling Messages

Feature Description

This feature supports the marking of DSCP values to control packets as per the configuration at the following interfaces:

- GTPC: S11, S5
- PFCP: Sxa

Feature Configuration

Configuring this feature involves the following steps:

- Configuring DSCP under the S11 Interface for the GTP Endpoint. For more information, refer to Configuring DSCP under S11 Interface for GTP Endpoint, on page 5.

- Configuring DSCP under the S5e Interface for the GTP Endpoint. For more information, refer to Configuring DSCP under S5e Interface for GTP Endpoint, on page 5.
- Configuring DSCP under the Sxa Interface for the Protocol Endpoint. For more information, refer to Configuring DSCP under Sxa Interface for Protocol Endpoint, on page 6.

Configuring DSCP under S11 Interface for GTP Endpoint

To configure this feature, use the following configuration:

```
config
    instance instance-id instance_id
        endpoint endpoint_name
        interface interface_name
        dscp dscp_value
        end
```

NOTES:

- **endpoint** *endpoint_name*—Specify the endpoint name.
- **interface** *interface_name*—Specify the endpoint interface name.
- **dscp** *dscp_value*—Specify the DSCP value. Must be a hexadecimal string starting with 0x (for example, 0x3F), or a decimal value (for example, 12). The decimal value must be in the range of 0-63.

Configuration Example

The following is an example configuration.

```
config
    instance instance-id 1
        endpoint gtp
        interface s11
        dscp 0x2
        end
```

Configuration Verification

To verify the configuration:

```
show running-config instance instance-id 1 endpoint
    endpoint gtp
    interface s11
    dscp 0x2
    end
```

Configuring DSCP under S5e Interface for GTP Endpoint

To configure this feature, use the following configuration:

```
config
    instance instance-id instance_id
        endpoint endpoint_name
        interface interface_name
        dscp dscp_value
        end
```

Configuration Example

The following is an example configuration.

```
config
    instance instance-id 1
        endpoint gtp
        interface s5e
        dscp 0x2
        end
```

Configuration Verification

To verify the configuration:

```
show running-config instance instance-id 1 endpoint
    endpoint gtp
    interface s5e
    dscp 0x2
    end
```

Configuring DSCP under Sxa Interface for Protocol Endpoint

To configure this feature, use the following configuration:

```
config
    instance instance-id instance_id
        endpoint endpoint_name
        interface interface_name
        dscp dscp_value
        end
```

Configuration Example

The following is an example configuration.

```
config
    instance instance-id 1
        endpoint gtp
        interface sxa
        dscp 0x2
        end
```

Configuration Verification

To verify the configuration:

```
show running-config instance instance-id 1 endpoint
    endpoint gtp
    interface sxa
    dscp 0x2
    end
```

Removing DSCP Configuration

When you remove the DSCP signaling configuration from the interface or endpoint, it uses the default marking. The default value is 10 or 0xa (in Hexadecimal).

To clear the DSCP configuration:

```
config
    instance instance-id instance_id
```

```
endpoint endpoint_name
interface interface_name
no dscp
end
```

Configuration Example

The following is an example configuration for the removal of the DSCP configuration.

```
config
    instance instance-id 1
        endpoint gtp
        interface s11
        no dscp
        end
```

Configuration Verification

To verify the DSCP configuration removal:

```
show running-config instance instance-id 1 endpoint
    instance instance-id 1
    endpoint gtp
    interface s5e
    dscp 0x4
    exit
    interface s11
    exit
    exit
    endpoint protocol
    interface sxa
    dscp 8
    end
```