



# Support For QoS Upgrade From GGSN or PCRF

This chapter describes the Support for QoS Upgrade feature.

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## Feature Description

The SGSN negotiates the Requested QoS with Subscribed QoS from HLR (the HLR Subscribed QoS can be over-riden by the local configuration). The SGSN includes this Negotiated QoS in Create PDP Context Request and Update PDP Context Request messages to the GGSN, the negotiate QoS is capped to the Subscribed QoS and cannot exceed it. The "Upgrade QoS Supported" flag is not set, and the GGSN cannot negotiate a QoS higher than that sent by the SGSN.

This feature enables the functionality, where the SGSN can set the "Upgrade QoS Supported" flag within the common flags IE in Tunnel management messages, Create PDP Context Request and Update PDP Context Request messages. The SGSN accepts the QoS from GGSN in Create PDP Context Response, Update PDP Context Request/Response messages as the Negotiated QoS for the PDP session.

In a 3G scenario, if QoS is downgraded by the RNC then SGSN sets the "No QoS negotiation" flag in the common Flags IE of the corresponding Update PDP Context Request. The "QoS upgrade supported" flag is not set.

## How it Works

A new configuration CLI is provided under the APN Profile configuration mode to support the QoS upgrade feature. If this CLI is configured, the SGSN sets the "Upgrade QoS Supported" bit in the Common Flags IE in Create PDP Context Request and Update PDP Context Request. The SGSN accepts the QoS from the GGSN in Create PDP Context Response, Update PDP Context Request/Response as the Negotiated QoS for the PDP session.

A detail description of the implementation of the QoS upgrade feature in various 3G scenarios is provided below:

### The "Upgrade QoS Supported" flag in Create PDP Context Request and Response messages

1. During the primary and secondary PDP context activation, if support to send "Upgrade QoS Supported" flag is configured under the APN-Profile, the SGSN sets the flag while sending the Create PDP Context Request.
2. The Create PDP Context Response arrives from the GGSN. If the configuration for "Upgrade QoS Supported" flag is enabled under the APN-Profile, the GGSN requested QoS is handled.

A CLI option is provided to enable or disable the keyword **prefer-as-cap subscription**. Based on the configuration of this keyword, the following QoS processing occurs:

- The keyword **prefer-as-cap subscription** is disabled: The SGSN accepts the QoS in the Create PDP Context Response as the negotiated QoS. This negotiated QoS can be downgraded by the RNC during RAB assignment. If the RNC downgrades the QoS then "Upgrade QoS Supported" flag is not set in the corresponding Update PDP Context Request message.
- The keyword **prefer-as-cap subscription** is enabled: The SGSN negotiates the QoS received in the Create PDP Context Response with the Subscribed QoS. After negotiation if the QoS is downgraded, the "Upgrade QoS Supported" flag not set in the Update PDP Context Request message.

### The "Upgrade QoS Supported" flag in Update PDP Context Request and Response messages

If support to send "Upgrade QoS Supported" flag is configured under the APN-Profile and "No QoS negotiation" flag is not set, the SGSN sets the "Upgrade QoS Supported" flag while sending the Update PDP Context Request. The "Upgrade QoS Supported" flag is not set in every Update PDP Context Request, for example, in preservation and direct tunnel this flag is not set in Update PDP Context Request message. The relationship between the "No QoS negotiation" flag and the "Upgrade QoS Supported" flags in Update PDP Context Request messages is summarized as:

- If "No QoS negotiation" flag is set, the "Upgrade QoS Supported" flag is not set.
- If "No QoS negotiation" flag is not set, the "Upgrade QoS Supported" flag is set.

A CLI option is provided to enable or disable the keyword **prefer-as-cap subscription**. Based on the configuration of this keyword, the following QoS processing occurs:

- The keyword **prefer-as-cap subscription** is disabled: The SGSN accepts the QoS in the Create PDP Context Response as the Negotiated QoS. This Negotiated QoS can be downgraded by the RNC during RAB assignment. If the RNC downgrades the QoS then "Upgrade QoS Supported" flag is not set in the corresponding Update PDP Context Request message.
- The keyword **prefer-as-cap subscription** is enabled: The SGSN negotiates the QoS received in the Create PDP Context Response with the Subscribed QoS. After negotiation if the QoS is downgraded, the "Upgrade QoS Supported" flag not set in the Update PDP Context Request message.

A detail description of the implementation of the QoS upgrade feature in various 2G scenarios is provided below:

### The "Upgrade QoS Supported" flag for Create PDP Context Request and Response

1. During the primary and secondary PDP context activation, if support to send "Upgrade QoS Supported" flag is configured under the APN-Profile, the SGSN sets the flag while sending the Create PDP Context Request.

2. The Create PDP Context Response arrives from the GGSN. If the configuration for "Upgrade QoS Supported" flag is enabled under the APN-Profile, the GGSN requested QoS is handled.

A CLI option is provided to enable or disable the keyword **prefer-as-cap subscription**. Based on the configuration of this keyword, the following QoS processing occurs:

- The keyword **prefer-as-cap subscription** is disabled: The SGSN accepts the QoS in the Create PDP Context Response as the Negotiated QoS. In an ideal 2G scenario where all the parameters are configured appropriately at the GGSN/PCRF, an upgrade beyond "472" kbps does not occur. If the GGSN sends QoS greater than "472" kbps, this requested bitrate is capped to "472" kbps.
- The keyword **prefer-as-cap subscription** is enabled: The SGSN negotiates the QoS received in the Create PDP Context Response with the Subscribed QoS. After negotiation if the QoS is downgraded, the "Upgrade QoS Supported" flag not set in the Update PDP Context Request message.

### The "Upgrade QoS Supported" flag for Update PDP Context Request and Response

If support to send "Upgrade QoS Supported" flag is configured under the APN-Profile and "No QoS negotiation" flag is not set, the SGSN sets the "Upgrade QoS Supported" flag while sending the Update PDP Context Request. The "Upgrade QoS Supported" flag is not set in every Update PDP Context Request, for example, in preservation and direct tunnel this flag is not set in Update PDP Context Request message. The relationship between the "No QoS negotiation" flag and the "Upgrade QoS Supported" flags in Update PDP Context Request messages is summarized as:

- If "No QoS negotiation" flag is set, the "Upgrade QoS Supported" flag is not set.
- If "No QoS negotiation" flag is not set, the "Upgrade QoS Supported" flag is set.

A CLI option is provided to enable or disable the keyword **prefer-as-cap subscription**. Based on the configuration of this keyword, the following QoS processing occurs:

- The keyword **prefer-as-cap subscription** is disabled: The SGSN accepts the QoS in the Create PDP Context Response as the Negotiated QoS. This Negotiated QoS can be downgraded by the RNC during RAB assignment. If the RNC downgrades the QoS then "Upgrade QoS Supported" flag is not set in the corresponding Update PDP Context Request message.
- The keyword **prefer-as-cap subscription** is enabled: The SGSN negotiates the QoS received in the Create PDP Context Response with the Subscribed QoS. After negotiation if the QoS is downgraded, the "Upgrade QoS Supported" flag not set in the Update PDP Context Request message.

## Configuring Support for QoS upgrade from GGSN/PCRF

The following command is used to configure the support for QoS upgrade from GGSN/PCRF:

```
config
  apn-profile profile_name
    qos allow-upgrade access-type { gprs | umts } [ prefer-as-cap
subscription ]
    remove qos allow-upgrade access-type { gprs | umts }
  end
```

Notes:

- The "Upgrade QoS Supported" flag is now set in "Create PDP Context" and "Update PDP Context" messages sent by SGSN. The SGSN signals the availability of this functionality by use of the "Upgrade QoS Supported" bit within the Common Flags IE. The SGSN sets the "Upgrade QoS Supported" bit within the Common Flags IE to "1" within the "Create PDP Context" and "Update PDP Context"
- If keyword **prefer-as-cap subscription** is enabled, SGSN accepts a higher QoS in the Create/Update PDP Context Response than sent in Create/Update PDP Context Request, but negotiates and restricts the value within HLR/local subscribed QoS. If this keyword is disabled, the SGSN accepts the QoS in Create PDP Context Response and Update PDP Context Response as the Negotiated QoS (this QoS may be downgraded by the RNC in case of UMTS access).

For more information on the command, see *Command Line Interface Reference*.

## Verifying the QoS Upgrade Support Configuration

The configuration can be verified by executing the show command **show apn-profile full name <apn\_profile\_name>**. The following parameters are displayed on executing the command:

1. Allow QoS Upgrade from GGSN
2. QoS Upgrade From GGSN (UMTS)
3. Capped with Subscribed QoS
4. QoS Upgrade From GGSN (GPRS)
5. Capped with Subscribed QoS

For description of the fields listed above see, *Statistics and Counters Reference*.