

QoS Profile Configuration Mode Commands

Command Modes

The QoS Profile Configuration mode is used to create and configure a QoS Profile.

Exec > Global Configuration > Quality of Service Profile Configuration

configure > quality-of-service-profile

Entering the above command sequence results in the following prompt:

```
[local]host_name(qos-of-service-profile)#
```

Important For information on common commands available in this configuration mode, refer to the Common Commands chapter.

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apn-ambr

Configures the APN-AMBR (aggregate maximum bit rate) that will be stored in the Home Subscriber Server (HSS).

Product

MME

SGSN

Privilege

Security Administrator, Administrator

Command Modes

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Entering the above command sequence results in the following prompt:

```
[local]host_name(qos-of-service-profile)#
```

Syntax Description

apn-ambr max-ul *mbr-up* **max-dl** *mbr-dwn* **{ pgw-upgrade | prefer-as-cap } { local | minimum | rej-if-exceed }**
remove apn-ambr

remove

Removes the APN-AMBR changes from the configuration for this APN profile.

max-ul *mbr-up* max-dl *mbr-dwn*

Defines the maximum bit rates for uplink (subscriber to network) and downlink (network to subscriber) traffic.

mbr-up is an integer from 0 through 1410065408.

mbr-dwn is an integer from 0 through 1410065408.

prefer-as-cap

This keyword configures the capping that is applied on the subscription value received from the HSS or the value received from the peer-node (MME/S4-SGSN) during inbound relocation. One of the following actions must be configured under **prefer-as-cap** -- Note that the resulting value is used for the QoS parameter and sent in the Create Session Request or the Modify Bearer Command (in case of HSS-initiated QoS/APN-AMBR modification) message:

- **local** - The configured local value will be used.
- **minimum** - The minimum (lowest) value of the configured local value or the HSS-provided value will be used.
- **reject-if-exceed** - The request/procedure is rejected if the HSS-provided value exceeds the configured local value.

pgw-upgrade

MME only.

This keyword configures the QoS capping to be applied on the values received from the PGW during Attach / PDN-connectivity / Bearer-creation / Bearer-modification procedures. One of the following actions must be configured under **pgw-upgrade** -- Note that the resulting value is used for the QoS parameter and sent to the UE:

- **local** - The configured local value will be used.
- **minimum** - The minimum (lowest) value of the configured local value or the PGW-provided value will be used.
- **reject-if-exceed** - The request/procedure is rejected if the PGW-provided value exceeds the configured local value.

Usage Guidelines

Use this command to define the MBR that will be enforced by the P-GW for both uplink and downlink traffic shaping.

For the MME, use the **apn-ambr** command to set local values QoS capping type to be applied for the APN-AMBR received from HSS/PGW/peer-node. One or both **prefer-as-cap** and/or **pgw-upgrade** must be configured to override the default behavior, which is to accept the received value from the HSS/peer-node/PGW.

Example

A command similar to the following sets the APN-AMBR maximum uplink and maximum downlink bit rates for the QoS profile:

```
qos apn-ambr max-ul 24234222 max-dl 23423423
```

A command similar to the following sets the **prefer-as-cap minimum**capping action to be taken when the SGSN or MME receives outside of APN-AMBR maximum uplink and maximum downlink bit rates :

```
qos apn-ambr max-ul 24234222 max-dl 23423423 prefer-as-cap minimum
```

associate

This command associates a specific bearer control profile with this QoS profile.

Product

MME

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Command Modes

Exec > Global Configuration > Quality of Service Profile Configuration

configure > quality-of-service-profile

Entering the above command sequence results in the following prompt:

```
[local]host_name(qos-of-service-profile)#
```

Syntax Description

associate bearer-control-profile *bc_profile_name* **qci** *qci_value* **[to** *end_qci_value* **]**
remove associate bearer-control-profile *bc_profile_name*

remove

Add this command prefix to the command to delete the association between the QoS profile and the identified bearer-control-profile.

bc_profile_name

Identifies the name of the bearer control profile being associated with the QoS profile. Enter 1 to 64 alphanumeric characters.

qci *qci_value* [to *end_qci_value*]

qci - Identifies either a specific QoS class identifier (QCI) or a range of QCI:

- *qci_value* - Enter an integer from 1 through 9 to identify a specific QCI. You can enter the new standardized QCI values 65, 66, 67, 69 and 70.
- **to** *end_qci_value* - Type "to" and then enter an integer from 2 through 9 that is greater than the QCI value entered for the beginning of the range. You can enter the new standardized QCI values 65, 66, 67, 69 and 70.

Usage Guidelines

Use the **associate** command in Quality of Service Profile configuration mode to associate the bearer control profile with the QoS profile and map a specific QCI or a range of QCI to the bearer control profile being associated with the QoS profile.

A specific QCI cannot be associated to more than one bearer control profile. The QCI of the bearer is used to identify the applicable bearer control profile.

- For dedicated bearers, the QCI of bearer is initially determined by the QCI value received from PGW during dedicated bearer activation or the value received from peer MME/S4-SGSN.
- For default bearers, the QCI of bearer is initially determined by the subscription from HSS or the value received from peer MME/S4-SGSN during inbound relocation.

Example

The following sample command associates the *BCprof1* bearer control profile with the QoS profile and maps QCI *7* to this bearer control profile:

```
associate bearer-control-profile BCprof1 qci 7
```

class

Configures local values for the traffic class (TC) parameters for the quality of service (QoS) configured for this QoS profile.

Important To enable any of the values/features configured with this command, the **prefer-as-cap** configuration (also in the QoS profile configuration mode) must be set to either **local** or **both-hlr-and-local**.

Product

SGSN

Privilege

Security Administrator, Administrator

Command Modes

Exec > Global Configuration > Quality of Service Profile Configuration

configure > quality-of-service-profile

Entering the above command sequence results in the following prompt:

```
[local]host_name(qos-of-service-profile)#
```

Syntax Description

```
class { background | conversational | interactive | streaming } [
qualif_option ]
remove class { background | conversational | interactive | streaming } [
 qualif_option ]
```

remove

Removes previously defined values for the specified option or for an entire class if a qualifying option is not included in the command.

background

Selects the background traffic class. This 'best-effort' class manages traffic that is handled as a background function, like email, where time to delivery is not a key factor. The selection of background traffic class can be refined with the addition of one of the following qualifying options:

- **all-values**
- **arp**
- **evolved-arp**
- **mbr-down**
- **mbr-map-down**
- **mbr-map-up**
- **mbr-up**
- **residual-bit-error-rate**
- **sdu**

All qualifying options are explained below.

conversational

Selects the 'real-time' conversational traffic class of service, which has the most stringent time requirements of the four classes and is typically reserved for voice traffic. The section of the conversational traffic class can be refined with the addition of one of the following qualifying options:

- **all-values**
- **arp**
- **evolved-arp**
- **gbr-down**
- **gbr-up**
- **mbr-down**
- **mbr-map-down**
- **mbr-map-up**
- **mbr-up**
- **min-transfer-delay**
- **residual-bit-error-rate**
- **sdu**

All qualifying options are explained below.

interactive

Selects interactive traffic class of service. This class is characterized by a request/response pattern (someone sends data and then waits for a response) which requires the preservation of the data but delivers on a 'best-effort' model. The section of the interactive traffic class can be refined with the addition of one of the following qualifying options:

- **all-values**

- **arp**
- **evolved-arp**
- **mbr-down**
- **mbr-map-down**
- **mbr-map-up**
- **mbr-up**
- **residual-bit-error-rate**
- **sdu**
- **thp**

All qualifying options are explained below.

streaming

Selects the streaming traffic class of service, which handles one-way, real-time data transmission - such as streaming video or audio. The section of the interactive traffic class can be refined with the addition of one of the following qualifying options:

- **all-values**
- **arp**
- **evolved-arp**
- **gbr-down**
- **gbr-up**
- **mbr-down**
- **mbr-map-down**
- **mbr-map-up**
- **mbr-up**
- **min-transfer-delay**
- **residual-bit-error-rate**
- **sdu**

All qualifying options are explained below.

qualif_option

Qualifying options are the QoS parameters and they include:

- **all-values** - This option will change the configuration to predefined values for *all* the relevant QoS parameters for the class. This keyword is not used if other options are to be defined. The predefined values are:

Table 1: Predefined QoS Parameters

QoS Parameter	Predefined Value
Traffic Class	**Background**
SDU delivery order	No
Delivery of Erroneous SDUs	No
Max Bit Rate Uplink	64 kbps

QoS Parameter	Predefined Value
Max Bit Rate Downlink	64 kbps
Allocation/Retention Priority	3
SDU Max Size	1500 octets
SDU Error Ratio	3 (1 * 10 ^ -3)
Residual Bit Error Rate	4 (4 * 10 ^ -3)
Traffic Class	**Conversational**
SDU delivery order	No
Delivery of Erroneous SDUs	No
Max Bit Rate Uplink	16 kbps
Max Bit Rate Downlink	16 kbps
Allocation/Retention Priority	3
Guaranteed Bit Rate Uplink	16 kbps
Guaranteed Bit Rate downlink	16 kbps
SDU Max Size	1500 octets
Minimum Transfer Delay	100 milliseconds
SDU Error Ratio	1 (1 * 10 ^ -2)
Residual Bit Error Rate	1 (5 * 10 ^ -2)
Traffic Class	**Interactive**
SDU delivery order	No
Delivery of Erroneous SDUs	No
Max Bit Rate Uplink	64 kbps
Max Bit Rate Downlink	64 kbps
Traffic Handling Priority	3
SDU Max Size	1500 octets
SDU Error Ratio	3 (1 * 10 ^ -3)
Residual Bit Error Rate	4 (4 * 10 ^ -3)
Traffic Class	**Streaming**
SDU delivery order	No
Delivery of Erroneous SDUs	No
Max Bit Rate Uplink	16 kbps
Max Bit Rate Downlink	16 kbps

QoS Parameter	Predefined Value
Allocation/Retention Priority	3
Guaranteed Bit Rate Uplink	16 kbps
Guaranteed Bit Rate downlink	16 kbps
SDU Max Size	1500 octets
Minimum Transfer Delay	300 milliseconds
SDU Error Ratio	7 (1 * 10 ^ -3)
Residual Bit Error Rate	1 (5 * 10 ^ -2)

- **arp** - Sets the allocation/retention priority. Enter an integer from 1 to 3.
- **evolved-arp** - This keyword is used to configure the E-ARP values. The values for pre-emption capability, pre-emption vulnerability and priority value can be configured using this option.
  - **preemption-capability**: The value of **preemption-capability** is configured as either "0" or "1".
  - **preemption-vulnerability**: The value of **preemption-vulnerability** is configured as either "0" or "1".
  - **priority-level**: The **priority-level** can be configured as an integer value in the range "1" up to "15".
- **gbr-down** - Guaranteed Kbps rate for the downlink direction. Enter an integer from the range 1 to 256000.
- **gbr-up** - Guaranteed Kbps rate for the uplink direction. Enter an integer from 1 to 256000.
- **mbr-down** - Maximum Kbps rate for the downlink direction. Enter an integer from the range 1 to 256000.
- **mbr-map-down from** *from_kbps* **to** *to_kbps* - Map received HLR MBR (**from** value) to a locally configured downlink MBR value (**to** value):
  - *from_kbps* - Enter an integer from 1 to 25600.
  - *to_kbps* - Enter an integer from 1 to 25600.
- **mbr-map-up from** *from_kbps* **to** *to_kbps* - Map received HLR MBR (**from** value) to a locally configured uplink MBR value (**to** value):
  - *from_kbps* - Enter an integer from 1 to 25600.
  - *to_kbps* - Enter an integer from 1 to 25600.
- **mbr-up** - Maximum Kbps rate for the uplink direction. Enter an integer from 1 to 256000.
- **min-transfer-delay** - Minimum transfer delay in milliseconds. Enter an integer from 80 to 4000.
- **residual-bit-error-rate** -
  - Background TC residual-bit-error-rate range is from 4*10^-4 to 6*10^-8. Enter on of the following integers, where:
    - **4**: represents 4*10^-3
    - **7**: represents 10^-5
    - **9**: represents 6*10^-8
  - Conversational TC residual-bit-error-rate range is from 5*10^-2 to 10^-6. Enter one of the following integers, where:

- **1**: represents 5*10^-2
- **2**: represents 10^-2
- **3**: represents 5*10^-3
- **5**: represents 10^-3
- **6**: represents 10^-4
- **7**: represents 10^-5
- **8**: represents 10^-6

- Interactive TC residual-bit-error-rate range is from 4*10^-4 to 6*10^-8. Enter one of the following integers, where:
  - **4**: represents 4*10^-3
  - **7**: represents 10^-5
  - **9**: represents 6*10^-8

- Streaming TC residual-bit-error-rate range is from 5*10^-2 to 10^-6. Enter one of the following integers, where:
  - **1**: represents 5*10-2
  - **2**: represents 10^-2
  - **3**: represents 5*10^-3
  - **5**: represents 10^-3
  - **6**: represents 10^-4
  - **7**: represents 10^-5
  - **8**: represents 10^-6

- **sdu** - Signalling data unit keyword, must include one of the following options:
  - **delivery-order**- Enter one of the two following options:
    - **no**- Without delivery order
    - **yes**- With delivery order
  - **erroneous**- Enter one of the two following options:
    - **no**- Erroneous SDUs will not be delivered
    - **no-detect**- Erroneous SDUs are not detected ('-')
    - **yes**- Erroneous SDUs will be delivered
  - **error-ratio**- The SDU error-ratio range is from 10^-3 to 10^-6. Enter an integer from 1 to 6, where:
    - **3**- Represents 10^-3
    - **4**- Represents 10^-4
    - **6**- Represents 10^-6
  - **max-size**- Defines the maximum number of octets (size) of the SDU. Enter an integer from 10 to 1502.
- **thp** - Sets the traffic handling priority. Enter an integer from 1 to 3.

Usage Guidelines

This command defines the qualifying options (parameters) for each QoS traffic class defined for this QoS profile.

Repeat the command as often as needed with different options to define all required QoS criteria. For example, to configure the maximum bit rate (MBR) for the downlink and uplink directions for a traffic class, this command must be used twice, specifying **mbr-down** once and **mbr-up** once.

Advantage for local mapping of MBR: some HLRs cannot be configured with high MBR values. Using the **mbr-map-up** and the **mbr-map-down** parameters allows the SGSN to be configured to treat a specific HLR value as meaning the desired high MBR value. In a case where the HLR does not support HSPA+ bit rates, but the handsets and network do, this feature allows the operator to overcome limitations on the HLR and provide HSPA+ bit rates by overwriting the provisioned HLR-QoS MBR values with SGSN-configured values. When MBR mapping is configured, if QoS is preferred as the HLR value, then the subscription QoS MBR received from the HLR is compared with the "from" value in the table. If it matches, then it is converted to the value specified by the "to" value in the table. QoS negotiation happens based on the converted value.

Advantage for QoS capping with THP and ARP: Controlling THP and ARP via Operator Policy: This functionality can differentiate home vs. roaming subscribers, and prevent visiting subscribers from receiving a high-tiered service. For example, a service provider could offer service differentiation using Ultra/Super/Standard service levels based upon QoS; this could justify charging a corporate customer more to use the Internet APN than would be charged to a consumer. This could be accomplished by controlling the traffic handling priority (THP) over the air interface, i.e. THP 1 = Ultra, THP 2 = Super and THP 3 = Standard.

Example

Use the following command to configure the entire conversational traffic class with predefined QoS options:

```
class conversational all-values
```

Now change the background class ARP from 3 to 2:

```
class background arp 2
```

Invalidate the THP parameter, by removing all value from the parameter, for the interactive class:

```
remove class interactive thp
```

description

Defines a descriptive string relevant to the specific QoS profile.

Product

SGSN

Privilege

Security Administrator, Administrator

Command Modes

Exec > Global Configuration > Quality of Service Profile Configuration

configure > quality-of-service-profile

Entering the above command sequence results in the following prompt:

```
[local]host_name(qos-of-service-profile)#
```

Syntax Description

description *description*
remove description

remove

Removes the configured description from this QoS profile.

description

Specifies a description for this QoS profile as an alphanumeric string of 1 through 100 characters. The string may include spaces, punctuation, and case-sensitive letters if the string is enclosed in double quotation marks (").

Usage Guidelines Define information that identifies this particular QoS profile.

Example

Indicate that QoS profile *qosprof1* is to be used for customers in India and that the profile was created on April 10th of 2014:

```
description "qosprof1 defines QoS for customers in India (4/10/14)."
```

epc-qos-params-in-gtpv1

This command enables or disables the SGSN to send EPC QoS parameters to the GGSN.

Product SGSN

Privilege Security Administrator, Administrator

Command Modes Exec > Global Configuration > Quality of Service Profile Configuration

configure > quality-of-service-profile

Entering the above command sequence results in the following prompt:

```
[local]host_name(qos-of-service-profile)#
```

Syntax Description

```
epc-qos-params-in-gtpv1 { eps-subscription | gprs-subscription }
remove epc-qos-params-in-gtpv1
```

remove

Removes previous configuration changes and resets the default.

eps-subscription

If the keyword **eps-subscription** is configured, the EPC QoS parameters from EPS subscription are sent to the GGSN. (Note: This option is not supported in this release).

gprs-subscription

If the keyword **gprs-subscription** is configured, E-ARP and APN-AMBR from the GPRS subscription are sent. The UE-AMBR value is read from the user (local capping).

Usage Guidelines This command is disabled by default. On enabling this command E-ARP and APN-AMBR parameters are included in the GTPV1 SM messages towards the GGSN.

Example

The following command enables the SGSN to send EPC QoS parameters to the GGSN. The E-ARP and APN-AMBR values are picked from the GPRS subscription and the UE-AMBR value is read from the user (local capping).

```
epc-qos-params-in-gtpv1 gprs-subscription
```

operator-defined-qci

This command enables Operator Specific QCI in MME. If this command is enabled, MME accepts the QCI range 128 - 254 from HSS and P-GW.

Product MME

Privilege Security Administrator, Administrator

Command Modes Exec > Global Configuration > Quality of Service Profile Configuration

configure > quality-of-service-profile

Entering the above command sequence results in the following prompt:

```
[local]host_name(qos-of-service-profile)#
```

Syntax Description

```
[ remove ] operator-defined-qci
```

remove

Removes the operator defined QCI configuration from the QoS profile.

Usage Guidelines The non-standard QCIs provides Operator Specific QoS for M2M and other mission critical communications.

In order to use operator specific QCIs, the QoS parameters need to be configured using the **pre-rel8-qos-mapping** command. On configuring this command, the operator defined QCI values are mapped to the PreRelease8QoS parameters during to UTRAN/GERAN.

Example

The following command enables Operator Defined QCI :

```
operator-defined-qci
```

prefer-as-cap

This command instructs the SGSN to choose the QoS configuration as the "qos parameters" for session establishment.

Product SGSN

Privilege Security Administrator, Administrator

Command Modes Exec > Global Configuration > Quality of Service Profile Configuration

configure > quality-of-service-profile

Entering the above command sequence results in the following prompt:

```
[local]host_name(qos-of-service-profile)#
```

Syntax Description **prefer-as-cap [both-subscription-and-local | subscription | local]**

both-subscription-and-local

This keyword instructs the SGSN to use, as the capping value during session establishment, the lower of either the locally configured QoS bit rate or the subscription received from HLR/HSS.

subscription

Instructs the SGSN to take QoS parameters from the subscription received from HLR (or HSS) and use the same as the capping value for session establishment.

Default for SGSN.

local

Instructs the SGSN to take QoS parameters from the local configuration and use it for session establishment.

Usage Guidelines Use this command to instruct the SGSN to choose the QoS configuration for sessionestablishment.

Example

The following command instructs the SGSN to cap the bit rate with the lower rate of the two configurations, subscription or local:

prefer-as-cap both-subscription-and-local

prefer-tc

Use this command to instruct which traffic class to use. This command overrides the traffic class received from subscription.

Product SGSN

Privilege Security Administrator, Administrator

Command Modes Exec > Global Configuration > Quality of Service Profile Configuration

configure > quality-of-service-profile

Entering the above command sequence results in the following prompt:

```
[local]host_name(qos-of-service-profile)#
```

Syntax Description

prefer-tc [background | conversational | streaming | interactive] remove prefer-tc

remove

Removes previous configuration changes and resets the default.

background

Use this keyword to use the **background** traffic class.

conversational

Use this keyword to use the **conversational** traffic class.

streaming

Use this keyword to use the **streaming** traffic class.

interactive

Use this keyword to use the **interactive** traffic class.

Usage Guidelines

Use this command to instruct which traffic class to use. This command is applicable only if following is configured, or the configuration will be ignored during call processing:

- The **prefer-as-cap** is set to **local** or **both-subscription-and-local**.
- The Traffic class configured in **prefer-tc** should be configured. For example, if **prefer-tc** is configured as background then background class under QoS should also be configured.

Example

The following command is used to choose the background traffic class as the preferred traffic class:

prefer-tc background

qci-when-missing-in-subscription

This command is used to assign a default QCI value when a QCI value is not received from the subscription.

Product

MME

Privilege

Security Administrator, Administrator

Command Modes

Exec > Global Configuration > Quality of Service Profile Configuration

configure > quality-of-service-profile

Entering the above command sequence results in the following prompt:

```
[local]host_name(qos-of-service-profile)#
```

Syntax Description **[remove] qci-when-missing-in-subscription***qci_value*

remove

Removes the default QCI value configuration from the QoS profile.

qci_value

The *qci_value* variable in this configuration is considered as a default QCI value. The QCI value accepted is either a Standard QCI value or Operator Specific value. The Standard QCI values range from 1 to 9. The Operator Specific values range from 128 to 254. The configuration does not accept any other value apart from the ones mentioned above.

Usage Guidelines Use this command to configure a default QCI to avoid rejection during handovers to UTRAN/GERAN by MME when a QCI value is not received from the Subscription.

Example

The following command configures a default value QCI of value 5:

```
qci-when-missing-in-subscription 5
```

qci-reject

Use this command to identify a specific QCI or a range of QCI for which the MME must reject bearer establishment or modification.

Product MME

Privilege Administrator

Command Modes Exec > Global Configuration > Quality of Service Profile Configuration

configure > quality-of-service-profile

Entering the above command sequence results in the following prompt:

```
[local]host_name(qos-of-service-profile)#
```

Syntax Description

```
qci-reject { default-bearer | dedicated-bearer } qci_value [ to  end_qci_value ]
remove qci-reject
```

remove qci-reject

Deletes this configuration from the QoS profile configuration.

dedicated-bearer

Identifies either a specific QoS class identifier (QCI) or a range of QCI for the dedicated-bearer.

default-bearer

Identifies either a specific QoS class identifier (QCI) or a range of QCI for the default-bearer.

qci_value

Identifies a specific QCI value.

- For dedicated-bearers, enter an integer from 1 through 9. You can enter the new standardized QCI values 65, 66, 67, 69 and 70.
- For default-bearers, enter an integer from 5 through 9. You can enter the new standardized QCI values 69 and 70.

to *end_qci_value*

Type "to" and then enter an integer for the QCI value to end the range.

- For dedicated-bearers, enter an integer from 2 through 9 that is greater than the QCI value entered for the beginning of the range. You can enter the new standardized QCI values 65, 66, 67, 69 and 70.
- For default-bearers, enter an integer from 6 through 9 that is greater than the QCI value entered for the beginning of the range. You can enter the new standardized QCI values 69 and 70.

Usage Guidelines

The MME can reject default-bearers and dedicated-bearers based on QCI received from the subscription or the peer-MME/S4-SGSN during inbound relocation or the Create Session Response/Update Bearer Request/Create Bearer Request procedure.

Example

The following is a sample command that illustrates the configuration for the MME to reject bearer establishment for the dedicated-bearer channel if QCI 7 is received from the P-GW:

```
 qci-reject
dedicated-bearer 7
```