Support for SGSN QoS based on PLMN, RAT Type

This chapter describes the Support for SGSN QoS based on PLMN, RAT type.

Feature Description

SGSN support for QoS selection based on RAT type is introduced through this feature, this functionality improves the Operator Policy based QoS Control capabilities. Currently, the SGSN supports only PLMN based QoS selection. The Operator policy on SGSN allows the operators to control QoS for visiting subscribers (National or International roaming-in subscribers or MVNO subscribers) on an APN basis depending on the PLMN-ID or IMSI range. APN profiles are configured under the Operator Policy as either default for all APN or specific profiles for particular APN.

The following limitations are encountered when only PLMN based QoS selection is supported:

1. When co-locating MME and SGSN into the same node, separate Operator Policy can be configured for E-UTRAN on the MME and both GERAN/UTRAN on the SGSN but not for GERAN and UTRAN separately on the SGSN.

2. The Operator policy currently allows to 'allow' or 'restrict' access to the network based on zone-code (set of LA/SA for 2G/3G and TA for LTE) but does not allow restricting the QoS in specific area of the network based on zone-code.

To overcome the limitations listed above, Operator Policy based QoS Control capabilities are introduced based on RAT-Type or a combination of RAT-Type with PLMN-ID or IMSI range.

How it Works

With the introduction of QoS selection based on RAT type, several QoS profiles can now be configured and associated with the APN profile with the access type marked as either GPRS or UMTS.

Listed below are the SGSN functions now supported for QoS selection:

1. Configuration of QoS based on RAT type

2. Configuration of QoS based on PLMN, this configuration automatically happens as the Operator policy is PLMN based. The QoS Profile is configured on RAT basis.

3. SGSN provides support for configuring APN-AMBR and UE-AMBR per RAT Type.

The SGSN supports configuring all the R99 QoS parameter under the APN profile except for Traffic class. It also supports configuring the R97 QoS parameters namely Delay Class, Reliability class, Peak throughput, Precedence class and Mean Throughput. This configuration is used to over-ride the HLR provided Subscribed QoS value or the configured values are used in combination with subscribed values.

QoS capping has to be performed at various levels like the RAT-Type and PLMN. To achieve QoS capping at different levels, the QoS parameters under the APN profile are also made available under a new profile called the "QoS-profile". The QoS-profile also provides support for over-riding the R97 QoS parameters, Traffic class, UE-AMBR and the APN-AMBR (UE-AMBR and APN-AMBR applicable only for S4-SGSN). This feature enhancement supports backward compatibility.

The QoS Profile can be associated with the APN profile, for each access-type independently or as common to profile.

At the APN profile level, if QoS parameters (R99 parameters except traffic class) as well as a QoS profile are configured, then the QoS profile takes precedence over the QoS parameters.

QoS parameters in QoS profile and APN profile are identical. The new QoS profile provides the modular approach in configuring QoS parameters and associate it to APN Profile per RAT Type.

QoS profile also provides an additional configuration (when compared to apn-profile) named "prefer-tc". This configuration allows the operator to override the Traffic class received in Subscription. "prefer-tc" works closely with "prefer-as-cap" configuration; either:

1. If "prefer-as-cap" is set to both subscription and local then SGSN will negotiate the traffic class configured to traffic class subscribed. Further QoS parameters under this traffic class will be negotiated.

2. If "prefer-as-cap" is set to local then QoS parameters under local configuration will be negotiated with requested for QoS capping.

If operator configures "prefer-tc" then he is expected to configure all the QoS parameters of all traffic class under QoS profile.

Configuring SGSN Support for RAT Type based QoS Selection

This section provides information on configuring SGSN support for QoS selection based on PLMN, RAT Type. The following commands have to be configured to enable RAT type based QoS selection:

Configuring APN Profile and QoS Profile Association

Use the following command to associate an APN profile with a QoS profile:

```
config
 apn-profile profile_name
  associate quality-of-service-profile profile_name access-type [ gprs  |
umts ]
    remove associate quality-of-service-profile profile_name access-type [
```

```
gprs  | umts ]
   exit
```

Notes:

This command is used to associate the specified Quality of Service profile with the APN profile. The access-type must be configured as either **gprs** or **umts**.

Configuring the Quality of Service Profile

Use the following commands under the new CLI configuration mode "Quality of Service Profile" to configure the QoS parameters:

```
config
 quality-of-service-profile <qos_profile_name>
    apn-ambr max-ul mbr-up max-dl mbr-dwn
    remove apn-ambr
    class { background | conversational | interactive | streaming } [
qualif_option ]
    remove class { background | conversational | interactive | streaming
 } [ qualif_option ]
    description description
    remove description
    end
    exit
    prefer-as-cap [ both-subscription-and-local | subscription | local ]
    prefer-tc [ background | conversational | streaming | interactive ]
    remove prefer-tc
    exit
```

For details about the commands listed above, refer to the *Command Line Interface Reference*.

Monitoring and Troubleshooting RAT Type Based QoS Selection

This section provides information on how to monitor the QoS Selection feature and to determine that it is working correctly.

Show Command(s) and/or Outputs

The following show commands are used to monitor this feature:

show apn-profile full [all | name]

The following parameters are introduced in the **show apn-profile full [all | name]**:

- Associated Quality of Service Profile Name (UMTS)

- Validity

- Associated Quality of Service Profile Name (GPRS)

show quality-of-service-profile [all | full [all | name] | name]

This new show command is introduced to support this feature. The following parameters are displayed on execution of this command:

- QoS Profile Name

- Description

- Preferred Traffic Class

- Quality of Service Capping

- Prefer Type

- Traffic Class

- Sdu delivery order

- Delivery Of Erroneous Sdus

- Max Bit Rate Uplink

- Max Bit Rate Downlink

- Allocation/Retention Priority

- Guaranteed Bit Rate Uplink

- Guaranteed Bit Rate Downlink

- Sdu Max Size

- Minimum Transfer delay

- Sdu Error Ratio

- Residual BE R

- QoS APN-AMBR

- Max uplink

- Max downlink