



# Support for RAT/Frequency Selection Priority ID (RFSP-ID)

This chapter describes the SGSN Support for RAT/Frequency Selection Priority ID.

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## Feature Description

SGSN supports sending of the RAT/Frequency Selection Priority (RFSP ID) from subscription or a local overridden value towards RNC BSC. The RNC/BSC use the subscribed RFSP ID or locally overridden value at the SGSN to choose the Radio frequency. RANAP Direct transfer Extension, RANAP Common ID Extension and DL-Unitdata message will be encoded with RFSP ID. RFSP ID is sent in Common ID message to RNC. RFSP ID is sent in DL-Unitdata PDU and PS handover related messages to BSC. RFSP ID will also be send in BSSGP DL-UNITDATA msg

## How it Works

### Encoding and De-coding of RFSP Ids in different scenarios

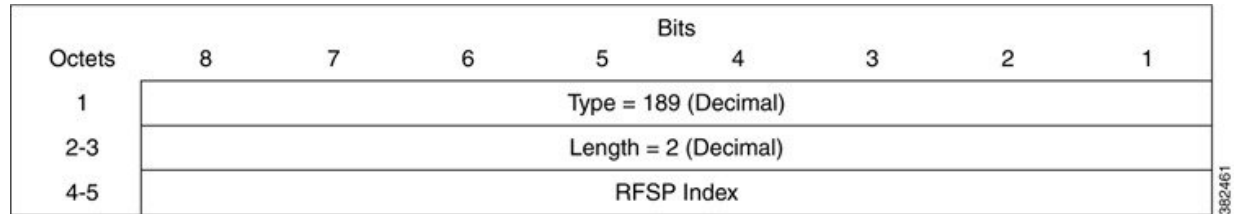
**Encoding of RFSP-Id in DL-unit data:**RFSP Id is encoded as "Subscriber Profile ID for RAT/Frequency priority" IE in DL-UnitData message as per 3GPP TS 48.018 (version 10.8.0, Section 10.2.1).

**Figure 1: Subscriber Profile ID for RAT/Frequency priority coding**

	8	7	6	5	4	3	2	1
Octet 1	IEI							
Octet 2	Length Indicator							
Octet 3	Octet 3 contains the value part of the Subscriber Profile ID for RAT/Frequency priority IE.							

**Encoding of Subscribed RFSP Index and RFSP Id in GTPC-V1 messages:** RFSP ID will be encoded in GTPC-V1 message as per 3GPP TS 29.060 (version 11.8.0 Release 11, Section 7.7.88)

*Figure 2: Encoding of Subscribed RFSP Id in GTPC-V1 messages*



**De-coding of RFSP-ID in a MAP message:** The RFSP-Id in EPS-Subscription Data IE is received as part of Insert Subscriber Data request for Gn/Gp SGSN. The decoding of RFSP-Id is done as per 3GPP TS 29.272 (Version 11.9.0, Section 7.3.46).

**De-coding of RFSP-Id AVP in Subscription data from the S6d interface:** The RFSP ID is grouped in Subscription Data AVP on receiving ULA from HSS over the S6d interface. This is used in the S4-SGSN. This AVP is of type Unsigned 32 as per 3GPP TS 29.272 (Version 11.9.0, Section 7.3.46).

In the SGSN MAP module, the MAP module is enhanced to de-code the RFSP-Id in Insert Subscriber Data request as part of Update GPRS Location procedure. Since RFSP-Id and APN profile are optional parameters the DB record will be updated as follows:

1. If RFSP ID is present in EPS subscription and the override value is present in the Call Control Profile for that RFSP-Id then the RFSP-Id is modified with the overridden value and stored in the mm-ctxt DB parameter. If override value is not present in the Call Control Profile for RFSP-Id then RFSP Id received in ISD request is used.
2. If RFSP-Id is not present in the EPS Subscription, then default override RFSP-Id is used.

In the 3G Access module, the RFSP ID for the UE is sent to the RNC through the following RANAP IEs:

• **Common ID IE:**

Before setting up the RRC connection RNC needs to be notified with RFSP ID, the RFSP ID is sent to the RNC using Common ID procedure. The Common ID is sent during Attach, RAU and Service request.

• **Direct Transfer IE:**

If there is a change in the RFSP ID, the RNC is notified with the RFSP-ID in the Direct Transfer message. Along with the direct transfer IE, the latest value of the RFSP ID is notified to the RNC (for example, after GLU, ULR/ULA procedure).

• **Source RNC-To Target RNC-Transparent Container-Ext IE:**

The Subscriber Profile ID for RFP IE is transferred from Source RNC to Target RNC as a part of Source RNC-To Target RNC-Transparent Container-Ext IE during SRNS re-location procedure.

In the 3G MM module, during Attach the default RFSP-ID is sent in the Common ID. message towards RNC before retrieving Subscription data from HLR. The RFSP-ID will be fetched from EPS Subscription Data. RFSP-ID will be overridden based on:

1. If RFSP-ID is present in EPS subscription and the override value is present in the Call Control Profile for that RFSP-ID then the RFSP-ID is modified with the overridden value and stored in the mm-ctxt DB parameter. If override value is not present in the Call Control Profile for RFSP-ID then RFSP-ID received in ISD request is used.

2. If RFSP-ID is not present in the EPS Subscription, then default override RFSP-ID is used.

The final RFSP ID is encoded as "Subscriber Profile ID for RAT/Frequency priority" as per 3GPP TS 48.018 (Section 10.2.1) in the next Direct transfer message containing Attach Accept.

In a 2G module, the DL-data unit messages are encoded with RFSP-ID as "Subscriber Profile ID for RAT/Frequency priority" IE in DL-UnitData message as per 3GPP TS 48.018 (Section 10.2.1).

### Idle Mode Handover

Consider the following Idle Mode Handover scenarios:

#### • Inter-SGSN RAU New SGSN

##### Subscriber moves to a Gn/Gp SGSN

- Routing Area Update request is received at the Gn/Gp SGSN.
- After DNS, the old node found to be a Gn/Gp SGSN.
- The new SGSN sends a Context request in the SGSN Context Request (GTPv1) to the old SGSN.
- New SGSN decodes the Context Response in GTPv1 format for the RFSP ID and overrides the same. The RFSP ID is then stored in the mm-context.

##### Subscriber moves to S4-SGSN

The Routing Area Update request is received at the S4-SGSN, SGSN sends the Context Request to Old SGSN:

1. After DNS the old node found to be Gn/Gp SGSN. The S4-SGSN sends the Context request in SGSN Context Request (GTPv1) to the old SGSN. The new SGSN decodes the Context Response in GTPv1 format for the RFSP ID and overrides the same. The RFSP ID is then stored in the mm-context.
2. After DNS the old node found to be S4 SGSN/MME, the new SGSN sends the Context request in SGSN Context Request (GTPv2) to the S4-SGSN/MME. The new SGSN decodes the Context Response in GTPv2 format for the RFSP ID and override the same. The RFSP ID is then stored in the mm-context.

#### • Inter-SGSN RAU Old SGSN

When a SGSN receives the Context request in GTPv1 format, the SGSN Context response is sent back to the sender SGSN in GTPv1 format with RFSP ID encoded as per the 3GPP TS 29.060 (Release 8, Version 8.16.0, Section 7.7.88) in mm-context.

When a SGSN receives the Context request in GTPv2 format, the SGSN Context response is sent back to the sender SGSN in GTPv2 format with RFSP ID encoded.

### Connected Mode Handover

#### • Inter-SRNS New SGSN

When a Gn/Gp-SGSN receives a Forwards Relocation Request from the Old SGSN as a result of the SRNS Re-location Procedure, it decodes the RFSP ID from the GTPv1 formatted message and applies overriding policy before saving it in the mm-context.

When a S4-SGSN receives Forwards Re-location Request from an Old Gn/Gp SGSN as a result of SRNS Re-location Procedure, it decodes the RFSP ID from the GTPv1 formatted message and applies the overriding policy before saving it in the mm-context.

When a S4-SGSN receives a Forwards Re-location Request from an Old S4-SGSN/MME as a result of SRNS Re-location Procedure, it decodes the RFSP ID from GTPv2 formatted message and applies the overriding policy before saving it in the mm-context.

- **Inter-SRNS old SGSN**

When a Gn/Gp SGSN receives a re-location request from the RNC as a part of the SRNS Re-location Procedure, it encodes the Forward Relocation Request with RFSP ID in GTPv1 formatted message.

When a S4-SGSN receives a re-location request from the RNC as a part of the SRNS Re-location Procedure, it encodes the Forward Re-location Request with RFSP ID in GTPv2 formatted message.

## Standards Compliance

This feature complies with the following standards:

- 3GPP TS 48.018 (Release 8)
- 3GPP TS 23.060 (Release 8)
- 3GPP TS 25.413 (Release 8)
- 3GPP TS 29.002 (Release 8)
- 3GPP TS 29.272 (Release 8)
- 3GPP TS 25.413 (version 11.5.0)
- 3GPP TS 48.018 (version 10.8.0)
- 3GPP TS 29.060 (version 11.8.0)
- 3GPP TS 29.272 (version 11.9.0)
- 3GPP TS 29.002 (version 11.7.0)

## Configuring Support for RAT/Frequency Selection Priority ID

Listed below are the commands to configure the support for RFSP ID:

1. This command configures the RAT frequency selection priority override parameters for this call control profile. A new keyword **eutran-ho-restricted** *value* has been introduced to configure the value for RAT frequency selection priority when Handover to EUTRAN is restricted.

```

config
  call-control profile profile_name
    rfsp-override { default value | eutran-ho-restricted value
  | ue-val value new-val value + }
    remove rfsp-override { default | eutran-ho-restricted |
ue-val value }
  exit

```

2. This command is introduced to enable or disable the inclusion of the Subscriber Profile ID for RAT/Frequency priority IE in RANAP Direct transfer Extension and Common Id. Extension messages.

```

config
  context <context_name>
  iups_service <service_name>
  rnc id rnc_id

```

```
ranap rfsp-id-ie
no ranap rfsp-id-ie
exit
```

3. Configure this command to exclude or include RAT/Frequency Selection Priority (RFSP ID) in BSSGP DL-Unitdata messages to the BSC.

```
config
sgsn-global
bssgp-message dl-unitdata rfsp-id exclude
default bssgp-message dl-unitdata rfsp-id exclude
exit
```

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

## Monitoring and Troubleshooting the the Support for RFSP-ID

Use the commands listed below to monitor and/or troubleshoot the support for RFSP ID.

### Show Command(s) and/or Outputs

This section provides information regarding show commands and/or their outputs in support of the RFSP ID:

#### show call-control profile

The following new field is added in the show output to display the configured value for RAT frequency selection priority when Handover to EUTRAN is restricted:

- Rfsp-override eutran-ho-restricted

#### show subscribers sgsn-only full all

The following new field is added in the show output to display the value of the RFSD Id. Used:

- RFSP Id in Use

#### show subscribers gprs-only full all

The following new field is added in the show output to display the value of the RFSD Id. Used:

- RFSP Id in Use

#### show iups-service name

The following new field is added in the show output to display if the Subscriber Profile ID for RAT/Frequency priority IE is included or not in the outbound RANAP Direct transfer Extension and Common Id Extension message:

- RFSP ID

## show sgsn-mode

The following new field is added in the show output to display if the RFSP ID is either included or excluded in BSSGP DL-Unitdata messages to the BSC:

- DL Unitdata Tx