

Configuring Regional Subscription

OPERATION DIRECTIONS

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1 Introduction

This document describes configuring regional subscription in the SGSN-MME for LTE systems.

1.1 Scope

This document covers the following:

- Prerequisites.
- Configuring regional subscription.
- Checking the consistency of the configuration, and activating and checkpointing the configuration.

Apply the configuration using Command Line Interface (CLI) commands. For more information about the Operation & Maintenance (O&M) environment, including CLI, see [Operation and Maintenance Description](#).

1.2 Target Groups

This document is intended for personnel configuring the SGSN-MME.

2 Prerequisites

This section outlines the prerequisites to configure the SGSN-MME.

2.1 Planning

Consider the following when planning the regional subscription configuration:

- The parameters associated with regional subscription are listed in [Regional Subscription \(CLI\)](#). The parameters required to configure a Geographical Area (GA) are listed in the [Parameter Description](#).
- The regional subscription restrictions configured are ignored for a UE with IMS emergency services.



2.2 User

To follow the CLI commands in this document, the user must be logged on as an O&M user with configuration rights. For more information, see [Operator Access Handling](#).

Training in the following areas for personnel configuring the SGSN-MME:

- Evolved Packet System (EPS) network in the LTE system
- UNIX™
- SGSN-MME

2.3 Activation

Changes to the configuration are implemented in runtime and do not require a restart.

3 Configuring Regional Subscription (LTE)

A regional subscription defines regional subscription areas (regions) where access is allowed or is restricted for an individual subscriber. Regional subscription is enforced on a per PLMN basis. For more information about regional subscription, see [LTE Mobility Management](#). To display the configuration classes and parameters related to regional subscription, see [Regional Subscription \(CLI\)](#).

Prerequisites

The following prerequisites are required to configure regional subscription:

- A Subscription based restriction feature license.
- One or more IMSI number series for which regional subscriptions are to be configured.

For more information on IMSI number series, see [Creating an IMSI Number Series](#).

- A PLMN configured with one or more Tracking Area (TA), where regional subscription is to be applied.

The following subsections present four examples of configuring regional subscription for LTE networks. In [Figure 1](#), [Figure 2](#), [Figure 3](#), and [Figure 4](#), each



hexagon represents a TA. The TAs are grouped into GAs represented by diagonally shaded lines. The GAs represent regional subscription areas, which are associated with Zone Codes (ZCs) in the SGSN-MME.

Note: If the SGSN-MME does not receive any ZC information in the subscription data, or receives a ZC which does not correspond to the ZC configured for the regional subscription area, then regional subscription does not apply.

Note: The examples are purely hypothetical and are used only to illustrate the possibilities of configuring regional subscription.

3.1 Configuring Regional Subscription to Restrict Part of a PLMN (LTE)

This example describes how regional subscription can be used to restrict part of a PLMN, and allow the rest of the PLMN implicitly. The following example configures the SGSN-MME to restrict the UE in a region covering TA 1 - TA 4, but to allow the UE in the rest of the PLMN.

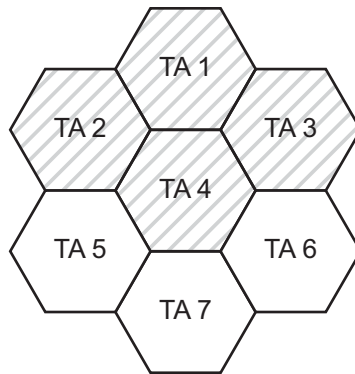


Figure 1 Configuring Regional Subscription to Restrict Part of the PLMN

In Figure 1, all seven TAs belong to the same PLMN. For IMSI number series 88889999, a regional subscription area covering TA 1 - TA 4 is configured. This region is configured to correspond to a ZC with decimal value 1111. This region is also configured to correspond to ZC with a decimal value 2222. In this example, we have two different ZCs that are used independently for the same regional subscription area.

If the SGSN-MME receives ZC 1111 or ZC 2222 in the subscription data during a mobility procedure for a UE belonging to IMSI number series 88889999, the corresponding area is restricted in the SGSN-MME. However, TAs that are not included in the corresponding region are allowed implicitly.

Configure regional subscription to restrict part of the PLMN by performing the following instructions:

1. Create a regional subscription profile to contain the regional subscription configuration.



```
gsh create_rs_profile -rpn RsProf1
```

2. Associate the selected IMSI number series with the regional subscription profile.

```
gsh modify_imsins -imsi 88889999 -rpn RsProf1
```

3. Create a regional subscription ZC list to specify rule to use and the PLMN identifier.

```
gsh create_rs_list -rln RsList1 -rule restrict -mcc 123 -mnc 456
```

4. Associate the regional subscription ZC list with the regional subscription profile.

```
gsh create_rs_profile_rs_list -rpn RsProf1 -rln RsList1
```

5. Create a regional subscription ZC with an associated name and decimal value per ZC to use.

```
gsh create_rs_zone_code -zcn ZoneCode1 -zc 1111
```

```
gsh create_rs_zone_code -zcn ZoneCode2 -zc 2222
```

6. Associate the zone codes with the regional subscription ZC list.

```
gsh create_rs_list_rs_zone_code -rln RsList1 -zcn ZoneCode1
```

```
gsh create_rs_list_rs_zone_code -rln RsList1 -zcn ZoneCode2
```

7. Create a GA covering the area to be restricted.

```
gsh create_ga -gan GaForRsRestrict
```

8. In the created GA, add a range of TAs in the specified PLMN, which are to be restricted when regional subscription is applied.

```
gsh create_ga_ta_range -gan GaForRsRestrict -tan TaForRsRestrict -mcc 123 -mnc 456 -first 1 -last 4
```

9. Associate the ZCs with the GA.

```
gsh create_rs_zone_code_ga -zcn ZoneCode1 -gan GaForRsRestrict
```

```
gsh create_rs_zone_code_ga -zcn ZoneCode2 -gan GaForRsRestrict
```

10. Enable the regional subscription feature.

```
modify_feature_state -fsi regional_subscription -fs ACTIVATED
```

11. Check the consistency of the configuration, and activate the configuration.

See Section 4 on page 10 for more information.



3.2 Configuring Regional Subscription to Allow Part of a PLMN (LTE)

This example describes how regional subscription can be used to allow part of a PLMN, and restrict the rest of the PLMN implicitly. The following example configures the SGSN-MME to allow the UE in a region covering TA 1 - TA 4, but to restrict the UE in the rest of the PLMN.

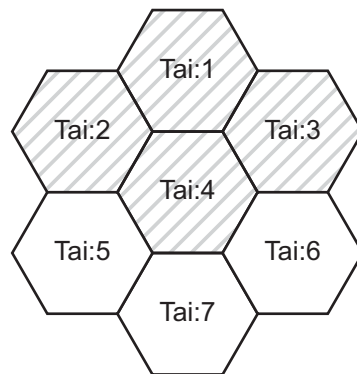


Figure 2 Configuring Regional Subscription to Allow Part of the PLMN

In Figure 2, all seven TAs belong to the same PLMN. For IMSI number series 88889999, a regional subscription area covering TA 1 - TA 4 is configured. This region is configured to correspond to ZC with decimal value 1111. If the SGSN-MME receives ZC 1111, the corresponding area is allowed in the SGSN-MME, but the TAs that are not included in the corresponding region are restricted.

Configure regional subscription to allow part of the PLMN by performing the following instructions:

1. Create a regional subscription profile to contain the regional subscription configuration.

```
gsh create_rs_profile -rpn RsProf2
```

2. Associate the selected IMSI number series with the regional subscription profile.

```
gsh modify_imsins-imsi 88889999 -rpn RsProf2
```

3. Create a regional subscription ZC list to specify the rule to use and PLMN identifier.

```
gsh create_rs_list -rln RsList2 -rule allow -mcc 123 -mnc 456
```

4. Associate the regional subscription ZC list with the regional subscription profile.

```
gsh create_rs_profile_rs_list -rpn RsProf2 -rln RsList2
```



5. Create a regional subscription ZC with name VipZone and decimal value 1111.

```
gsh create_rs_zone_code -zcn VipZone -zc 1111
```

6. Associate the zone code with the regional subscription ZC list.

```
gsh create_rs_list_rs_zone_code -rln RsList2 -zcn VipZone
```

7. Create a GA covering the area to be allowed.

```
gsh create_ga -gan VipRegion
```

8. In the created GA, add a range of TAs in the specified PLMN, which are to be allowed when regional subscription is applied.

```
gsh create_ga_ta_range -gan VipRegion -tan TaForRsAllow -mcc 123 -mnc 456 -first 1 -last 4
```

9. Associate the ZC with the GA.

```
gsh create_rs_zone_code_ga -zcn VipZone -gan VipRegion
```

3.3 Configuring Regional Subscription to Override Roaming Restrictions in the PLMN (LTE)

This example describes how regional subscription can be used to allow part of a PLMN, thus overriding any roaming restrictions configured in the PLMN. See [Configuring Roaming Restrictions](#) for more information about roaming restrictions.

The following example configures the SGSN-MME to allow the UE with regional subscription in a region covering TA 4 - TA 7 under all conditions, thus implicitly restricting the UE in TA 1 – TA 3. In this example, we also assume that roaming restrictions are configured in TA 1 – TA 4. The roaming restriction in TA 4 is overridden if the SGSN-MME receives ZC 1111 from the HSS in the subscription data.

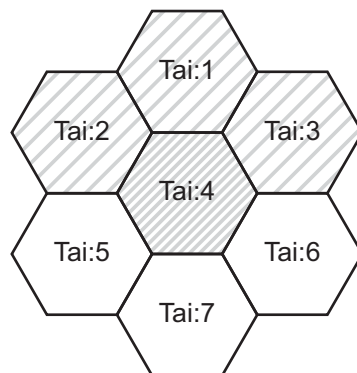


Figure 3 Configuring Regional Subscription to Override Roaming Restrictions in the PLMN



In Figure 3, all seven TAs belong to the same PLMN. Originally, roaming restrictions are configured for IMSI number series 88889999 in TA 1 to TA 4. For the IMSI number series 88889999, regional subscription is configured to allow the UE in TA 4 – TA7, thus overriding roaming restrictions in TA4, if the MME receives ZC with decimal value 1111 from the HSS. TA5 – TA 7 are allowed for IMSI number series 88889999 under all conditions.

Configure regional subscription to override roaming restrictions in the network by performing the following instructions:

1. Create a regional subscription profile to contain the regional subscription configuration.

```
gsh create_rs_profile -rpn RsProf3
```

2. Associate the selected IMSI number series with the regional subscription profile.

```
gsh modify_imsins -imsi 88889999 -rpn RsProf3
```

3. Create a regional subscription ZC list to specify the rule to use and PLMN identifier.

```
gsh create_rs_list -rln RsList3 -rule allow -mcc 123 -mnc 456
```

4. Associate the regional subscription profile with the regional subscription ZC list.

```
gsh create_rs_profile_rs_list -rpn RsProf3 -rln RsList31
```

5. Create a regional subscription ZC with name ZoneCode3 and decimal value 1111.

```
gsh create_rs_zone_code -zcn ZoneCode3 -zc 1111
```

6. Associate the zone code with the regional subscription ZC list.

```
gsh create_rs_list_rs_zone_code -rln RsList3 -zcn ZoneCode3
```

7. Create a GA covering the area to be allowed.

```
gsh create_ga -gan GaForRsAllow
```

8. In the created GA, add a range of TAs in the specified PLMN, which are to be allowed when regional subscription is applied.

```
gsh create_ga_ta_range -gan GaForRsAllow -tan TaForRsAllow -mcc 123 -mnc 456 -first 4 -last 7
```

9. Associate the ZC with the GA.

```
gsh create_rs_zone_code_ga -zcn ZoneCode3 -gan GaForRsAllow
```

3.4 Configuring Regional Subscription to Prevent Access to an External PLMN (LTE)

This example describes how regional subscription can also be used to prevent a UE from performing a handover or TAU to an external PLMN. The following example configures the SGSN-MME to restrict the UE in the PLMN (with MCC 123 MNC 456) from accessing an external PLMN (with MCC 123 MNC 789).

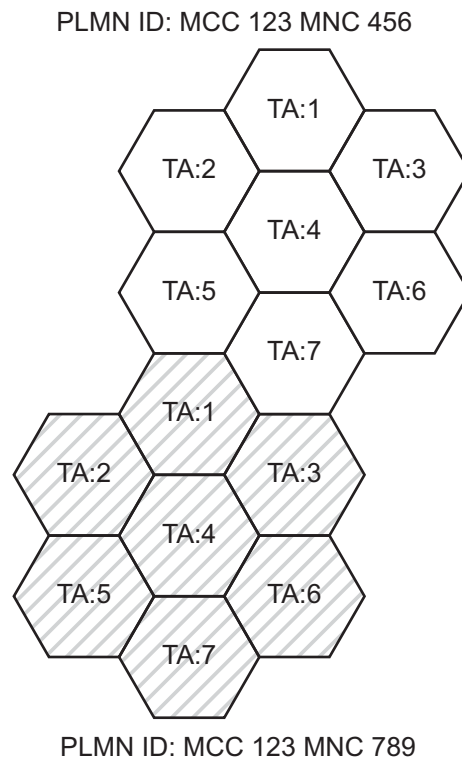


Figure 4 Configuring Regional Subscription to Restrict an External PLMN

In Figure 4, for IMSI number series 88889999, a regional subscription area covering an entire external PLMN (with MCC 123 MNC 789) is configured, which corresponds to ZC with decimal value 1111. The external PLMN (with MCC 123 MNC 789) is configured as allowed for handover with a Handover Restriction List (HRL) using the Equivalent PLMN list. See [Configuring a Handover Restriction List for LTE Access](#) for more information. The external PLMN (with MCC 123 MNC 789) is also configured as an equivalent PLMN using the selective Equivalent PLMN list. See [Configuring a Selective Equivalent PLMN List for LTE Access](#) for more information.

If the SGSN-MME receives ZC 1111 from the HSS when the UE enters the PLMN (with MCC 123 MNC 456), the external PLMN (with MCC 123 MNC 789) is excluded from the HRL in S1AP messages and from the Equivalent PLMN list in NAS messages. In this manner, the UE is prevented from performing a mobility procedure with the external PLMN (with MCC 123 MNC 789).



The MME prevents access to the external GA by performing the following actions:

- Removing the external PLMN from the Equivalent PLMN list that is sent in the NAS message to the UE.

See [Configuring a Selective Equivalent PLMN List for LTE Access](#) for more information.

- Removing the PLMN from the allowed PLMN list in the Handover Restriction List (HRL) sent to the eNodeB.

See [Configuring a Handover Restriction List for LTE Access](#) for more information.

Configure regional subscription to prevent a UE from performing a handover to an external PLMN by performing the following instructions:

1. Create a regional subscription profile to contain the regional subscription configuration.

```
gsh create_rs_profile -rpn RsProf4
```

2. Associate the selected IMSI number series with the regional subscription profile.

```
gsh modify_imsins -imsi 88889999 -rpn RsProf4
```

3. Create a regional subscription ZC list to specify the rule to use and the PLMN identifier.

```
gsh create_rs_list -rln RsList4 -rule restrict -mcc 123 -mnc 456
```

Note: In this special case, the SGSN-MME interprets the rule as `restrict`, regardless of the value of the `-rule` parameter. Use the `create_ga_ta_range` command to specify the external PLMN restricted in this manner.

4. Associate the regional subscription ZC list with the regional subscription profile.

```
gsh create_rs_profile_rs_list -rpn RsProf4 -rln RsList4
```

5. Create a regional subscription ZC with nameZoneCode4 and decimal value 1111.

```
gsh create_rs_zone_code -zcn ZoneCode4 -zc 1111
```

6. Associate the zone code with the regional subscription ZC list.

```
gsh create_rs_list_rs_zone_code -rln RsList4 -zcn ZoneCode4
```

7. Create a GA covering the area to be restricted.



```
gsh create_ga -gan ExternalGa
```

8. In the created GA, add a range of TAs covering the entire external PLMN to be restricted. See *Geographical Area (CLI)* for more information.

```
gsh create_ga_ta_range -gan ExternalGa -mcc 123 -mnc 789 -first 1 -last 65535
```

Note: The PLMN specified above must be different from the configured using the `create_rs_list` command.

9. Associate the ZC with the created GA.

```
gsh create_rs_zone_code_ga -zcn ZoneCode4 -gan ExternalGa
```

4 Checking the Consistency of the Configuration, and Activating and Checkpointing the Configuration

This section describes the procedures for checking the consistency of the configuration, and for activating and checkpointing the configuration.

4.1 Checking the Consistency of the Configuration

A consistency check must always be performed before activating the pending configuration. It is performed to guarantee that an inconsistent configuration is not activated. A consistency check is performed on the configuration that will be active after an activation, that is, the active configuration combined with the changes in the pending configuration.

A consistency check displays warnings such as variables out of the recommended range, or errors such as inconsistent or improper configuration commands.

Instructions

Run a consistency check on the active configurations with pending configurations by using the `check_config` CLI command.

List the pending configuration by using the `list_config_pending` CLI command.

Cancel the pending configuration by using the `undo_config_pending` CLI command.



The consistency check does not guarantee full coverage in all situations. For a further description of the consistency rules and expected coverage, see the `check_config` CLI command. In a troubleshooting situation, it can be beneficial to run a consistency check with an empty pending configuration.

4.2 Activating the Configuration

The pending configuration must be activated for the configuration to take effect.

Activate the pending configuration, by using the `activate_config_pending` CLI command.

4.3 Checkpointing the SC

To persistently store the Software Configuration (SC) in the SGSN-MME, a checkpoint must be performed.

Checkpoint the SC, by using the `checkpoint` CLI command.