

Configuring MMTel Service

OPERATION DIRECTIONS

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Contents

1	Introduction	1
1.1	Scope	1
1.2	Target Groups	2
2	Prerequisites	2
2.1	Planning	2
2.2	User	2
2.3	Activation	3
3	Activating the MMTel Feature	3
4	Configuring IMS Emergency Service and IMS Voice Service in PLMN	3
4.1	Configuring the Emergency Number List for IMS Emergency Service	3
4.1.1	Creating an Emergency Number List for IMS Emergency Service	3
4.1.2	Creating an Emergency Number for IMS Emergency Service	4
4.2	Configuring the Emergency Profile for IMS Emergency Service	5
4.3	Configuring the PLMN for IMS Emergency Service and IMS Voice Service	6
5	Configuring IMS Voice Service and IMS Emergency Service on IMSI Number Series and GA	7
5.1	Configuring VoiceLocalBreakOut for IMSI Number Series	7
5.2	Configuring IMS Emergency Services Selection for IMSI Number Series	8
5.3	Configuring IMS Voice Service Support based on IMSI Number Series	8
5.4	Configuring IMS Voice Service and IMS Emergency Service per GA Based on IMSI Number Series	9
5.5	Configuring IMS Voice Service Support based on IMSI Number Series	11
6	Configuring IMEI Check for IMS Emergency Service	12
7	Configuring Service Priority Based Paging	12
8	Configuring the Gr Interface	14



9	Configuring Subscription Data and UE SRVCC Capability Check for IMS Voice Service	14
10	Consistency Checking, Activating, and Checkpointing	15
10.1	Checking Performance Measurement Jobs	15
10.2	Checking and Activating the Configuration	15
10.3	Checkpointing the SC	15
	Reference List	17



1 Introduction

This document describes how to configure the Multimedia Telephony Service (MMTel) feature for IMS Emergency Service and IMS Voice Service. IMS Emergency Service is part of the licensed MMTel feature and allows for configuration of the MME for emergency session support. Once configured, the MME can establish emergency bearer services for UE that is authenticated, access restricted, roaming restricted, or unauthenticated.

IMS voice service support depends on the following configurations:

- Status of the licensed feature MMTel, as configured in Section 3 on page 3.
- VoIP configuration of the current PLMN, as configured in Section 4 on page 3.
- IMS Voice Service configuration of IMSI Number Series, as configured in Section 5 on page 7.

For UEs with at least one non-emergency PDN, the MME firstly checks the following before checking the above configurations:

- IMS Voice Service configuration Based on Subscription Data and UE SRVCC Capability, as configured in Section 9 on page 14.

1.1 Scope

This document covers the following areas:

- Prerequisites for the configuration
- Instructions for activation of the MMTel feature
- Instructions for the configuration of IMS Emergency Service and IMS Voice Service in PLMN
- Instructions for IMSI number series and Geographical Area (GA) level configuration
- Instructions for the IMEI check configuration for IMS Emergency Service
- Instructions for the configuration of checking subscription data and UE SRVCC capability for IMS voice service
- Configuration processes for checking the consistency of the configuration, and activating and checkpointing it



1.2 Target Groups

This document is intended for personnel performing configuration of IMS Voice Service and IMS Emergency Service in the SGSN-MME.

2 Prerequisites

This section outlines the prerequisites for the configuration of IMS Voice Service and IMS Emergency Service.

- The license-key file containing the license for the MMTel feature is loaded. For more information, see [Installing Node-Based Licenses](#). If network-based licenses are used, see [Activation of NeLS Client Licenses](#).

2.1 Planning

Consider the following when planning the configuration of IMS Voice Service and IMS Emergency Service:

- Refer to [LTE Session Management](#) and [LTE Mobility Management](#) to understand the feature.
- The necessary parameters for the CLI commands outlined in this document are listed in [Parameter Description](#).
- To display the configuration classes and parameters related to IMS Emergency Service, use the `get_config_area -can EmergencyCall` CLI command.
- To display the configuration classes and parameters related to IMS Voice Service, use the `get_config_area -can ImsVoiceService` CLI command.

2.2 User

The person performing the configuration should have solid knowledge of, and training in the following areas:

- Working in UNIX™
- Packet-switching communication
- Operation of the SGSN-MME



2.3 Activation

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

3 Activating the MMTel Feature

To activate the MMTel feature, perform the instructions below:

Instructions

1. Activate the licensed feature MMTel by using the `modify_feature_state` CLI command.

4 Configuring IMS Emergency Service and IMS Voice Service in PLMN

This section describes the configurations of IMS Emergency Service and IMS Voice Service in the PLMN.

4.1 Configuring the Emergency Number List for IMS Emergency Service

This section describes how to create or modify an emergency number list and the emergency numbers for IMS Emergency Service.

Note: The configurations described in the following subsections are required only when IMS Emergency Service is to be provided in the PLMN.

4.1.1 Creating an Emergency Number List for IMS Emergency Service

The emergency number list contains emergency numbers used by the serving network.

Configure an emergency number list according to the instructions below:



Instructions

1. Create an emergency number list using the `create_emergency_number_list` CLI command.
2. List the existing emergency number lists using the `list_emergency_number_list` CLI command.
3. Delete an emergency number list using the `delete_emergency_number_list` CLI command.

4.1.2 Creating an Emergency Number for IMS Emergency Service

Once an emergency number list has been created, it can be populated with emergency numbers. The emergency numbers correspond to specific emergency services available in the serving network, for example, police, or ambulance.

Configure an emergency number according to the instructions below:

Instructions

1. Create an emergency number using the `create_emergency_number` CLI command.
2. List the existing emergency numbers using the `list_emergency_number` CLI command.
3. Check the parameters and current values of an emergency number using the `get_emergency_number` CLI command.
4. Modify the parameters and current values of an emergency number using the `modify_emergency_number` CLI command.

When modifying an emergency number, it is possible to modify the emergency number itself and its associated service categories.

5. Delete an emergency number using the `delete_emergency_number` CLI command.

When creating an emergency number, one or more service types can be associated to it.

The parameter **ServiceCategoryList** is by default set to **all**. It is possible to manually define the service categories with a comma-separated list, see Table 1.

Table 1 Service Categories and Inputs

Service Category	Input
Police	po
Ambulance	am
Fire brigade	fb



Marine guard	mg
Mountain rescue	mr
All service categories	a11

4.2 Configuring the Emergency Profile for IMS Emergency Service

This section describes how to create or modify an emergency profile for IMS Emergency Service.

Note: The configuration described in this section is required only when IMS Emergency Service is to be provided in the PLMN.

The emergency profile is a configuration profile containing data used during IMS Emergency Service. The emergency profile is configured on the MME and applies to the entire PLMN. The emergency profile contains the following information:

- Access Point Name (APN)
- Quality of Service (QoS)
- Emergency PGW list/PGW identity

Note: The emergency PGW list and PGW identity cannot be configured in an emergency profile at the same time. The PGW identity specifies one emergency PGW to be used. The emergency PGW list specifies a list of emergency PGWs to be used, which enables the redundancy of emergency PGWs and load sharing among emergency PGWs.

- Emergency Mobile Reachable Timer
- Configuration to allow or prevent the MME from sending an emergency PDN connection between PLMNs
- Configuration to allow or prevent the MME from sending an emergency PDN connection to a UTRAN
- Diameter Routing Message Priority (DRMP) value
- GTPv2 Message Priority (MP) value

For more information on configuring the MME to send an emergency PDN connection between PLMNs, or, over to a UTRAN, see [Parameter Description](#).

Note: In the case of mobility procedures, the target SGSN-MME must have the same emergency profile configuration as the source SGSN-MME to be able to retain an emergency PDN connection.

Configure an emergency profile according to the instructions below:



Instructions

1. If the emergency profile needs to include an emergency PGW list, create an emergency PGW list using the `create_emergency_pgw_list` CLI command.
2. If the emergency PGW list is created, create an emergency PGW in the emergency PGW list using the `create_emergency_pgw` CLI command.

Repeat this instruction to create more emergency PGWs in the emergency PGW list.

3. If emergency PGWs are created in the emergency PGW list, configure the emergency PGW selection method by enabling the node function `random_emergency_pgw_selection` using the `modify_node_function` CLI command.
4. Create an emergency profile using the `create_emergency_profile` CLI command.
5. List the existing emergency profiles using the `list_emergency_profile` CLI command.
6. Check the parameters and current values of an emergency profile using the `get_emergency_profile` CLI command.
7. Modify the parameters and current values of an emergency profile using the `modify_emergency_profile` CLI command.
8. Delete an emergency profile using the `delete_emergency_profile` CLI command.

4.3 Configuring the PLMN for IMS Emergency Service and IMS Voice Service

The PLMN configuration contains the following parameters related to IMS Emergency Service and IMS Voice Service:

- The `VoIPServices` parameter, used to configure support for IMS Voice Service and IMS Emergency Service. The `VoIPServices` parameter can be configured to one of the following values:
 - `no`: no IMS voice service
 - `voip_without_emergency`: IMS voice service supported but no IMS emergency service.
 - `voip_with_emergency_auth_only`: IMS voice service supported and IMS emergency service only for authenticated UEs.
 - `voip_with_emergency_sim_only`: IMS voice service supported and IMS emergency service only for UEs with SIM card (both authenticated and unauthenticated).



- `voip_with_emergency_all`: IMS voice service supported and IMS emergency service for all UEs with and without SIM card.
- The `EmergencyListName` parameter, identifying an emergency number list. This parameter is configured for IMS Emergency Service only.
- The `EmergencyProfileName` parameter, identifying an emergency profile. This parameter is configured for IMS Emergency Service only.
- The `EmergencyContinuityViaHss` parameter, identifying whether the MME is allowed to select the emergency PGW from the HSS and send the Notify Request to the HSS for the non-roaming authenticated UE. This parameter is configured for IMS Emergency Service only.

Instructions

1. Create a PLMN using the `create_plmn` CLI command, or modify an existing PLMN using the `modify_plmn` CLI command.

For a full list of CLI commands related to the configuration of the PLMN for IMS Emergency Service, see [PLMN Identification \(CLI\)](#)

5 Configuring IMS Voice Service and IMS Emergency Service on IMSI Number Series and GA

This section describes the configuration of IMS Voice Service and IMS Emergency Service on IMSI Number Series and GA.

5.1 Configuring VoiceLocalBreakOut for IMSI Number Series

The `VoiceLocalBreakOut` parameter specifies if local breakout for the IMS APN is supported for the IMSI number series. This parameter is only applicable to roaming subscribers.

Note: Local breakout support for the IMS APN PDN connection also depends on the `VPLMN Dynamic Address Allowed` information, present in subscription data.

Instructions

1. Enable local breakout for the IMS APN, and associate it with an IMSI number series, by using the `create_imsins` or `modify_imsins` CLI command.



```
modify_imsins -imsi 123456 -vlbo true
```

2. Optionally specify the APN-OI for IMS APN local breakout by configuring the `VoiceLocalBreakoutAPNOI` parameter, using the `modify_imsins` CLI command.

```
modify_imsins -imsi 123456 -vlbo true -vlbaoi mnc456.mcc123.gprs
```

For a full list of CLI commands related to the configuration of the IMSI number series for IMS Voice Service, see [IMSI Number Series \(CLI\)](#).

5.2 Configuring IMS Emergency Services Selection for IMSI Number Series

The `ImsEmergencyServiceSupported` parameter specifies if IMS emergency service selection is supported for an IMSI number series.

- `no_emergency`: no IMS emergency service.
- `emergency_auth_only`: IMS emergency service only for authenticated UEs.
- `emergency_sim_only`: IMS emergency service only for all UEs with a SIM card.

This parameter provides an additional level of restriction for IMS emergency services over the PLMN IMS emergency service configuration. This configuration is only required if IMS voice service is configured on the PLMN level, and IMS Emergency Services are supported. See Section 4.3 on page 6 for more information.

Instructions

1. Create an IMSI number series using the `create_imsins` CLI command, or modify an existing IMSI number series using the `modify_imsins` CLI command.

```
modify_imsins -imsi 123456 -iess no_emergency
```

For a full list of CLI commands related to the configuration of the IMSI number series for IMS Voice Service, see [IMSI Number Series \(CLI\)](#).

5.3 Configuring IMS Voice Service Support based on IMSI Number Series

The `ImsVoiceServiceSupported` parameter specifies if IMS voice service is supported for the IMSI number series. It influences how the MME sets the IMS voice over PS Session indicator bit in the EPS Network Feature Support IE in the Attach Accept or TAU Accept message for the IMSI number series.



- If the parameter is set to true, the MME sets the IMS voice over PS Session indicator bit to 1.
- If the parameter is set to false, the MME sets the IMS voice over PS Session indicator bit to 0.
- If the parameter is not defined, the MME sets the IMS voice over PS Session indicator bit to 1 for a home subscriber and sets the IMS voice over PS Session indicator bit to 0 for a visiting subscriber.

Instructions

1. Create an IMSI number series using the `create_imsins` CLI command, or modify an existing IMSI number series using the `modify_imsins` CLI command.

```
modify_imsins -imsi 123456 -ivss true
```

For a full list of CLI commands related to the configuration of the IMSI number series for IMS Voice Service, refer to [IMSI Number Series \(CLI\)](#).

5.4 Configuring IMS Voice Service and IMS Emergency Service per GA Based on IMSI Number Series

This section describes how to configure IMS Voice Service and IMS Emergency Service in a specific GA, which contains one or more Tracking Area (TA) ranges. The configuration is based on IMSI number series.

The configuration described in this section is only required under the following circumstances:

- IMS Voice Service (and maybe IMS Emergency Service) is configured on PLMN level. For more information, see [Section 4 on page 3](#)
- The `ImsVoiceServiceSupported` specifies if local breakout for the IMS APN is supported for the IMSI number series. For more information, see [Section 5.3 on page 8](#).
- The operator has some GAs where IMS Voice Service or IMS Emergency Service is not supported.

Instructions

1. Create a GA where the UE should be notified that IMS Voice Service and/or IMS Emergency Service is not supported, by using the `create_ga` CLI command.
2. Populate the GA with one or more TAs, by using the `create_ga_ta_range` CLI command.
3. Create the cause codes, by using the `create_rr_cause_code` CLI command.



Note: Cause code #90 and cause code #91 can be configured. Cause code #90 indicates that neither IMS Voice Service nor IMS Emergency Service is supported. Cause code #91 indicates that IMS Emergency Service is not supported.

Cause codes #90 and #91 are not sent to the UE. When a UE performs Attach or Tracking Area Update (TAU) in a TA, the EPS network feature support IE with IMS voice over PS session indicator and Emergency bearer services indicator may be sent to the UE in the Attach Accept or TAU Accept message.

To allow the MME to include TAs where the Voice over IMS service is not supported for the UE in the forbidden TAs, turn on the `cc90_cc91_indicate_forbidden_ta` node function. Otherwise, turn off the node function.

4. Map the `RrCauseCode` to the GA, by using the `create_rr_cause_code_ga` CLI command.
5. Map IMSI number series to the configured `RrCauseCode`, by using the `create_rr_cause_code_imsins` CLI command.

Example

In Figure 1, each hexagon represents a TA. TAs are grouped into Geographical Areas `West_Region` and `East_Region` where IMS Voice Service and IMS Emergency Service can be configured in the SGSN-MME(s) serving them.

The UE moves from TA1 in `West_Region` to TA2 in `East_Region` by an Attach or TAU procedure. The SGSN-MME checks whether IMS Voice Service and IMS Emergency Service are supported for the UE belonging to IMSI number series 123456 and 456789 in TA2 in `East_Region`.

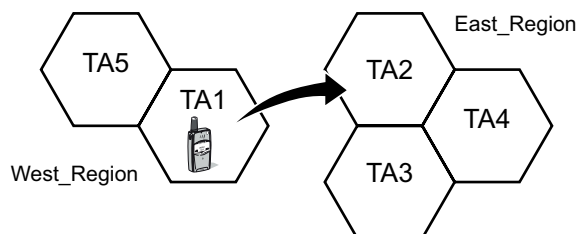


Figure 1 Configuring Restrictions for Voice Services in a Geographical Area

The following example describes a scenario where IMS Voice Service and IMS Emergency Service has been configured on PLMN level and the `ImVoiceServiceSupported` parameter has been configured for the IMSI number series. However, IMS Voice Service and IMS Emergency Service are not supported in all regions. In `East_region`, the support of these features is restricted. The UE belonging to IMSI number series 123456 cannot use the IMS Voice Service or IMS Emergency Service in TA2, TA3 and TA4 while the UE belonging to IMSI number series 456789 cannot use the IMS Emergency Service in TA2, TA3 and TA4.



1. Create the Geographical Area, in this case East_Region.

```
create_ga -gan East_Region
```

2. Populate East_Region with one or more TAs, in this case TA2, TA3, and TA4.

```
create_ga_ta_range -gan East_Region -tan East_Region_TA2_TA4
-mcc 123 -mnc 456 -first 2 -last 4
```

3. Create the RrCauseCodes.

```
create_rr_cause_code -rc East_Region_cc90 -cc 90
```

```
create_rr_cause_code -rc East_Region_cc91 -cc 91
```

4. Map the RrCauseCodes to the East_Region.

```
create_rr_cause_code_ga -rc East_Region_cc90 -gan East_Region
```

```
create_rr_cause_code_ga -rc East_Region_cc91 -gan East_Region
```

5. Map the IMSI number series to the RrCauseCodes.

```
create_rr_cause_code_imsins -rc East_Region_cc90 -imsi 123456
```

```
create_rr_cause_code_imsins -rc East_Region_cc91 -imsi 456789
```

After following the configuration example, the UE that belongs to IMSI number series 123456 or 456789 has the following restrictions in TA2 (also TA3 and TA4):

1. If a UE that belongs to IMSI number series 123456 tries to perform a TAU or Attach procedure to TA2 within East_Region, the UE gets informed that neither IMS Voice Service nor IMS Emergency Service is supported.
2. If a UE that belongs to IMSI number series 456789 tries to perform a TAU or Attach procedure to TA2 within East_Region, the UE gets informed that IMS Emergency Service is not supported.

5.5 Configuring IMS Voice Service Support based on IMSI Number Series

The `SrvccPossibleS8` parameter specifies if SRVCC is possible for visiting subscribers with a home-bound IMS voice connection, in this IMSI number series.

Note: When the `SrvccPossibleS8` parameter is not defined, SRVCC is supported. If the `VoiceLocalBreakOut` parameter or `ImEmergencyServiceSupported` parameter is supported for this IMSI number series, then this parameter has no effect, and SRVCC is supported.

Instructions

1. Create an IMSI number series using the `create_imsins` CLI command, or modify an existing IMSI number series using the `modify_imsins` CLI command.



```
modify_imsins -imsi 123456 -sps8 true
```

For a full list of CLI commands related to the configuration of the IMSI number series for IMS Voice Service, see [IMSI Number Series \(CLI\)](#).

6 Configuring IMEI Check for IMS Emergency Service

This section describes how to configure the MME to handle an emergency PDN connection from unknown or blacklisted UE if the IMEI Check feature is activated. The MME can be configured to ignore unknown or blacklisted IMEI Check results using the `IgnoreResultForEmergency` parameter.

Note: The configuration described in this section is required only when IMS Emergency Service is to be provided.

Instructions

1. Create an IMEI Check instance using the `create_imei_check` CLI command.
2. List the existing IMEI Check instance using the `list_imei_check` CLI command.
3. Modify the parameters of the specified IMEI Check instance using the `modify_imei_check` CLI command.

For more information on configuring the MME to handle an emergency PDN connection from unknown or blacklisted UE, see [Parameter Description](#), [Configuring IMEI Check](#), and [IMEI Check \(CLI\)](#).

7 Configuring Service Priority Based Paging

This section describes how to enable, verify, and modify the configuration of Service Priority Based Paging.

Note: Service Priority Based Paging is applicable only when the MMTel feature is activated.



Instructions

1. Enable Service Priority Based Paging and set an ARP by configuring the `PrioritizePagingBasedOnArp` parameter, using the `create_s1_mme` CLI command.

Example

```
create_s1_mme -s1 s1 -no 9 -uecm 1500 -uecr 500 -ppba 3
```

2. Verify that Service Priority Based Paging is enabled and working normally.
 - a Trace the `L_SERVICE_REQUEST` event, using the `modify_event_job` CLI command.

For more information, see [Configuring Event-Based Monitoring](#).

- b Filter out and analyze sub-cause code `NON_MPS_PAGING_ABORTED_DUE_TO_DDN_WITH_HIGHER_PRIORITY_ARP_RECEIVED` to verify the basic mechanism.
 - c Analyze the measurement results of the following counters:
 - `VS.MM.PsPagingBypassQuarantineTimerAtt.E`
 - `VS.MM.PsPagingBypassQuarantineTimerSucc.E`
 - `VS.MM.PsPagingRestartBasedOnArpAtt.E`
 - `VS.MM.PsPagingRestartBasedOnArpSucc.E`
3. Check the status of Service Priority Based Paging or the ARP set for this enhancement, using the `list_s1_mme` CLI command.

Example

```
list_s1_mme -ppba '*'
```

4. Disable Service Priority Based Paging or modify the ARP by configuring the `PrioritizePagingBasedOnArp` parameter, using the `modify_s1_mme` CLI command.

Example

```
modify_s1_mme -s1 s1 -ppba 4 -no 7
```

For more information on Service Priority Based Paging, see [LTE Mobility Management](#).



8 Configuring the Gr Interface

This section describes how to control the inclusion of the `t-adsDataRetrieval` and the `homogeneousSupportOfIMSVoiceOverPSSessions` MAP parameter in the `MAP_UPDATE_GPRS_LOCATION` message on the Gr interface during Attach, TAU, and T-ADS procedures. If the node function `gr_send_tads` is enabled, the MAP parameters are included. If the node function is disabled, the MAP parameters are not included.

Instructions

Enable the node function `gr_send_tads` using the `modify_node_function` CLI command.

Example

```
gsh modify_node_function -name gr_send_tads -state on
```

9 Configuring Subscription Data and UE SRVCC Capability Check for IMS Voice Service

This section describes how to enable the MME to check the subscribed IMS APN Configuration profile, the subscribed STN-SR, and the SRVCC capability of UE respectively, when the MME sets the IMS Voice Service support indicator during Attach, TAU, and T-ADS procedures.

Note: This configuration applies to UEs with at least one non-emergency PDN connection.

Instructions

- Enable the MME to check the IMS APN configuration profile in the subscription data of UE by setting the `vops_based_on_ims_apn` parameter to on, using the `modify_node_function` CLI command.

Example

```
modify_node_function -name vops_based_on_ims_apn -state on
```

- Enable the MME to check the STN-SR in the subscription data of UE by setting the `vops_based_on_stn_sr` parameter to on, using the `modify_node_function` CLI command.

**Example**

```
modify_node_function -name vops_based_on_stn_sr -state on
```

- Enable the MME to check the SRVCC capability of UE by setting the `vops_based_on_ue_srvcc_capability` parameter to `on`, using the `modify_node_function` CLI command.

Example

```
modify_node_function -name vops_based_on_ue_srvcc_capability  
-state on
```

10 Consistency Checking, Activating, and Checkpointing

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

10.1 Checking Performance Measurement Jobs

See Step 7c in Section 7 on page 12 for more information on relevant counters.

10.2 Checking and Activating the Configuration

Check the consistency and activate the pending configuration by performing the following steps:

1. Run a consistency check before activating the pending configurations by using the following CLI command:

```
gsh check_config
```

2. Activate the pending configuration by using the following CLI command:

```
gsh activate_config_pending
```

10.3 Checkpointing the SC

When all features are configured, perform the following steps:



1. Verify that the traffic is stable by performing a health check. For more information about how to perform the health check procedure, see [Health Check](#).
2. When the traffic is stable, store the current trusted Software Configuration (SC) by performing a checkpoint. Set the SC as the default SC (permanent SC) for recovery in the event of automatic fallback.

```
gsh checkpoint { -cpn CheckpointName } -default_sc true
```



Reference List

Network License Server (NeLS) CPI Library References

- [1] Activation of NeLS Client Licenses
USER GUIDE, 6/1553-AVA 901 45/1