



Technical Adaptation of Devices through Late Customisation

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1 Introduction

1.1 Overview

This document provides recommendations on a framework for manufacturers and MNO's (mobile network operators) so they can technically configure Open Market mobile devices, to ensure the device can support the customer with the services being promoted and offered by the MNO.

The configurations would typically take place upon 1st insertion of a SIM, by a process that is known as Late Customisation, and is referred to in this document as the Technical Adaptation of a Device (TAD)

Without harmonisation of this process across the industry and a clear understanding of which settings must be configured, each manufacturer and MNO face the challenge of having to document, in individual bilateral agreements, the technical settings they need implementing. Without a clear framework a device is being configured for a 2nd time could inherit some legacy settings from its 1st configuration, unless it is clearly understood which settings should always be configured. It is desirable to avoid such unintentional inheritance as it could compromise the performance of the MNO services and the device itself.

1.2 Scope

This document aims to describe the settings that SHOULD be configured whenever a Technical 'Late Customisation' package is deployed to a device. The assumption is that the customisation packages are deployed using a mechanism under the control of the device manufacturer. The deployment mechanism is not in scope of this document.

The document also describes at high level the scenarios when a customisation package would be triggered for deployment.

This document does not specifically cover the Late Customisation of application layer customisations including deployment of MNO specific apps, UI (User Interface) customisation and branding assets. However it is recognised that many MNO's offer services to customers which can use customisation of Application layer features and parameters e.g. start page, bookmarks, Google client ID, speed dial, such settings can be added in table "MNO Supplementary" although it should be noted that implementation whilst strongly encouraged is at the discretion of the OEM (Original Equipment Manufacturer).

Marketing assets such as graphical branding, OS (Operating System) and UI (User Interface) branding and installation of specific apps are not in scope of TS.32.

1.3 Definitions

| Term | Description |
|---------------|---|
| Factory Reset | User-initiated process by which the device is returned to the state it is normally delivered in from the factory. This implies erasing all user-installed applications and data, and restoration of configuration values to those that were applied when the device left the factory. SIM Lock settings and status are NOT changed as part of this process. |

| Term | Description |
|----------------------------|--|
| General Settings | If an MNO is host of MVNOs, they may have General Settings for all their MVNOs that have not provisioned their own Settings. General Settings use the MNOs MCC/MNC values, but do not define the GID/SPN values. The General Settings ensure the functionality of the MNO's services for their MVNOs. |
| In Life Service | A service provided by the MNO for use on the customer device, when the customer is under contract with that MNO |
| Late Customisation | A term used to describe the process for configuring a device upon 1 st SIM insertion by a customer, after the point of sale. Usually managed and deployed by the Manufacturer. |
| Manufacturer | The commercial entity that designs and either directly fabricate, or uses a 3 rd party fabrication of a Mobile Device, and manages the TAD deployment service. |
| MNO Provisioning | Configuration and activation of an 'in life' service by an MNO. Usually managed and deployed by the MNO. |
| Open Market mobile devices | An Open Market mobile device is a device which is sold through a retail channel not tied or aligned with an MNO or MVNO. A device that is intended for potential distribution to more than one MNO. As such, the device should be able to take on the customization values of all MNOs whose SIM cards may end up being inserted into the device. |
| SIM Lock | A SIM lock, network lock or subsidy lock is a technical restriction built into devices by the devices manufacturers for use by services providers to restrict the use of these phones to specific countries and/or networks. Personalisation of Mobile Equipment, as defined in 3GPP TS22.022 (ETSI TS 122 022) allows a device to be restricted to only accepting SIM cards that meet certain criteria. For the purposes of this document, it is focused on network personalisation and/or SP personalisation. |
| TAD | Technical Adaptation of Devices – a terms to describe the technical configuration of a device using Late Customisation |

1.4 Abbreviations

| Term | Description |
|-------|--|
| 5GS | 5G System |
| APN | Access Point Name |
| GID_1 | Elementary File - Group Identifier level 1` |
| ICCID | Integrated Circuit Card Identifier This is a unique number to identify a Profile in an UICC as defined by ITU-T E.118 [4] |
| IMEI | International Mobile Equipment Identity |
| IMSI | International Mobile Subscriber Identity |
| MCC | Mobile Country Code |
| MNC | Mobile Network Code |
| | |
| MNO | Mobile Network Operator |
| MVNO | Mobile Virtual Network Operator |

| Term | Description |
|-------|---|
| NR | New Radio |
| RILTE | Roaming in LTE |
| SIM | Subscriber Identity Module |
| SPN | Service Provider Name |
| OEM | Original Equipment Manufacturer |
| OS | Operating System |
| TAD | Technical Adaptation of Devices – a term to describe the technical configuration of a device using Late Customisation |
| UI | User Interface |
| UICC | Universal Integrated Circuit Card |
| VoLTE | Voice over LTE |

1.5 References

| Ref | Doc Number | Title |
|-----|-----------------|---|
| [1] | GSMA PRD TS.36 | Devices Settings Database specification |
| [2] | GSMA PRD IR.92 | IMS Profile for Voice and SMS |
| [3] | RFC2119 | RFC 2119 - Key words for use in RFCs to Indicate Requirement Levels |
| [4] | ITU-T E.118 | The International Telecommunication Union charge card |
| [5] | GSMA PRD IR.94 | IMS Profile for Conversational Video Service |
| [6] | GSMA PRD IR.51 | IMS Profile for Voice, Video and SMS over untrusted Wi-Fi access |
| [7] | GSMA PRD NG.106 | IMS Profile for Voice, Video and SMS over trusted Wi-Fi access |
| [8] | GSMA PRD NG.102 | IMS Profile for Converged IP Communications |
| [9] | GSMA PRD NG.114 | IMS Profile for Voice, Video and Messaging over 5GS |

1.6 Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 (RFC2119) [3] (RFC8174) [5] when, and only when, they appear in all capitals, as shown here.

2 Technical Adaptation of Devices

2.1 Introduction

This section describes what is and what is not relevant for a TAD late customisation, the high level process to be used to identify the correct package to be deployed, and when it should be deployed.

2.2 Late Customisation

Late Customisation is the use of techniques to configure devices at the point of SIM detection, rather than pre-configuring the device in the manufacturer's production line.

A TAD late customisation focuses on the configuration of technical settings for core features supported by the network and device, typically related to Voice calls, messaging and data services.

2.3 Difference between TAD late customisation and MNO Provisioning.

It is important to understand the difference between a TAD late customisation, and MNO provisioning.

TAD through late customisation is implemented on a device by the deployment of a customisation package which is typically managed and deployed by the manufacturer; this process will be triggered at the first use, on insertion of a SIM, or after a Factory Reset of the device. It will customise technical settings that are not normally configurable by the MNO or the end user.

MNO provisioning is carried out by an MNO when enabling an 'in life' service for a customer. Settings which can be customised via MNO provisioning would not normally be part of a TAD late customisation package.

However, in some circumstances it may be applicable for a TAD package to set a default value of such settings in a device, in order to provide a common baseline, so that MNO's can be confident of the devices default configuration, even if a service is not enabled by them.

2.4 User experience

The customer's experience of a TAD implementation must be positive and equivalent to a device with preconfigured software. In particular, the boot time (from power on to the user's interaction with the manufacturer's start-up wizard) SHALL be similar.

It is not necessary for the device to notify the user of the customisation being applied, but if the manufacturer chooses to provide such a notification, the wording must be clear and unambiguous. If considered appropriate the information relevant to the TAD customisation can form part of the interaction within the start-up wizard.

2.5 SIM lock

A TAD customisation of an Open Market device SHALL not apply a SIM lock.

A Device that is SIM locked SHALL only be customisable to that SIM's customisation profile.

2.6 Software and OS updates

If a manufacturer deploys a Software or OS (Operating System) update to a device, which changes any of the parameters and values for settings (as defined in TS.32) of the already configured services and features on the device, the device shall initiate a TAD reconfiguration based on the appropriate TAD settings for the MNO profile to restore the device back to the settings configuration prior to the update.

2.7 First boot with no SIM card

If the device is first booted without a SIM, then the 'out of box' software configuration SHALL be used until the SIM is inserted for the first time.

Should the TAD configuration mechanisms deployed by the manufacturer require a Factory Reset to deploy the TAD customisation, once insertion of the SIM is carried out, the user SHALL be informed during the initial boot up that any personalisation they make prior to insertion of a SIM, including accounts setup, or user data created on the device (e.g. photos) may be deleted as part of the configuration process once a SIM is inserted.

2.8 First SIM configuration

SIM detection and subsequent customisation SHALL occur with the first SIM inserted into the device, typically as part of the boot up and initialisation of the device.

2.9 Customisation Package identification (SIM card and customer profile identification)

A device implementing TAD customisations SHALL be able to distinguish between the different MNO SIM cards and customers profiles

It is recommended that manufacturer's use the following combination of identifiers in order to ensure they implement the appropriate customisation package. The precise method and algorithm used by the manufacturer to perform any lookup and identification is at their discretion, providing they achieve the required level of granularity without needing user interaction.

Most countries permit the support of one or more MVNOs (Mobile Virtual Network Operator) on MNO networks, sharing Mobile Country Code (MCC) and Mobile Network Code (MNC).

In the case of an MVNO using a Roaming Brokering service provided by their host MNO, which will involve a device potentially having multiple IMSI (International Mobile Subscriber Identity) and MNC, the inclusion of the ICCID (Integrated Circuit Card Identifier) is strongly recommended, and that OEM's include this as part of their algorithm for identifying when and what customisation package to deploy.

However since the ICCID support is optional, the MVNO using a Roaming Brokering service provided by their host MNO shall always provide the needed setting templates for each of the different MCC/MNC/SPN (Service Provider Name) or GID (Group Identifier level) values used.

Therefore, when identifying MVNOs using a Roaming Broker solutions, OEMs need to consider that their customization package can be spread across several MCC/MNC values.

It is also possible that different TAD customisations will need to be implemented by the same MNO based on customer profile (Business, Consumer, Post Pay, Pre Pay etc.)

If an MVNO is identified, for which there are no specific settings available, the OEM shall use the parent MNOs General Settings. The General Settings of the parent MNO may be

identified by the MCC/MNC codes. General Settings do not have any entries for the GID/SPN values.

| SIM card and customer profile identifiers |
|---|
| Mobile Country Code (MCC) |
| Mobile Network Code (MNC) |
| Service Provider Name (SPN) |
| GID_1 (if applicable) |
| IMSI prefix/range (if applicable) |
| ICCID prefix/range (if applicable) |

Figure 1: SIM card and customer profile identifiers

2.10 If no customisation package exists for the Identified MNO/MVNO

If no customisation package exists for the identified MNO/MVNO then the GSMA recommends that manufacturers SHOULD deploy a generic package based on default values identified in section 3, if specified; where default values are not specified the manufacturers preferred value SHOULD be used.

2.11 If OEM is unable to identify the MNO/MVNO

If the MNO/MVNO cannot be identified, the GSMA recommends that manufacturers SHOULD deploy a generic package based on default values identified in section 3, where default values are not specified the manufacturers preferred value SHOULD be used.

2.12 SIM Swap or factory reset

2.12.1 Factory reset

A factory reset SHALL take the device back to 'out-of-box settings'. If the device is restored to out-of-box settings (factory reset) then the TAD customisation should be invoked when a SIM is inserted.

This allows a User to change MNO or to pass their device to a different User who will have an Open market-like device.

The factory reset SHALL delete all user content. It would be appropriate to ensure users are fully aware of this and encouraged to take suitable steps to protect and backup critical data.

2.12.2 SIM Swap

If a device has been configured with the first SIM card, and later a different SIM card is inserted, the TAD mechanism MAY be triggered.

Any deployment of a TAD customisation package in such a scenario SHALL require interaction and permissions from the customer.

Should such a change be implemented then the manufacturer SHALL be able to configure the device back to the original MNO settings, should the 1st SIM card be re-inserted. Unless the user confirms that they do not require roll back to the original configuration.

When such a use case is encountered the following SHALL always apply.

1. Reconfigure Specific Technical Settings as defined in this document, the manufacturer must ensure continuity of key services including voice, messaging and data connection.
2. Minimise impact on the user ensuring a smooth user experience during this configuration.
3. Protect user content and service configurations not specific to the new MNO, i.e. any account, personal data and files must be backed up for automatic restoration or remain untouched unless the user gives permission to remove them.

Users should be notified that some services such as sending email may not work until they have configured the application based on the requirements of the new MNO, they should be referred to their MNO for these settings

2.12.3 Use cases.

Scenario No 1

A device is powered on for the first time with an MNO-1 SIM. The device is configured according to MNO-1's requirements.

The device is subsequently turned on with an MNO-2 SIM card: The Device will identify if the Manufactures Late Customisation package for the MNO/Device is available.

If a Late customisation package is available, the User is asked if they wish to re-configure the device for the MNO-2 SIM. If yes then the process's described in 2.12.2 of this document SHALL be implemented.

Scenario No 2

The User plans to pass the device on someone else, and so performs a factory reset, returning the device to out-of-box settings.

The new User inserts MNO-2 SIM. The TAD customisation SHALL be invoked according to MNO-2's requirements.

3 Settings

The following settings shown in Tables 1 to 7 SHALL always be part of a TAD customisation package.

The parameter/value type that is associated with that setting has been listed.

Default values for the setting have been recommended. These shall be used when deploying a generic TAD customisation, or when an MNO has not provided a specific value. Where no default values exist the OEM shall use their preferred value for this setting.

Therefore, when implementing a customisation the following priorities should be applied when selecting which setting is to be used, this is as defined in GSMA PRD TS.32 Annex A or the GSMA TS.36 Network Settings Exchange.

- Priority 1: MNO Recommended Value
- Priority 2: Where MNO recommended value is blank use TS.32 default Value
- Priority 3: Where both MNO recommended, and Default values are blank the OEM may use their preferred value

Settings which are defined in this document should not cause conflict with other regulation or mandatory specifications. If this is found to be the case then the specific settings impacted from this document may be disregarded.

The setting lists below are broken down by high level technology.

Each table contains the:

4. Setting name
5. Setting value option -
6. Default value (unless otherwise specified by an MNO)
7. Comment – additional notes for clarity

3.1 IMS Settings

IMS settings in Table 6 have been defined by GSMA RILTE group. The IMS settings are related to the provision of Operator based communication services as defined in RILTE PRDs IR.92 [2], IR.94 [5], IR.51 [6], NG.106 [7], NG.102 [8] & NG.114 [9]. The list of settings in this document represents RILTE's advice on which parameters within its PRDs have optionality, and therefore need to be defined by the MNO. If a setting in any RILTE PRD is not in this list then the value for that setting is clearly defined within the appropriate RILTE PRD.

3.2 Access Point Name (APN)'s

TS.32 allows the capture of an MNOs APN details, these should be listed in Table 8, when listing an APN, the MNO SHALL provide the information detailed in Table 8 for each of the relevant APN type, these details are the minimum that should be supplied.

It is permissible to list multiple APN's, e.g. Default APN, MMS APN, Tethering APN, Event APN etc. This can be done by listing multiple supplementary APN's in Table 8.

An MNO SHALL indicate the type of APN in the 'APN Type' field e.g. whether it is a Default, MMS or Supplementary APN.

3.2.1 AOSP APN File

The GSMA notes that APN details for MNOs are also captured in the Android Open Source Project, which maintains a file listing APN's, it can be accessed from the link below;

<https://android.googlesource.com/device/sample/+master/etc/apns-full-conf.xml>

The file can be updated by any AOSP contributor using normal processes for submission to the AOSP

The APN Settings Table below allows a MNO to indicate if this file also contains their APN information.

3.3 MNO Specific supplementary Settings

The TAD settings list has been defined by GSMA to provide a common group of settings which are always defined in a Late Customisation, However it is recognized that in some circumstances MNO's may have a requirement to define settings outside of this list.

If such settings are not configurable by the MNO using MNO Provisioning, then it is acceptable for the MNO to define a list of supplementary settings for inclusion in a Late Customisation. However the manufacturer will need to confirm to the MNO that they can configure these settings as they are outside the scope of the agreed TAD settings list

Such supplementary settings can be added using the Excel Template associated to this document, or using the process defined in TS.36.

Supplementary settings would use the same format as defined in this document, plus indicate which of the Technology Groupings it belongs to e.g. GSM, UTRA, HSPA, LTE, IMS, Other. The table header below shows the fields to be defined for these supplementary settings

| Index | Technology Group (e.g. GSM,HSPA,LTE, IMS) | Setting Name | Permissible Setting Value | Default Value | Additional Comment |
|-------|---|--------------|---------------------------|---------------|--------------------|
| | | | | | |

It is recommended that supplementary settings should be kept to a minimum by any MNO. The MNO should take care not to include settings where the value is well defined in relevant specifications. MNO's should take care not to define settings which encourage deviation from relevant specifications.

3.4 Table 1 GSM Settings

| Index | Setting Name | Permissible Setting Value | Default Value | Additional Comment |
|----------|--------------|---------------------------|---------------|---|
| GSM 1.01 | VOID | | | Index number no longer used. |
| GSM 1.02 | VOID | | | Index number no longer used. |
| GSM 1.03 | A5/1 | Activate/Deactivate | Activate | See 3GPP 43.020 (section 4.9), 24.008 (sections 10.5.1.5, 10.5.1.6, 10.5.5.12a). Mandatory in 3GPP Rel-10 |
| GSM 1.04 | A5/3 | Activate/Deactivate | Activate | See 1.04 |
| GSM 1.05 | A5/4 | Activate/Deactivate | Activate | See 3GPP 43.020 (section 4.9), 24.008 (sections 10.5.1.5, 10.5.1.6, 10.5.5.12a) |

| Index | Setting Name | Permissible Setting Value | Default Value | Additional Comment |
|----------|-----------------------------------|---------------------------|---------------|---|
| GSM 1.06 | GEA1 Encryption | Activate/Deactivate | Deactivate | See 3GPP TS 43.020 V16.0.0 (section D.4.9) – prohibited to support in UEs from 3GPP Rel-12 |
| GSM 1.07 | GEA3 Encryption | Activate/Deactivate | Activate | See 3GPP TS 43.020 V16.0.0 (section D.4.9) – mandatory to support in UEs |
| GSM 1.08 | GEA4 Encryption | Activate/Deactivate | Activate | See 3GPP TS 43.020 V16.0.0 (section D.4.9) – optional to support in UEs |
| GSM 1.09 | VOID | | | Index number no longer used. |
| GSM 1.10 | VAMOS Level | 0,1,2 | 0 | 0 = off, 1 = VAMOS 1, 2 = VAMOS 1 +2 See 3GPP 45.001 (section 13.2) and 24.008 (section 10.5.1.7) |
| GSM 1.11 | VOID | | | Index number no longer used. |
| GSM 1.12 | GSM_AMR-Wideband | Activate/Deactivate | Activate | See 3GPP 26.103 (section 5.7) and 24.008 section 10.5.4.32 |
| GSM 1.13 | VOID | | | Index number no longer used. |
| GSM 1.14 | Dual Transfer Mode | Activate/Deactivate | Activate | There are multiple capabilities associated with DTM (see 3GPP 43.055 section 4.6). “Deactivate” means that no DTM capabilities are to be indicated; “Activate” means one or more DTM capabilities may be indicated. |
| GSM 1.15 | Randomized L2 fill bits in Uplink | Activate/Deactivate | Activate | See 3GPP 44.006, section 5.2. Use of this feature is mandatory from 3GPP Release 6. |
| GSM 1.16 | GEA2 Encryption | Activate/Deactivate | Activate | |

3.5 Table 2 UTRA Settings

| Index | Setting Name | Permissible Setting Value | Default value | Additional Comments |
|-----------|-------------------|---------------------------|---------------|------------------------------|
| UTRA 1.01 | VOID | | | Index number no longer used. |
| UTRA 1.02 | UEA1 | Activate/Deactivate | Activate | |
| UTRA 1.03 | UEA2 | Activate/deactivate | Activate | |
| UTRA 1.04 | UIA1 | Activate/deactivate | Activate | |
| UTRA 1.05 | UIA2 | Activate/deactivate | Activate | |
| UTRA 1.06 | VOID | | | Index number no longer used. |
| UTRA 1.07 | UMTS-AMR-Wideband | Activate/deactivate | Activate | |
| UTRA 1.08 | ROHC header | Activate/Deactivate | Deactivate | |

| | | | | |
|--|---|--|--|--|
| | compression RFC4815 & RFC3095 for GSM | | | |
|--|---|--|--|--|

3.6 Table 3 HSPA settings

| Index | Setting Name | Permissible Settings Value | Default Value | Additional Comments |
|-----------|---|----------------------------|---------------|---|
| HSPA 1.01 | VOID | | | Index number no longer used. |
| HSPA 1.02 | 3G to 2G PSHO | Activate/Deactivate | Deactivate | |
| HSPA 1.03 | VOID | | | Index number no longer used. |
| HSPA 1.04 | VOID | | | Index number no longer used. |
| HSPA 1.05 | VOID | | | Index number no longer used. |
| HSPA 1.06 | VOID | | | Index number no longer used. |
| HSPA 1.07 | Dual Carrier / Dual Band | Activate/Deactivate | Deactivate | |
| HSPA 1.08 | Dual Carrier HSDPA | Activate/Deactivate | Activate | |
| HSPA 1.09 | Dual Carrier HSUPA | Activate/Deactivate | Deactivate | |
| HSPA 1.10 | CPC DRX | Activate/Deactivate | Activate | |
| HSPA 1.11 | CPC DTX | Activate/Deactivate | Activate | |
| HSPA 1.12 | CPC HS SCCH less Operation | Activate/Deactivate | Activate | |
| HSPA 1.13 | CPC UL Slot format 4 | Activate/Deactivate | Activate | |
| HSPA 1.14 | Enhanced Fractional DPCH | Activate/Deactivate | Activate | |
| HSPA 1.15 | Enhanced Cell FACH DL | Activate/Deactivate | Deactivate | |
| HSPA 1.16 | Enhanced Cell FACH UL | Activate/Deactivate | Deactivate | |
| HSPA 1.17 | Improved Layer2 UL | Activate/Deactivate | Deactivate | |
| HSPA 1.18 | Improved Layer2 DL | Activate/Deactivate | Activate | |
| HSPA 1.19 | Enhanced UE DRX Capability | Activate/Deactivate | Deactivate | |
| HSPA 1.20 | Fast Dormancy pre-R8 | Activate/Deactivate | Deactivate | This behaviour is not specified by 3GPP |
| HSPA 1.21 | VOID | | | Index number no longer used. |
| HSPA 1.22 | Fast Dormancy R8 | Activate/Deactivate | Activate | 3GPP 25.331 |
| HSPA 1.23 | Fast Dormancy Rel.8 timer / display illumination = on | Value in seconds | | 3GPP specifications do not specify this behaviour. In case Fast Dormancy R8 is active and the display is On, Fast Dormancy is applied when the following condition is met: No data transfer for |

| Index | Setting Name | Permissible Settings Value | Default Value | Additional Comments |
|-----------|--|----------------------------|---------------|--|
| | | | | an application for a the specified time, whereby the time interval can be longer when CPC DRX/DTX feature is configured |
| HSPA 1.24 | Fast Dormancy Rel.8 timer / display illumination = off | Value in seconds | | 3GPP specifications do not specify this behaviour. In case Fast Dormancy R8 is active and the display is OFF, Fast Dormancy is applied when the following condition is met: No data transfer for an application for the specified time, whereby the time interval can be longer when CPC DRX/DTX feature is configured |

3.7 Table 4 LTE Settings

| Index | Setting Name | Permissible Setting Value | Default Value | Additional comments |
|----------|--|---------------------------|---------------|------------------------------|
| LTE 1.01 | Support of LTE DL Carrier Aggregation | Activate/Deactivate | Activate | |
| LTE 1.02 | VOID | | | Index number no longer used. |
| LTE 1.03 | VOID | | | Index number no longer used. |
| LTE 1.04 | Inter-RAT PSHO LTE to GERAN | Activate/Deactivate | Deactivate | |
| LTE 1.05 | R9 Redirection to GERAN | Activate/Deactivate | Activate | |
| LTE 1.06 | R8 redirection w/ "skip non-mandatory SIBs" | Activate/Deactivate | Activate | |
| LTE 1.07 | ISR - Idle Signalling Mode Reduction | Activate/Deactivate | Activate | |
| LTE 1.08 | ESM_info_flag (EPS Session Management) | True/False | FALSE | |
| LTE 1.09 | VOID | | | Index number no longer used. |
| LTE 1.10 | Fast Return from 3G to LTE after CSFB | Activate/Deactivate | Activate | |
| LTE 1.11 | VOID | | | Index number no longer used. |
| LTE 1.12 | Fast Return from 2G to LTE after CSFB | Activate/Deactivate | Activate | |
| LTE 1.13 | Voice / Data centric setting in attach message | Voice=1, Data=2 | | MNO must specify a value |
| LTE 1.14 | Voice Domain Preference in attach message | 0,1,2,3 | | |
| LTE 1.15 | VOID | | | Index number no longer used. |
| LTE 1.16 | 3G -> LTE PS HO | Activate/Deactivate | Activate | |
| LTE 1.17 | Force 3G/2G LU before CSFB emergency call | Activate/Deactivate | | |
| LTE 1.18 | R9 SON rach reporting | Activate/Deactivate | | |
| LTE 1.19 | Forbidden TA list expiry time | Value | 24Hours | See 24.301, Section 5.3.2. |

| Index | Setting Name | Permissible Setting Value | Default Value | Additional comments |
|----------|--|----------------------------|---------------|---|
| | | | | Permitted range of 12 to 24 hours. |
| LTE 1.20 | VOID | | | Index number no longer used. |
| LTE 1.21 | FeICIC (Cell Reference Signal interference handling) | Activate/Deactivate | Deactivate | |
| | | | | |
| LTE 1.22 | TM9 (Transmission Mode) (with 8 CSI reference signal ports for FDD) | Activate/Deactivate | Activate | |
| LTE 1.23 | TM10 (Transmission Mode) | Activate/Deactivate | Deactivate | |
| LTE 1.24 | NAICS | Activate/Deactivate | Deactivate | |
| LTE 1.25 | Minimisation of drive test | Activate/Deactivate | Activate | |
| LTE 1.26 | UE-TxAntenna Selection Supported | Activate/Deactivate | Activate | |
| LTE 1.27 | halfDuplex | Activate/Deactivate | Deactivate | |
| LTE 1.28 | Transmission Mode 7 for FDD | Activate/Deactivate | | |
| LTE 1.29 | Transmission Mode 8 for FDD | Activate/Deactivate | | |
| LTE 1.30 | Cross carrier scheduling operation for CA for FDD | Activate/Deactivate | | |
| LTE 1.31 | VOID | | | Index number no longer used. |
| LTE 1.32 | 3G FGI1: 3G -> LTE (PCH Cell Reselection) | Activate/Deactivate | Activate | |
| LTE 1.33 | 3G FGI2: 3G -> LTE (measurement/reporting) | Activate/Deactivate | Activate | |
| LTE 1.34 | 3G FGI3: 3G -> LTE (CELL_FACH absolute priority cell reselection for high priority layers) | Activate/Deactivate | Deactivate | |
| LTE 1.35 | 3G FGI4: 3G -> LTE (CELL_FACH absolute priority cell reselection for all layers) | Activate/Deactivate | Deactivate | |
| LTE 1.36 | 2G -> LTE support in packet transfer mode | : 0,1,2,3 (or 00,01,11,12) | 1 | See 3GPP TS 24.008 section 10.5.5.12a 0="none", 1="UE autonomous reselection", 2="CCO", and predecessor 3="PS HO" and predecessor. A device shall not set the capability indicator greater than the indicated setting. |
| LTE 1.37 | VOID | | | Index number no longer used. |
| LTE 1.38 | 2G ->LTE PS HO | Activate/Deactivate | Deactivate | If 1.36 is set to 3 this setting must be Activate |
| LTE 1.39 | 2G -> LTE measurement/reporting | Activate/Deactivate | Activate | See 3GPP TS 45.008 (section 8.4.7). Reporting E-UTRAN frequencies is mandatory (based on |

| Index | Setting Name | Permissible Setting Value | Default Value | Additional comments |
|----------|--|-----------------------------|---|--|
| | | | | network signalling) for 2G+LTE capable devices. |
| LTE 1.40 | VOID | | | Index number no longer used. |
| LTE 1.41 | Combined Attach in LTE for CSFB/SMS | PS+CS, PS+CS (SMS only), PS | PS+CS | CSFB is only possible if PS+CS is selected here and CSFB is supported by network |
| LTE 1.42 | EEA0 | Activate/Deactivate | Activate | 3GPP 33.401 specification – only for emergency calls. |
| LTE 1.43 | EEA1 | Activate/Deactivate | Activate | As specified in 3GPP TS 33.401 specification |
| LTE 1.44 | EEA2 | Activate/deactivate | Activate | As specified in 3GPP TS 33.401 specification |
| LTE 1.45 | EEA3 | Activate/deactivate | Activate | As specified in 3GPP TS 33.401 specification |
| LTE 1.46 | EIA1 | Activate/deactivate | Activate | As specified in 3GPP TS 33.401 specification |
| LTE 1.47 | EIA2 | Activate/deactivate | Activate | As specified in 3GPP TS 33.401 specification |
| LTE 1.48 | EIA3 | Activate/deactivate | Activate | As specified in 3GPP TS 33.401 specification |
| LTE 1.49 | FeICIC (Synchronization Signal and common channel interference handling) | Activate/Deactivate | Deactivate | FeICIC (Synchronization Signal and common channel interference handling) |
| LTE 1.50 | ROHC header compression | Activate/Deactivate | Activate (for VoLTE devices) De-activate (non-VoLTE devices) | Note it is mandatory for ROHC to be supported in LTE if VoLTE is activated, See GSMA IR.92 and 3GPP 36.523-2 specification |

3.8 Table 5 LTE FGI Bits

| Index of indicator (bit number) | Setting Name - E-UTRA Capabilities - Feature Group Indicators | FDD - Setting Value | TDD - Setting Value | Default |
|---------------------------------|--|---------------------|---------------------|---------|
| 1 (leftmost bit) | - Intra-sub frame frequency hopping for PUSCH scheduled by UL grant | Binary | Binary | |
| | - DCI format 3a (TPC commands for PUCCH and PUSCH with single bit power adjustments) | | | |
| | - Multi-user MIMO for PDSCH | | | |
| | - Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected sub band CQI without PMI | | | |
| | - Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-2 – UE selected sub band CQI with multiple PMI | | | |
| 2 | - Simultaneous CQI and ACK/NACK on PUCCH, i.e. PUCCH format 2a and 2b | Binary | Binary | |
| | - Absolute TPC command for PUSCH | | | |

| Index of indicator (bit number) | Index of indicator (bit number) | Setting Name - E-UTRA Capabilities - Feature Group Indicators | FDD - Setting Value | TDD - Setting Value | Default |
|---------------------------------|---------------------------------|---|---------------------|---------------------|---------|
| | | - Resource allocation type 1 for PDSCH | | | |
| | | - Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-0 – UE selected sub band CQI without PMI | | | |
| | | - Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-1 – UE selected sub band CQI with single PMI | | | |
| 3 | | - 5bit RLC UM SN | Binary | | |
| | | - 7bit PDCP SN | | | |
| 4 | | - Short DRX cycle | Binary | Binary | |
| 5 | | - Long DRX cycle | Binary | | |
| | | - DRX command MAC control element | | | |
| 6 | | - Prioritised bit rate | Binary | | |
| 7 | | - RLC UM | Binary | | |
| 8 | | - EUTRA RRC_CONNECTED to UTRA CELL_DCH PS handover | Binary | Binary | |
| 9 | | - EUTRA RRC_CONNECTED to GERAN GSM_Dedicated handover | Binary | Binary | |
| 10 | | - EUTRA RRC_CONNECTED to GERAN (Packet_) Idle by Cell Change Order | Binary | Binary | |
| | | - EUTRA RRC_CONNECTED to GERAN (Packet_) Idle by Cell Change Order with NACC (Network Assisted Cell Change) | | | |
| 11 | | - EUTRA RRC_CONNECTED to CDMA2000 1xRTT CS Active handover | Binary | Binary | |
| 12 | | - EUTRA RRC_CONNECTED to CDMA2000 HRPD Active handover | Binary | Binary | |
| 13 | | - Inter-frequency handover | Binary | | |
| 14 | | - Measurement reporting event: Event A4 – Neighbour > threshold | Binary | | |
| | | - Measurement reporting event: Event A5 – Serving < threshold1 & Neighbour > threshold2 | | | |
| 15 | | - Measurement reporting event: Event B1 – Neighbour > threshold | Binary | Binary | |
| 16 | | - Periodical measurement reporting for non-ANR related measurements | Binary | | |
| 17 | | - Periodical measurement reporting for SON / ANR | Binary | | |
| | | - ANR related intra-frequency measurement reporting events | | | |
| 18 | | - ANR related inter-frequency measurement reporting events | Binary | | |
| 19 | | - ANR related inter-RAT measurement reporting events | Binary | Binary | |
| 20 | | If bit number 7 is set to '0': | Binary | | |
| | | - SRB1 and SRB2 for DCCH + 8x AM DRB | | | |
| | | If bit number 7 is set to '1': | | | |
| | | - SRB1 and SRB2 for DCCH + 5x AM DRB + 3x UM DRB | | | |

| Index of indicator (bit number) Index of indicator (bit number) | Setting Name - E-UTRA Capabilities - Feature Group Indicators | FDD - Setting Value | TDD - Setting Value | Default |
|--|---|---------------------|---------------------|---------|
| | NOTE: UE which indicate support for a DRB combination also support all subsets of the DRB combination. Therefore, release of DRB(s) never results in an unsupported DRB combination. | | | |
| 21 | - Predefined intra- and inter-sub frame frequency hopping for PUSCH with N _{sb} > 1 - Predefined inter-sub frame frequency hopping for PUSCH with N _{sb} > 1 | Binary | | |
| 22 | - UTRAN measurements, reporting and measurement reporting event B2 in E-UTRA connected mode | Binary | Binary | |
| 23 | - GERAN measurements, reporting and measurement reporting event B2 in E-UTRA connected mode | Binary | Binary | |
| 24 | - 1xRTT measurements, reporting and measurement reporting event B2 in E-UTRA connected mode | Binary | Binary | |
| 25 | - Inter-frequency measurements and reporting in E-UTRA connected mode | Binary | | |
| 26 | - HRPD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode | Binary | Binary | |
| 27 | - EUTRA RRC_CONNECTED to UTRA CELL_DCH CS handover | Binary | Binary | |
| 28 | - TTI bundling | Binary | Binary | |
| 29 | - Semi-persistent scheduling | Binary | Binary | |
| 30 | - Handover between FDD and TDD | Binary | | |
| 31 | - Indicates whether the UE supports the mechanisms defined for cells broadcasting multi band information i.e. comprehending multiBandInfoList, disregarding in RRC_CONNECTED the related system information fields and understanding the EARFCN signalling for all bands, that overlap with the bands supported by the UE, and that are defined in the earliest version of TS 36.101 [42] that includes all UE supported bands. | Binary | | |
| 32 | -Undefined | | | |
| 33 | Inter-RAT ANR features for UTRAN FDD including: - Inter-RAT periodical measurement reporting where <i>triggerType</i> is set to <i>periodical</i> and <i>purpose</i> is set to <i>reportStrongestCellsForSON</i> - Inter-RAT periodical measurement reporting where <i>triggerType</i> is set to <i>periodical</i> and <i>purpose</i> is set to <i>reportCGI</i> | Binary | Binary | |
| 34 | Inter-RAT ANR features for GERAN including: - Inter-RAT periodical measurement reporting where <i>triggerType</i> is set to <i>periodical</i> and <i>purpose</i> is set to <i>reportStrongestCells</i> - Inter-RAT periodical measurement reporting where <i>triggerType</i> is set to <i>periodical</i> and <i>purpose</i> is set to <i>reportCGI</i> | Binary | Binary | |
| 35 | Inter-RAT ANR features for 1xRTT including: - Inter-RAT periodical measurement reporting where <i>triggerType</i> is set to <i>periodical</i> and <i>purpose</i> is set to <i>reportStrongestCellsForSON</i> | Binary | Binary | |

| Index of indicator (bit number) Index of indicator (bit number) | Setting Name - E-UTRA Capabilities - Feature Group Indicators | FDD - Setting Value | TDD - Setting Value | Default |
|--|--|---------------------|---------------------|---------|
| | - Inter-RAT periodical measurement reporting where <i>triggerType</i> is set to <i>periodical</i> and <i>purpose</i> is set to <i>reportCGI</i> | | | |
| 36 | Inter-RAT ANR features for HRPD including: - Inter-RAT periodical measurement reporting where <i>triggerType</i> is set to <i>periodical</i> and <i>purpose</i> is set to <i>reportStrongestCellsForSON</i> - Inter-RAT periodical measurement reporting where <i>triggerType</i> is set to <i>periodical</i> and <i>purpose</i> is set to <i>reportCGI</i> | Binary | Binary | |
| 37 | Inter-RAT ANR features for UTRAN TDD including: - Inter-RAT periodical measurement reporting where <i>triggerType</i> is set to <i>periodical</i> and <i>purpose</i> is set to <i>reportStrongestCellsForSON</i> - Inter-RAT periodical measurement reporting where <i>triggerType</i> is set to <i>periodical</i> and <i>purpose</i> is set to <i>reportCGI</i> | Binary | Binary | |
| 38 | EUTRA RRC_CONNECTED to UTRA TDD CELL_DCH PS handover, if the UE supports both UTRAN FDD and UTRAN TDD | Binary | Binary | |
| 39 | UTRAN TDD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode, if the UE supports both UTRAN FDD and UTRAN TDD | Binary | Binary | |
| 40 | EUTRA RRC_CONNECTED to UTRA TDD CELL_DCH CS handover, if the UE supports both UTRAN FDD and UTRAN TDD | Binary | Binary | |
| 41 | Measurement reporting event: Event B1 – Neighbour > threshold for UTRAN FDD, if the UE supports UTRAN FDD and has set bit number 22 to 1 | Binary | Binary | |
| | | | | |
| 101 | DMRS with OCC (orthogonal cover code) and SGH (sequence group hopping) disabling | Binary | | |
| 102 | Trigger type 1 SRS (aperiodic SRS) transmission (Up to X ports) NOTE: X = number of supported layers on given band | Binary | Binary | |
| 103 | PDSCH transmission mode 9 when up to 4 CSI reference signal ports are configured | Binary | Binary | |
| 104 | PDSCH transmission mode 9 for TDD when 8 CSI reference signal ports are configured | Binary | | |
| 105 | Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-0 – UE selected sub band CQI without PMI, when PDSCH transmission mode 9 is configured Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-1 – UE selected sub band CQI with single PMI, when PDSCH transmission mode 9 and up to 4 CSI reference signal ports are configured | Binary | Binary | |

| Index of indicator (bit number) Index of indicator (bit number) | Setting Name - E-UTRA Capabilities - Feature Group Indicators | FDD - Setting Value | TDD - Setting Value | Default |
|--|--|---------------------|---------------------|---------|
| 106 | Periodic CQI/PMI/RI/PTI reporting on PUCCH: Mode 2-1 – UE selected sub band CQI with single PMI, when PDSCH transmission mode 9 and 8 CSI reference signal ports are configured | Binary | Binary | |
| 107 | Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected sub band CQI without PMI, when PDSCH transmission mode 9 is configured Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-2 – UE selected sub band CQI with multiple PMI, when PDSCH transmission mode 9 and up to 4 CSI reference signal ports are configured | Binary | Binary | |
| 108 | Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-2 – UE selected sub band CQI with multiple PMI, when PDSCH transmission mode 9 and 8 CSI reference signal ports are configured | Binary | Binary | |
| 109 | Periodic CQI/PMI/RI reporting on PUCCH Mode 1-1, sub mode 1 | Binary | Binary | |
| 110 | Periodic CQI/PMI/RI reporting on PUCCH Mode 1-1, sub mode 2 | Binary | Binary | |
| 111 | Measurement reporting trigger Event A6 | Binary | Binary | |
| 112 | SCell addition within the Handover to EUTRA procedure | Binary | Binary | |
| 113 | Trigger type 0 SRS (periodic SRS) transmission on X Serving Cells NOTE: X = number of supported component carriers in a given band combination | Binary | Binary | |
| 114 | Reporting of both UTRA CPICH RSCP and Ec/N0 in a Measurement Report | Binary | | |
| 115 | Time domain ICIC RLM/RRM measurement sub frame restriction for the serving cell time domain ICIC RRM measurement sub frame restriction for neighbour cells time domain ICIC CSI measurement | Binary | Binary | |
| 116 | Relative transmit phase continuity for spatial multiplexing in UL | Binary | Binary | |

3.9 Table 6 IMS Settings

Table 6 lists the IMS settings for the control of Operator based communication services.

NOTE : The index naming scheme “VxLTE” was originally chosen due to the parameters being defined in GSMA PRD IR.92 [2] for the VoLTE service. However, these parameters are generic IMS parameters and are also equally applicable to the provision of Operator based communication services over other access types such as Wi-Fi and 5G-NR.

| Index | Setting Name | Setting Value | GSMA Default Value | Applicability (LC =Late Customization , MNOP = MNO Provisioning or TBD) | Comments |
|-----------|--|------------------------------------|----------------------|---|---|
| VxLTE1.01 | VOID | | | | Index number no longer used. |
| VxLTE1.02 | VOID | | | | Index number no longer used. |
| VxLTE1.03 | VOID | | | | Index number no longer used. |
| VxLTE1.04 | VOID | | | | Index number no longer used. |
| VxLTE1.05 | ToConRef (Network Identifier part of the HOS APN) | String / Empty | Internet APN | LC & MNOP | Denotes the APN for XCAP Ut usage. If empty, then the APN is assumed to be the same as the APN for Internet access. See Section 5.9 of 3GPP Release 14 TS 24.424 (<code><X>/XCAP_conn_params_policy/<X>/XDM_MO_ref</code>) and 3GPP Release 14 TS 24.623. |
| VxLTE1.06 | Conf_Factory_URI (Conference Factory URI) | String / Empty | Empty | LC & MNOP | Denotes the URI of the Conference Factory / SIP AS. If empty, the URI is derived from the IMSI - see 3GPP TS 23.003. Defined in section 5.4 of 3GPP TS 24.166 (<code><X>/Conf_Factory_URI</code>) |
| VxLTE1.07 | SMS Over IP Networks Indication | SMSoIP Not Used / SMSoIP Preferred | 1 - SMSoIP Preferred | LC & MNOP | See section 5.28 of 3GPP TS 24.167 (<code><X>/SMS_Over_IP_Networks_Indication</code>) |
| VxLTE1.08 | Timer_T1 | Value | 2 secs | LC & MNOP | Standard SIP timer - see 3GPP TS 24.229 sect 7.7 and Section 5.10 of 3GPP TS 24.167 (<code><X>/Timer_T1</code>). |
| VxLTE1.09 | Timer_T2 | Value | 16 secs | LC & MNOP | Standard SIP timer - see 3GPP TS 24.229 sect 7.7 Section 5.11 of 3GPP TS 24.167 (<code><X>/Timer_T2</code>). |
| VxLTE1.10 | Timer_T4 | Value | 17 secs | LC & MNOP | Standard SIP timer - see 3GPP TS 24.229 sect 7.7 and Section 5.12 of 3GPP TS 24.167 (<code><X>/Timer_T3</code>). |

| Index | Setting Name | Setting Value | GSMA Default Value | Applicability (LC =Late Customization , MNOP = MNO Provisioning or TBD) | Comments |
|-----------|--|---------------------------------------|---|---|---|
| VxLTE1.11 | RegRetryBaseTime | Value | 30 secs | LC & MNOP | Base timer value for re-registration - see section 5.35 of 3GPP TS 24.167 (<X>/RegRetryBaseTime) |
| VxLTE1.12 | RegRetryMaxTime | Value | 1800 secs | LC & MNOP | Max timer value for re-registration - see Section 5.35 of 3GPP TS 24.167 (<X>/RegRetryMaxTime) |
| VxLTE1.13 | Precondition_disabling_policy (SIP Preconditions used) | Activate/Deactivate | 0 – the UE is allowed to use the precondition mechanism | LC & MNOP | Denotes whether SIP preconditions are used on the UE. See section 5.60 of 3GPP Release 14 TS 24.167 (<X>/Precondition_disabling_policy) and 3GPP Release 14 TS 24.229. |
| VxLTE1.14 | Ut Authentication | GAA/GBA/Digest | GAA | LC | The authentication mechanism to be used for XCAP Ut authentication. See IR.92 section 2.2.2 (where use of GAA is optional) |
| VxLTE1.15 | SS -Domain Setting | PS Only / CS Only / As voice service | no default | LC & MNOP | Denotes the method by which Supply Service control is enabled (i.e. via Ut or CS). See Section 5.41 3GPP TS 24.167 (<X>/SS_domain_setting). If no preference is provided then the default behaviour of the device is PS Preferred |
| VxLTE1.16 | USSD method | USSI/CSFB | | LC | See PRD NG.101 & 3GPP TS 24.391. |
| VxLTE1.17 | FromPreferred | "P-asserted-Id" header, "From" header | 0 - From header field is not used for the orig. party identity in OIP service | LC & MNOP | Used to control the SIP header from which CLI display information is taken. See 3GPP Release 14 TS 24.607 and section 5.4 of 3GPP Release 14 TS 24.417 (<X>/FromPreferred) not defined in 3GPP |
| VxLTE1.18 | Default_EPS_bearer_context_usage_restriction_policy | Allow / Prohibit | Prohibit | LC & MNOP | Denotes whether voice media is permitted to use the IMS signalling |

| Index | Setting Name | Setting Value | GSMA Default Value | Applicability (LC =Late Customization , MNOP = MNO Provisioning or TBD) | Comments |
|-----------|--|---|---|---|--|
| | icy (Voice media on default (QCI=5) bearer) | | | | bearer. See section 5.49 of 3GPP Release 14 TS 24.167 (interior node /<X>/Default_EPS_bearer_context_usage_restriction_policy) and 3GPP Release 14 TS 24.229. |
| VxLTE1.19 | Default_EPS_bearer_context_usage_restriction_policy (Video media on default QCI=5 bearer) | Allow / Prohibit | Prohibit | LC & MNOP | Denotes whether video media is permitted to use the IMS signalling bearer. See section 5.49 of 3GPP Release 14 TS 24.167 (interior node /<X>/Default_EPS_bearer_context_usage_restriction_policy) and 3GPP Release 14 TS 24.229. |
| VxLTE1.20 | XCAP Root URI | String / Empty | Empty | LC & MNOP | Denotes the ROOT URI for XCAP usage. If empty, then the URI is derived from the IMSI - see 3GPP TS 23.003. Defined in 3GPP TS 24.623. |
| VxLTE1.21 | IMS Enabled | Yes/No | Yes | LC & MNOP | Denotes whether IMS is enabled on the UE. See section 5.13 of 3GPP TS 24.305 [18] as /<X>/IMS |
| VxLTE1.22 | Policy_on_local_numbers (Local number type for voice and video calls) | Home-Local / Geo-Local | 1 - Home-Local | LC & MNOP | Denotes the local numbering scheme to be used when roaming. See IR.92 section 2.2.3.2 and Section 5.62 of 3GPP Release 14 TS 24.167 (/<X>/Policy_on_local_numbers) |
| VxLTE1.23 | SMSoIP_usage_policy (When to use SMSoIP) | Only with voice / Irrespective of voice | 2- SMSoIP irrespective of IMS voice support | LC & MNOP | Denotes whether SMSoIP can be used even if VoLTE is not used (VOPSI=No). See section 5.71 of 3GPP Release 14 TS 24.167 (/<X>/SMSoIP_usage_policy) |
| VxLTE1.24 | VoWiFi Mean Re-Keying timer | Value | 18hrs | LC & MNOP | Timer to refresh security credentials associated with EPC |

| Index | Setting Name | Setting Value | GSMA Default Value | Applicability (LC =Late Customization , MNOP = MNO Provisioning or TBD) | Comments |
|-----------|---|--|--------------------------|---|--|
| | | | | | integrated Wi-Fi. See Section 5.12A.3 of 3GPP Release 14 TS 24.312 (ANDSF/Untrusted_WLAN/RekeyingTime) |
| VxLTE1.25 | VoWiFi NAT Keep-Alive Timer | Value | 20 seconds | LC & MNOP | The timer to control sending of RTP keep alive packets when hosted NAT traversal encountered. See PRD IR51 & 3GPP TS 24.229 annex F5. Defined in section 5.12A.1 of 3GPP Release 14 TS 24.312 (ANDSF/Untrusted_WLAN/NATKeepAliveTime) |
| VxLTE1.26 | No MSRP Support | List of roaming partners | Empty | LC & MNOP | Denotes the list of roaming partners that do not support MSRP (see GSMA PRD NG.102 & RCC.07 Annex A.1.12). |
| VxLTE1.27 | Media_type_restriction_policy (Voice / Video over LTE allowed when roaming) | Voice Only / Voice & Video / Neither | Voice & Video prohibited | LC & MNOP | Denotes voice / video support over LTE when roaming. See section 5.43 of 3GPP Release 14 TS 24.167 (interior node /<X>/Media_type_restriction_policy) and 3GPP Release 14 TS 24.229. |
| VxLTE1.28 | Media_type_restriction_policy (Voice / Video over LTE allowed) | Voice Only / Voice & Video / Neither | Voice & Video allowed | LC & MNOP | Denotes voice / video support over LTE when in home network (not roaming). See section 5.43 of 3GPP Release 14 TS 24.167 (interior node /<X>/Media_type_restriction_policy) and 3GPP Release 14 TS 24.229. |
| VxLTE1.29 | PS Voice Preference Indicator | LTE only/ LTE preferred/ Wi-Fi_ only/ Wi-Fi_ preferred | no default | LC & MNOP | Denotes PS voice preference between LTE/EPC integrated Wi-Fi when in home network (not roaming). See Section 5.23 of 3GPP TS 24.216 (/<X>/OperatorPolicy/<X>/MediaPref/Preferred |

| Index | Setting Name | Setting Value | GSMA Default Value | Applicability (LC =Late Customization , MNOP = MNO Provisioning or TBD) | Comments |
|------------|--|--|--|---|---|
| | | | | | AccessNetworks) |
| VxLTE1.30 | PS Voice Preference Indicator when roaming | LTE only/ LTE preferred/ Wi-Fi_ only/ Wi-Fi_ preferred | no default | LC & MNOP | Denotes PS voice preference between LTE/EPC integrated Wi-Fi when not roaming. See Section 5.23 of 3GPP TS 24.216 (/X>/OperatorPolicy/<X>/MediaPref/Preferred AccessNetworks |
| VxLTE 1.31 | Sending SIP 18x reliably | Send 18x reliably / Do not send 18x reliably | 1 – Indicates that the SIP 18x responses (other than SIP 183 response) are to be sent reliably | LC & MNOP | Section 5.56 of 3GPP Release 14 TS 24.167 (/X>/Reliable_18x_policy /<X>/Send_18x_Reliably) and 3GPP Release 14 TS 24.229. |
| VxLTE 1.32 | Access for XCAP | Any access/ 3GPP access only/ EPC via WLAN only/ direct WLAN / 3GPP access preferred, direct WLAN secondary/ 3GPP access preferred, EPC via WLAN secondary | 1 - 3GPP Access Only | LC & MNOP | See 3GPP TS 24.424 and section 5.2.1.3 of 3GPP Release 14 TS 24.623 (/X>/AccessForXCAP) |
| VxLTE 1.33 | Rate Set for AMR | List of zero, one or more valid mode sets. | 0,2,4,7 ("mode-set = 0,2,4,7" included in the SDP answer) | LC & MNOP | Defined in clause 15.2 of 3GPP Release 9 TS 26.114 (/X>/Speech/<X>/RateSet) with (/X>/Speech/<X>/Codec= "amr") |

| Index | Setting Name | Setting Value | GSMA Default Value | Applicability (LC =Late Customization , MNOP = MNO Provisioning or TBD) | Comments |
|------------|---|---|---|---|---|
| VxLTE 1.34 | Rate Set for AMR-WB | List of zero, one or more valid mode sets. | Undefined (no mode-set parameter included in the SDP answer) | LC & MNOP | Defined in clause 15.2 of 3GPP Release 9 TS 26.114 (/X>/Speech/<X>/RateSet) (/X>/Speech/<X>/Codec= "amr-wb") |
| VxLTE 1.35 | EVS Bit Rate (EVS/br) | Range of bit rates for EVS codec | 5.9-24.4 | LC & MNOP | Defined in clause 15.2 of 3GPP Release 13 TS 26.114 (/X>/Speech/<X>/EVS/Br) & and clause 5 of 3GPP Release 13 TS 26.441 [76] (Table 1) |
| VxLTE 1.36 | EVS Bandwidth (EVS/Bw) | Range of bandwidths for EVS codec | nb-swb | LC & MNOP | Defined in clause 15.2 of 3GPP Release 13 TS 26.114 (/X>/Speech/<X>/EVS/Bw) |
| VxLTE 1.37 | EVS Initial partial redundancy offset (receive) | Denotes the frames used to transport partially redundant information in channel-aware mode. . | undefined (ch-aw-recv not included in SDP offer) | LC & MNOP | Defined in clause 17.2 of 3GPP Release 13 TS.26.114 <X>/Speech/<X>/ICM/INIT_PARTIAL_REDUNDANCY_OFFSET_RECV |
| VxLTE1.38 | XCAP PS Data Off Exempt | Not Exempt/ Exempt | 1 - Indicates that the SS configuration via XCAP is a 3GPP PS data off exempt service | LC & MNOP | See Section 5.11 of 3GPP TS 24.424 (/X>/3GPP_PS_data_off/SS_XCAP_config_exempt). |
| VxLTE1.39 | MMTEL Voice PS Data Off Exempt | Not Exempt/ Exempt | 1 - Indicates that the MMTEL voice is a 3GPP PS data off | LC & MNOP | See section 5.7 of 3GPP TS 24.275 (/X>/3GPP_PS_data_off/MMTEL_voice_exempt) |

| Index | Setting Name | Setting Value | GSMA Default Value | Applicability (LC =Late Customization , MNOP = MNO Provisioning or TBD) | Comments |
|-----------|--|--|---|---|--|
| | | | exempt service | | |
| VxLTE1.40 | Device Management PS Data Off Exempt | Not Exempt/ Exempt | 1 - Indicates that the device management is a 3GPP PS data off exempt service | LC & MNOP | See section 5.10i of 3GPP TS 24.368 (/X>/3GPP_PS_data_off/Exempted_service_list/X>/Device_management_over_PS) |
| VxLTE1.41 | SMS over IP PS Data Off Exempt | Not Exempt/ Exempt | 1 - Indicates that the SMS over IP is a 3GPP PS data off exempt service. | LC & MNOP | Section 5.67 of 3GPP TS 24.167 (/X>/3GPP_PS_data_off/SMSoIP_exempt) |
| VxLTE1.42 | USSI_PS Data Off Exempt | Not Exempt/ Exempt | 1 - Indicates that USSI is a 3GPP PS data off exempt service | LC & MNOP | Section 5.4B of 3GPP Release 14 TS 24.391 (/X>/3GPP_PS_data_off/USSI_exempt) |
| VxLTE1.43 | Emergency Registration Timer (emerg-reg) | Value | 10 secs | LC & MNOP | Section 5.61 of 3GPP Release 14 TS 24.167 (/X>/Timer_Emerg-reg) |
| VxLTE1.44 | COMPOSER AUTH | Disabled/ MSRP Composer/ MMTEL Composer/ MMTEL & MSRP Composer | 0 – Indicates that the service is disabled | LC & MNOP | Section 2.1.2 of RCC.20 (/X>/Services/composerAuth) If the value “1” is configured and the UE only supports MMTEL Call Composer, the UE must behave as defined for a value of “0”. |

| Index | Setting Name | Setting Value | GSMA Default Value | Applicability (LC =Late Customization , MNOP = MNO Provisioning or TBD) | Comments |
|-----------|----------------------------|--------------------|----------------------------------|---|--|
| | | | | | If the value "3" is configured and the UE only supports MMTEL Call Composer, the UE must behave as defined for a value of "2". |
| VxLTE1.45 | FT HTTP CS URI | String / Empty | Empty | LC & MNOP | Section A.2.4 of RCC.07 (/X>/Messaging/FileTransfer/ftHTTPCSURI) If empty, the URI is derived from the IMSI as defined in section A.1.4 of RCC.07. |
| VxLTE1.46 | FT HTTP DL URI | String / Empty | No default | LC & MNOP | Section A.2.4 of RCC.07 (/X>/Messaging/FileTransfer/ftHTTPDLURI) If empty, the URI is received in the incoming message from the network. |
| VxLTE1.47 | FT HTTP CS USER | | No default | LC & MNOP | Section A.2.4 of RCC.07 (/X>/Messaging/FileTransfer/ftHTTPCSUser) If used, this is a common N/W specific User ID. If empty, then GBA is used. |
| VxLTE1.48 | FT HTTP CS PWD | | No default | LC & MNOP | Section A.2.4 of RCC.07 (/X>/Messaging/FileTransfer/ftHTTPCSPwd) If used, this is a common N/W specific password. If empty, then GBA is used. |
| VxLTE1.49 | PRE AND POST CALL DATA OFF | Not Exempt/ Exempt | 1 – indicates that Call Composer | LC & MNOP | Section A.2.2 of RCC.07 (/X>/Services/Ext/DataOff/preAndPostCallDa |

| Index | Setting Name | Setting Value | GSMA Default Value | Applicability (LC =Late Customization , MNOP = MNO Provisioning or TBD) | Comments |
|-------------|---|---|---|---|---|
| | | | services are cellular data off exempt services | | taOff) |
| VxLTE1.50 | CAPABILITY DISCOVERY MECHANISM | Options Based / Presence Based / Disabled | 2 - Disabled | LC & MNOP | Section A.2.5 of RCC.07 (<u>CapDiscovery/defaultDisc</u>) |
| VxLTE1.51 | MMTEL Video PS Data Off Exempt | Not Exempt/ Exempt | 0 - Indicates that MMTEL video is not a 3GPP PS data off exempt service | LC & MNOP | Section 5.8 of 3GPP Release 14 TS 24.275 (<u>3GPP_PS_data_off/MMTEL_video_exempt</u>) |
| | | | | | |
| ViLTE2.01 | VOID | | | | Index number no longer used |
| | | | | | |
| VoWIFI 3.01 | Voice and Video / Voice enabled over Wi-Fi | Neither / Voice only/ Voice & Video | Voice & Video enabled | LC & MNOP | Denotes whether voice/video enabled via EPC integrated Wi-Fi. See Section 5.43 of 3GPP Release 14 TS 24.167 (interior node <u>Media_type_restriction_policy</u>) and 3GPP Release 14 TS 24.229 |
| VoWIFI 3.02 | Network Identifier part of the XCAP APN on EPC- | Same APN as LTE/other | No APN (i.e. use direct Wi- | LC & MNOP | Denotes the APN to be used for XCAP usage when attached via EPC |

| Index | Setting Name | Setting Value | GSMA Default Value | Applicability (LC =Late Customization , MNOP = MNO Provisioning or TBD) | Comments |
|-------------|---|---|--------------------------|---|---|
| | integrated WLAN | APN / no APN (direct Wi-Fi) | Fi access) | | integrated Wi-Fi. See GSMA PRD IR.51 and section 5.9 of 3GPP Release 14 TS 24.424 (XCAP_conn_params_policy/XDM_MO_ref) and 3GPP Release 14 TS 24.623 |
| VoWIFI 3.03 | Liveness check timer | Timer Value | 2 Minutes | LC & MNOP | Liveness check timer (the absence of a network specified value). See IR,51 and section 5.12A.2 of 3GPP Release 14 TS 24.312 (ANDSF/Untrusted_WLAN/LivenessCheckPeriod) |
| VoWIFI 3.04 | ePDG | String/ Empty | Empty | LC & MNOP | The ePDG to be used for emergency service. See IR.51 and section 5.11.11 of 3GPP Release 13 TS 24.312 (ANDSF/HomeNetworkPreference/ePDG) |
| VoWIFI 3.05 | Allow_Handover of IMS PDN connection from WLAN to LTE | HO with active session not allowed / HO with active session allowed/ HO not allowed | 2 – Handover not allowed | LC & MNOP | The parameter applies to roaming case and is defined in section 5.78 of 3GPP Release 15 TS 24.167 (X/Allow_Handover_PDN_connection_WLAN_and_EPS) |
| | | | | | |
| RCS 4.01 | RCS VOLTE SINGLE REGISTRATION | 0 - Dual, 1 - Single, 2- Single at home, dual roaming | 1 | LC & MNOP | Denotes whether single / dual IMS registrations are needed for VoLTE / RCS services (i.e. single converged core or separate IMS cores - see PRD NG.102 & RCC.07 annex A.1.7 |
| RCS 4.02 | Operator Configuration Enabled | Enabled/ Disabled | Enabled | LC | Parameter allowing to disable the client-triggered RCS operator device configuration |
| RCS 4.03 | RCS Operator Configuration Mechanism | HTTP(RCC.14)/OMA DM | HTTP(RC C.14) | LC | Controls the mechanism used for operator configuration |

3.10 Table 7 Other Settings

| Index | Setting Name | Setting Value | Default Value | Additional comments |
|------------|--|---------------------|---------------|--|
| Other 1.01 | VOID | | | Index number no longer used |
| Other 1.02 | Supports IPv4 | Activate/Deactivate | Activate | As specified in 3GPP TS 23.060 |
| Other 1.03 | Supports IPv4/6 | Activate/Deactivate | Activate | As specified in 3GPP TS 23.060 |
| Other 1.04 | Supports IPv6 | Activate/Deactivate | Activate | As specified in 3GPP TS 23.060 |
| Other 1.05 | 464xLAT | Activate/Deactivate | Activate | |
| Other 1.06 | SMS default alphabet | Activate/Deactivate | Activate | |
| Other 1.07 | MTU size | Value | | As specified in 3GPP TS 23.060 |
| Other 1.08 | TD-SCDMA | Activate/Deactivate | | |
| Other 1.09 | CDMA-2000 | Activate/Deactivate | | |
| Other 1.10 | Fast higher priority PLMN search upon entering VPLMN | Activate/Deactivate | Activate | As specified in 23.122, 4.4.3.1.1 |
| Other 1.11 | VOID | | | Index number no longer used. |
| Other 1.12 | VOID | | | Index number no longer used. |
| Other 1.13 | VOID | | | Index number no longer used. |
| Other 1.14 | Voice Mail Numbers | Numerical value | void | |
| Other 1.15 | VOID | | | Index number no longer used. |
| Other 1.16 | VOID | | | Index number no longer used. |
| Other 1.17 | VOID | | | Index number no longer used. |
| Other 1.18 | VOID | | | Index number no longer used. |
| Other 1.19 | VOID | | | Index number no longer used. |
| Other 1.20 | VOID | | | Index number no longer used. |
| Other 1.21 | VOID | | | Index number no longer used. |
| Other 1.22 | APN in EPC Initial Attach | No APN / APN name | No APN | As specified in 3GPP TS 24.301. Denotes whether an APN name when it is included in the initial attach. Furthermore, it is recommended that the default APN be the data APN (not always set to INTERNET) - If the MNO is setting a value they must state the actual APN name. |
| Other 1.23 | VOID | | | Index number no longer used. |

3.11 Table 8 APN Settings

| Index | APN Purpose | Setting Name | Setting Value | Default Value | Additional comments |
|---------|---------------------|------------------------------------|----------------------------|---------------|--|
| APN1.01 | Default APN | APN name | String | Void | Text Label to identify APN |
| APN1.02 | | APN | String | Void | As specified in 3GPP TS 23.060 |
| APN1.03 | | Authentication | PAP, CHAP, Normal | Void | As specified in 3GPP TS 23.060 |
| APN1.04 | | Username | String | Void | As specified in 3GPP TS 23.060 |
| APN1.05 | | Password | String | Void | As specified in 3GPP TS 23.060 |
| APN1.06 | | APN Type | default, supl, mms and wap | default | As specified in 3GPP TS 23.060 |
| APN1.07 | | Gateway / Proxy server IP address | IP Address | Void | As specified in 3GPP TS 23.060 |
| APN1.08 | | Gateway / Proxy server port number | Number | Void | As specified in 3GPP TS 23.060 |
| APN1.09 | | APN Protocol | IPV4, IPV6, IPV4/v6 | IPV4 | |
| APN1.10 | MMS APN | APN name | String | Void | Text Label to identify APN |
| APN1.11 | | MMS APN | String | Void | As specified in 3GPP TS 23.140 Annex F |
| APN1.12 | | Username | String | Void | As specified in 3GPP TS 23.060 |
| APN1.13 | | Password | String | Void | As specified in 3GPP TS 23.060 |
| APN1.14 | | MMSC URL | String | Void | As specified in 3GPP TS 23.140 Annex F |
| APN1.15 | | APN Type | default, supl, mms and wap | MMS | As specified in 3GPP TS 23.060 |
| APN1.16 | | MMS proxy address (if applicable) | String | Void | As specified in 3GPP TS 23.140 Annex F |
| APN1.17 | | MMSC Port Number | Integer | Void | As specified in 3GPP TS 23.140 Annex F |
| APN1.18 | Supplementary APN 1 | APN name | String | Void | Text Label to identify APN |
| APN1.19 | | APN | String | Void | As specified in 3GPP TS 23.060 |
| APN1.20 | | Authentication | PAP, CHAP, Normal | Void | As specified in 3GPP TS 23.060 |
| APN1.21 | | Username | String | Void | As specified in 3GPP TS 23.060 |
| APN1.22 | | Password | String | Void | As specified in 3GPP TS 23.060 |

| | | | | | |
|---------|----------------|---|----------------------------|------|---|
| APN1.23 | | APN Type | default, supl, mms and wap | Void | As specified in 3GPP TS 23.060 |
| APN1.24 | | Gateway / Proxy server IP address | IP Address | Void | As specified in 3GPP TS 23.060 |
| APN1.25 | | Gateway / Proxy server port number | Number | Void | As specified in 3GPP TS 23.060 |
| APN1.26 | | APN Protocol | IPV4, IPV6, IPV4/v6 | IPV4 | |
| APN1.27 | AOSP Reference | MNO confirms Android device can use AOSP APN file as alternate resource for APN details | Yes/No | Yes | https://android.googlesource.com/device/sample+/master/etc/apns-full-conf.xml |

4 Accessing preferred MNO values for Settings and parameters

The TAD customisation shall be implemented by OEM's for their Late Customisation deployments.

MNO's and MVNO's are requested to record their preferred values in the GSMA Network Settings Exchange, which is defined in TS.36

If a MNO or MVNO has not entered their data into the Network Settings Exchange then the OEM shall establish a bilateral agreement for the MNO or MVNO to send them their settings, for this purpose it is recommend that the template provided in **Annex A** of this document is used. This includes a column for MNO recommended Value.

If a MNO/MVNO settings are not available within the GSMA Network Settings Exchange or via bilateral agreement, then the manufacturer SHOULD use the default values to deploy a generic TAD customisation package, where no default values exist the OEM SHOULD use their preferred value for this setting.

Annex A Settings List template

Use the following Excel template when and OEM requests and MNO or MVNO to bilaterally provide the values for TAD setting



TS.32 v9.1.xlsx

Annex B Document Management

B.1 Document History

| Version | Date | Brief Description of Change | Approval Authority | Editor / Company |
|---------|----------------------------|-----------------------------------|--------------------|-----------------------|
| 1.0 | 13 th July 2016 | New PRD TS.32 | PSMC #146 | Doug Roberts / Orange |
| 2.0 | 24 March 2017 | Changes implemented as per CR1002 | TSG at TSG#27 | Doug Roberts / Orange |
| 3.0 | Sept 2017 | Changes implemented as per CR1003 | TSG at TSG#29 | Doug Roberts / Orange |
| 4.0 | Sept 2018 | Changes implemented as per CR1004 | TSG | Doug Roberts / Orange |
| 5.0 | Oct 2019 | Changes implemented as per CR1005 | TSG | Paul Gosden / GSMA |
| 6.0 | Dec 2019 | Changes implemented as per CR1006 | TSG#38 | Paul Gosden / GSMA |
| 7.0 | April 2020 | Changes implemented as per CR1007 | TSG - email | Tyler Smith / GSMA |
| 8.0 | July 2020 | Changes implemented as per CR1008 | TSG - email | Paul Gosden / GSMA |
| 9.0 | Jan 2021 | Changes implemented as per CR1010 | TSG - email | Paul Gosden / GSMA |

B.2 Other Information

| Type | Description |
|------------------|-------------------------|
| Document Owner | Terminal Steering Group |
| Editor / Company | Doug Roberts / Orange |

It is our intention to provide a quality product for your use. If you find any errors or omissions, please contact us with your comments. You may notify us at prd@gsma.com with your comments or suggestions & questions