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1 Introduction

1.1 Overview
The IP Multimedia Subsystem (IMS) Profile for Voice and SMS, documented in this Permanent Reference Document (PRD), defines a profile that identifies a minimum mandatory set of features which are defined in 3GPP specifications that a category M1 wireless device (the User Equipment (UE)) and network are required to implement in order to guarantee an interoperable, high quality IMS-based telephony service and IMS-based and Non-Access-Stratum (NAS) based Short Message Service (SMS) over LTE radio access.

The minimum mandatory set of features is defined by listing the features for the voice service over LTE that are required on top of the features defined in GSMA PRD IR.92 [1] for voice and SMS.

1.2 Relationship to existing standards

1.2.1 3GPP specifications
This profile is solely based on the open and published 3GPP specifications as listed in Section 1.5. 3GPP Release 8, the first release supporting LTE, that is taken as a basis. It should be noted, however that not all the features mandatory in 3GPP Release 8 are required for compliance with this profile.

Conversely, some features required for compliance with this profile are based on functionality defined in 3GPP Release 13 or higher releases.

All such exceptions are explicitly mentioned in the following sections along with the relevant Release 8 or higher 3GPP release specifications, respectively.

Unless otherwise stated, the latest version of the referenced specifications for the relevant 3GPP release applies.

1.3 Scope
This document defines a profile for voice over IMS over LTE, and for SMS over IMS and SMS over SGs, by listing a number of Evolved Universal Terrestrial Radio Access Network (E-UTRAN), Evolved Packet Core, IMS core, and UE features that are considered essential for category M1 UE and the network. The defined profile is compliant with 3GPP specifications. The scope of this profile is the interface between UE and the network.

The profile does not limit anybody, by any means, to deploy other standardized features or optional features, in addition to the defined profile.

1.4 Definition of Acronyms and Terms

1.4.1 Acronyms

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<th>Description</th>
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<tr>
<td>3GPP</td>
<td>3rd Generation Partnership Project</td>
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<tr>
<td>AMR</td>
<td>Adaptive Multi-Rate</td>
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<td>AMR-WB</td>
<td>Adaptive Multi-Rate wideband</td>
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<td>Acronym</td>
<td>Description</td>
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<td>---------</td>
<td>-------------</td>
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<td>CS</td>
<td>Circuit Switched</td>
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<td>DRX</td>
<td>Discontinuous Reception</td>
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<td>eNB</td>
<td>eNodeB</td>
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<td>EPS</td>
<td>Evolved Packet System</td>
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<td>E-UTRAN</td>
<td>Evolved Universal Terrestrial Radio Access Network</td>
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<td>EVS</td>
<td>Enhanced Voice Services</td>
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<td>FDD</td>
<td>Frequency-Division Duplexing</td>
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<td>GBR</td>
<td>Guaranteed Bit Rate</td>
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<td>GSM</td>
<td>Global System for Mobile communications</td>
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<td>HTTP</td>
<td>Hypertext Transfer Protocol</td>
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<td>IMS</td>
<td>IP Multimedia Subsystem</td>
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<td>IP</td>
<td>Internet Protocol</td>
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<td>LTE</td>
<td>Long Term Evolution</td>
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<td>MMTel</td>
<td>Multimedia Telephony</td>
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<td>MS-ISDN</td>
<td>Mobile Subscriber ISDN Number</td>
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<td>NAS</td>
<td>Non-Access-Stratum</td>
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<td>NGBR</td>
<td>Non Guaranteed Bit Rate</td>
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<td>P-CSCF</td>
<td>Proxy - Call Session Control Function</td>
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<td>PDN</td>
<td>Packet Data Network</td>
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<td>PS</td>
<td>Packet Switched</td>
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<td>QCI</td>
<td>Quality of Service Class Indicator</td>
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<td>RAT</td>
<td>Radio Access Technology</td>
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<td>RLC</td>
<td>Radio Link Control</td>
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<td>SIP</td>
<td>Session Initiation Protocol</td>
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<td>SMIPv6</td>
<td>SMS over IP</td>
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<td>SR-VCC</td>
<td>Single Radio Voice Call Continuity</td>
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<td>TAS</td>
<td>Telephony Application Server</td>
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<td>TDD</td>
<td>Time-Division Duplexing</td>
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<td>UE</td>
<td>User Equipment</td>
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<td>USSD</td>
<td>Unstructured Supplementary Service Data</td>
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<td>VoIP</td>
<td>Voice Over IP</td>
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<td>XCAP</td>
<td>XML Configuration Access Protocol</td>
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1.5 Definition of Terms

<table>
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<td>UE Category M1</td>
<td>A UE that supports the uplink and downlink category M1 as defined in 3GPP Release 13 TS 36.306 [3].</td>
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<td>Data Off</td>
<td>See GSMA PRD IR.92 [1].</td>
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1.6 Document Cross-References

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<td>[1]</td>
<td>GSMA PRD IR.92</td>
<td>IMS Profile for Voice and SMS</td>
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<tr>
<td>[6]</td>
<td>3GPP TS 23.682</td>
<td>Architecture enhancements to facilitate communications</td>
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2 IMS Feature Set

2.1 General
The IMS profile part lists the mandatory capabilities, that are required over the Gm and Ut reference points.

2.2 Support of generic IMS functions

2.2.1 SIP Registration Procedures
The UE and the IMS core network must conform to section 2.2.1 of GSMA PRD IR.92 [1].

2.2.2 Authentication
The UE and the IMS core network must conform to section 2.2.2 of GSMA PRD IR.92 [1] with the following modified requirement: the UE can support the Ut reference point.

2.2.3 Addressing
The UE and the IMS core network must conform to section 2.2.3 of GSMA PRD IR.92 [1].

2.2.4 Call Establishment and Termination
The UE and the IMS core network must conform to section 2.2.4 of GSMA PRD IR.92 [1].

2.2.5 Forking
The UE must conform to section 2.2.5 of GSMA PRD IR.92 [1].

2.2.6 The use of Signalling Compression
The UE must conform to section 2.2.6 of GSMA PRD IR.92 [1].
2.2.7 Early media and announcements
The UE must conform to section 2.2.7 of GSMA PRD IR.92 [1].

2.2.8 SIP Session Timer
The UE must conform to section 2.2.8 of GSMA PRD IR.92 [1].

2.3 Supplementary Services

2.3.1 Supplementary Services Overview
The UE and the Telephony Application Server (TAS) must conform to section 2.3.1 of GSMA PRD IR.92 [1].

2.3.2 Supplementary Service Configuration
The UE and the IMS core network can conform to section 2.3.2 of GSMA PRD IR.92 [1].

2.3.3 Ad-Hoc Multi Party Conference
The UE and the IMS core network can conform to section 2.3.3 of GSMA PRD IR.92 [1].

2.3.4 Communication Waiting
The UE and the IMS core network must conform to section 2.3.4 of GSMA PRD IR.92 [1].

2.3.5 Message Waiting Indication
The UE and the IMS core network must conform to section 2.3.5 of GSMA PRD IR.92 [1].

2.3.6 Originating Identification Restriction
The UE and the IMS core network must conform to section 2.3.6 of GSMA PRD IR.92 [1].

2.3.7 Terminating Identification Restriction
The UE and the IMS core network must conform to section 2.3.7 of GSMA PRD IR.92 [1].

2.3.8 Communication Diversion
The UE and the IMS core network must conform to section 2.3.8 of GSMA PRD IR.92 [1]
with the following modified requirement: the UE can support the Ut reference point.

2.3.9 Communication Barring
The UE and the IMS core network must conform to section 2.3.9 of GSMA PRD IR.92 [1]
with the following modified requirement: the UE can support the Ut reference point.

2.3.10 Communication Hold
The UE can conform to section 2.3.10 of GSMA PRD IR.92 [1].

2.3.11 Explicit Communication Transfer - Consultative
The UE and the IMS core network can conform to section 2.3.11 of GSMA PRD IR.92 [1].

2.3.12 Originating Identification Presentation
The UE and the IMS core network must conform to section 2.3.12 of GSMA PRD IR.92 [1].
2.4 Call Set-up Considerations

2.4.1 SIP Precondition Considerations
The UE and the IMS core network must conform to section 2.4.1 of GSMA PRD IR.92 [1].

2.4.2 Integration of resource management and SIP
The UE and the network must conform to section 2.4.2 of GSMA PRD IR.92 [1].

2.4.3 Voice Media Considerations
The UE must conform to section 2.4.3 of GSMA PRD IR.92 [1].

2.4.4 Multimedia Considerations
The UE must conform to section 2.4.4 of GSMA PRD IR.92 [1].

2.5 SMS over IP
The UE and the IMS core network must conform to section 2.5 of GSMA PRD IR.92 [1].

3 IMS Media
The UE and the IMS core network must conform to section 3 of GSMA PRD IR.92 [1] with the following modified requirement: the UE can support the Adaptive Multi-Rate wideband (AMR-WB) speech codec. The AMR-WB speech codec must be supported if wideband speech communication is offered. The Enhanced Voice Services (EVS) speech codec must be supported if super-wideband or fullband speech communication is offered. The details of AMR-WB and EVS, when supported, are as specified in IR.92 [1].

NOTE: In GSMA PRD IR.92 [1], both AMR and AMR-WB speech codecs are mandatory to support.

4 Radio and Packet Core Feature Set

4.0 General
The LTE radio capabilities included in this specification are applicable to category M1 UEs configured with CE Mode A and networks supporting FDD LTE only, TDD LTE only, or both FDD LTE and TDD LTE as specified in 3GPP Release 13 TS 36.331 [2].

4.1 Robust Header Compression
The UE and network must conform to section 4.1 of GSMA PRD IR.92 [1].

4.2 LTE Radio Capabilities

4.2.1 Radio Bearers
The UE and network must conform to section 4.2.1 of GSMA PRD IR.92 [1].

4.2.2 DRX Mode of Operation
The UE and network must conform to section 4.2.2 of GSMA PRD IR.92 [1].
4.2.3 RLC configurations
The UE and network must conform to section 4.2.3 of GSMA PRD IR.92 [1].

4.2.4 GBR and NGBR Services, GBR Monitoring Function
The UE and the network must conform to section 4.2.4 of GSMA PRD IR.92 [1].

4.3 Bearer Management

4.3.1 EPS Bearer Considerations for SIP Signalling and XCAP
The UE and the network must conform to section 4.3.1 of GSMA PRD IR.92 [1] with the following modified requirement: the UE can support the Ut reference point.

4.3.2 EPS Bearer Considerations for Voice
The UE and the network must conform to section 4.3.2 of GSMA PRD IR.92 [1].

4.3.3 EPS Bearer Considerations for voice media on emergency PDN Connection
The UE and the network must conform to section 4.3.3 of GSMA PRD IR.92 [1].

4.4 P-CSCF Discovery
The UE and the packet core network must conform to section 4.4 of GSMA PRD IR.92 [1].

4.5 Extended Idle Mode Discontinuous Reception
If the UE supports Extended Idle Mode Discontinuous Reception (eDRX), and the UE supports and uses terminating voice calls, then the UE must not include the extended idle mode DRX parameters information element during Attach and TAU procedure as specified in 3GPP Release 13 TS 23.682 [6].

4.6 Control Plane CIoT EPS Optimisation for transport of user data over NAS
Even if the UE supports control plane CIoT EPS optimisation for transport of user data over NAS, the UE must not indicate support of control Plane CIoT EPS optimizations during Attach and TAU procedure as specified in 3GPP Release 13 TS 24.301 [7].

5 Common Functionalities

5.1 IP Version
The UE and the network must conform to section 5.1 of GSMA PRD IR.92 [1] with the following modified requirement: the UE can support XCAP/HTTP.

5.2 Emergency Service

5.2.1 General
The UE and the network must conform to section 5.2.1 of GSMA PRD IR.92 [1].

5.2.2 Interactions between supplementary services and PSAP callback
The network must conform to section 5.2.2 of GSMA PRD IR.92 [1].
5.3 Roaming Considerations
This profile has been designed to support IMS voice roaming. For more information on the
IMS voice roaming models see GSMA PRD IR.65 [4] and GSMA PRD IR.88 [5].

5.4 Accesses in addition to E-UTRAN
The UE must conform to section 5.4 of GSMA PRD IR.92 [1].

5.5 Data Off and Services Availability
The UE and the network must conform to section 5.5 of GSMA PRD IR.92 [1].

5.6 Voice Calls and Smart Congestion Mitigation
The UE and the network must conform to section 5.6 of GSMA PRD IR.92 [1].

5.7 Extended Idle Mode Discontinuous Reception
If the UE supports Extended Idle Mode Discontinuous Reception (eDRX), and the UE
supports and uses terminating voice calls, then the UE must not include the extended idle
mode DRX parameters information element during Attach and TAU procedure as specified
in 3GPP Release 13 TS 23.682 [6].

5.8 Power Saving Mode
If the UE supports Power Saving Mode (PSM), and the UE supports and uses terminating
voice calls, then the UE must neither request an Active Time value nor request a Periodic
TAU/RAU Timer value during Attach and TAU procedures as described in 3GPP Release 13
TS 23.682 [6].
Annex A  Complementing IMS with CS

A.1  General
In order to offer its customers a seamless service, the operator may wish to complement the IMS VoIP and SMS over IP capable radio coverage by utilising the CS (Circuit Switched) radio access for voice and/or SMS over NAS signalling on cellular access. The IMS VoIP and SMS over IP coverage may be less or more extensive than the concurrent CS coverage. This Annex describes the additional features that need to be implemented for the UEs and networks that wish to support such a deployment scenario.

The voice related requirements in this annex are applicable if the UE has the setting of “IMS PS Voice preferred, CS Voice as secondary”.

A.2  Domain Selection
The UE and the network can conform to section A.2 of GSMA PRD IR.92 [1].

A.3  SR-VCC
The UE and the network can conform to section A.3 of GSMA PRD IR.92 [1].

A.4  IMS Voice service settings management when using CS access
The UE and the network can conform to section A.4 of GSMA PRD IR.92 [1].

A.5  Emergency Service
The UE and the network must conform to section A.5 of GSMA PRD IR.92 [1].

A.6  Roaming Considerations
The UE can conform to section A.6 of GSMA PRD IR.92 [1].

A.7  SMS Support
The UE and the network must conform to section A.7 of GSMA PRD IR.92 [1].

A.8  Call Waiting in the CS domain
The UE and the network can conform to section A.8 of GSMA PRD IR.92 [1].

A.9  USSD
The UE and the network can conform to section A.9 of GSMA PRD IR.92 [1].
Annex B  Features needed in certain regions

B.1  General
This Annex describes features that operators need to support in certain regions due to local regulatory requirements.

B.2  Global Text Telephony
The UE and the network must conform to section B.2 of GSMA PRD IR.92 [1].

B.3  Service Specific Access Control
The UE and the network must conform to section B.3 of GSMA PRD IR.92 [1].
Annex C   Document Management

C.1 Document History

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<th>Version</th>
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<th>Brief Description of Change</th>
<th>Approval Authority</th>
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<td>1.0</td>
<td>June 2017</td>
<td>New PRD</td>
<td>NG/PSMC</td>
<td>Ralf Keller (Ericsson)</td>
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<td>2.0</td>
<td>April 2018</td>
<td>Implemented CRs</td>
<td>NG/PSMC</td>
<td>Ralf Keller (Ericsson)</td>
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<td>• CR1002 eDRX and PSM in case of terminating voice calls</td>
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<td>• CR1003: DONAS and PDN Connections to IMS APN and HOS APN</td>
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Other Information

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<td>Editor / Company</td>
<td>George Foti (Ericsson)</td>
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Your comments or suggestions & questions are always welcome.