IMS profile for Video, Voice and SMS over trusted Wi-Fi access

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Table of Contents

Table of Contents

1   Introduction

1.1   Overview

The IP Multimedia Subsystem (IMS) Profile for Voice and Video, 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 wireless device (the User Equipment (UE)) and network are required to implement in order to guarantee interoperable, high quality IMS-based telephony and conversational video services over Wi-Fi access.

"Wi-Fi" is a trademark of the Wi-Fi Alliance and the brand name for products using WFA programs based on the IEEE 802.11 family of standards.

In this document, Wi-Fi access refers to a WLAN access to EPC (Evolved Packet Core), via Trusted access interface (S2a interface), as defined in 3GPP TS 23.402 [9]. The Untrusted access (S2b interface) is covered in GSMA PRD IR.51[4].

The content includes the following aspects:

- IMS basic capabilities and supplementary services for telephony [Chapter 2]
- Real-time media negotiation, transport, and codecs [Chapter 3]
- Wi-Fi radio and (evolved) packet core capabilities [Chapter 4]
- Functionality that is relevant across the protocol stack and subsystems [Chapter 5]
- Additional features that need to be implemented for the UEs and networks that wish to support Circuit Switched (CS) [Annex A]
- UE configuration to provide all necessary information to connect to, and receive voice service and SMS from, a specific IMS telephony operator [Annex B].
- Support for Unstructured Supplementary Service Data (USSD) Simulation Service in IMS (USSI) as optional feature [Annex C].

The conversational video services comprise of calls with full duplex voice and simplex/full-duplex video media with tight synchronization between the constituent streams. The call can be a point to point call or a multiparty conference call. The conversational video service can also be used to interact with for example dial in video conference systems.

A UE and a network compliant to this profile must support IMS-based telephony. A UE and a network compliant to this profile may support conversational video services.

1.2   Relationship to existing standards

1.2.1 3GPP Specifications

This profile is based on the open and published 3GPP specifications as listed in Section 1.5. 3GPP Release 12 is taken as a basis. It should be noted, however that not all the features specified in 3GPP Release 12 are required for compliance with this profile.

Conversely, some features required for compliance with this profile are based on functionality defined in 3GPP releases higher than the release taken as a basis.

All such exceptions are explicitly mentioned in the following sections along with the relevant 3GPP Release.

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

1.3   Scope

This document defines a voice and video over Wi-Fi IMS profile by profiling a number of Wi-Fi, (Evolved) Packet Core, IMS core, and UE features which are considered essential to launch interoperable IMS based voice and video on Wi-Fi over trusted access. This document is based on the IMS Voice and SMS profile described in GSMA PRD IR.92 [1], on the IMS Profile for Conversational Video Service profile described in GSMA PRD IR.94 [2] and IMS Profile for Video, Voice and SMS over Untrusted Wi-Fi in GSMA PRD IR.51 [4]. The defined profile is compliant with 3GPP specifications. The scope of this version of the profile is the interface between the UE and the network.

The profile does not limit anyone to deploy other standardized features or optional features, in addition to the defined profile.

1.4   Definitions

Term	Description
3GPP	3rd Generation Partnership Project
ANDSF	Access Network Discovery and Selection Function
APN	Access Point Name
DNS	Domain Name System
EAP-AKA	Extensible Authentication Protocol – Authentication and Key Agreement
EAP-AKA'	Improved Extensible Authentication Protocol Method for 3r Generation Authentication and Key Agreement (AKA)
EPC	Evolved Packet Core
FFS	For Further Study
FQDN	Fully Qualified Domain Name
IKEv2	Internet Key Exchange version 2
IM	IP Multimedia
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IPsec	IP Security
IPv4	Internet Protocol Version 4
IPv6	Internet Protocol Version 6
MCM	Multi-Connection Mode
P-CSCF	Proxy - Call Session Control Function
RTCP	RTP Control Protocol
RTP	Real Time Protocol
SDP	Session Description Protocol

Term	Description
SIP	Session Initiation Protocol
TWAG	Trusted WLAN Access Gateway
TWAN	Trusted WLAN Access Network
UE	User Equipment
USSI	Unstructured Supplementary Service Data (USSD) using IP Multimedia (IM) Core Network (CN) subsystem (IMS)
VoIP	Voice Over IP
WLCP	Wireless LAN Control Plane protocol
XCAP	XML Configuration Access Protocol
XML	eXtensible Markup Language

1.5 References

Ref	Doc Number	Title
1	GSMA PRD IR.92	IMS Profile for Voice and SMS.
2	GSMA PRD IR.94	IMS Profile for Conversational Video Service
3	GSMA PRD IR.61	WLAN Roaming Guidelines (Inter-Operator Handbook)
4	GSMA PRD IR.51	IMS Profile for Video, Voice and SMS over Wi-Fi
5	GSMA PRD IR.65	IMS Roaming and Interworking Guidelines
6	GSMA PRD IR.88	LTE Roaming Guidelines
7	GSMA PRD TS.22	Recommendations for Minimal Wi-Fi Capabilities of Terminals
8	3GPP TS 24.229	IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3
9	3GPP TS 23.402	Architecture enhancements for non-3GPP accesses
10	3GPP TS 24.302	Access to the 3GPP Evolved Packet Core (EPC) via non-3GPP access networks; Stage 3
11	3GPP TS 24.244	Wireless LAN Control Plane Protocol for trusted access; Stage 3
12	3GPP TS 23.167	IP Multimedia Subsystem (IMS) emergency sessions
13	IETF RFC 5448	Improved Extensible Authentication Protocol Method for 3rd Generation Authentication and Key Agreement (EAP-AKA')
14	IETF RFC 7296	Internet Key Exchange Protocol Version 2 (IKEv2)

2 IMS feature set

2.1 General

The IMS profile part lists the mandatory capabilities 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 network must conform to section 2.2.1 of GSMA PRD IR.51 [4].

2.2.2 Authentication

The UE and the network must conform to section 2.2.2 of GSMA PRD IR.51 [4].

2.2.3 Addressing

The UE and the network must conform to section 2.2.3 of GSMA PRD IR.51 [4].

2.2.4 Call Establishment and Termination

The UE and the network must conform to section 2.2.4 of GSMA PRD IR.51 [4].

2.2.5 Forking

The UE and the network must conform to section 2.2.5 of GSMA PRD IR.51 [4].

2.2.6 The use of Signalling Compression

The UE must conform to section 2.2.6 of GSMA PRD IR.51 [4].

2.2.7 Early Media and announcements

The UE must conform to section 2.2.7 of GSMA PRD IR.51 [4].

2.2.8 SIP Session Timer

The UE must conform to section 2.2.8 of GSMA PRD IR.51 [4].

2.2.9 SIP OPTIONS

The UE must conform to section 2.2.9 of GSMA PRD IR.51 [4].

2.3   Supplementary Services

The UE and the network must conform to section 2.3 of GSMA PRD IR.92 [1].

2.4   Call Set-up Considerations

2.4.1 SIP Precondition Considerations

The UE and the network must conform to section 2.4.1 of GSMA PRD IR.92 [1].

2.4.2 Integration of resource management and SIP

2.4.2.1 Loss of Radio Connection

The UE and the network must conform to section 2.4.2.1 of GSMA PRD IR.92 [1].

2.4.3 Voice Media Considerations

The UE and the network must conform to section 2.4.3 of GSMA PRD IR.92 [1].

2.4.4 Video Media Considerations

A UE and a network must conform to section 2.4.4 of GSMA PRD IR.51 [4].

2.5   SMS over IP

The UE and the network must conform to section 2.5 of GSMA PRD IR.92 [1].

2.6 User-Agent and Server Headers

The UE must support the User-Agent and Server headers for SIP and the User-Agent header for HTTP as defined in GSMA PRD IR.92 [1].

3 IMS media

The UE and the network must conform to section 3 of GSMA PRD IR.92 [1].

4 Radio and packet core feature set

4.1 Radio capabilities

4.1.1 Alignment with Wi-Fi Alliance Certification programmes

The UE must conform to section 2 of GSMA PRD TS.22 [7].

4.1.2 WLAN Policy provisioning

The UE must conform to section 3 of GSMA PRD TS.22 [7].

4.1.3 Connection management

The UE must conform to section 4 of GSMA PRD TS.22 [7].

4.2 Wi-Fi IP Access Network Detection

During the initial attach or handover attach, the UE must discover the trust relationship as specified in 3GPP TS 24.302 [10] (For Wi-Fi Access Network type, see GSMA PRD. IR.61 [3]) of the Wi-Fi Access Network in order to know which Wi-Fi Access procedure to initiate. The trust relationship of a Wi-Fi Access Network is made known to the UE if

1. the Wi-Fi Access supports 3GPP-based access authentication, the UE discovers the trust relationship during the 3GPP-based access authentication.
   or
2. the UE operates on the basis of pre-configured policy in the UE.

4.3 Wi-Fi Access Network Selection

The UE and the network must conform to specified in section 4.3 of GSMA PRD IR.51[4].

4.4 Non-3GPP Access Authentication and Security

The UE and the network must conform to the requirements for supporting trusted access as specified in section 5.3 of GSMA PRD IR.61 [3].

4.5 APN Considerations for SIP Signalling, HTTP for XCAP and HTTP Content Server

The UE and the network must support the procedure to signal APNs (Access Point Name), as specified in section 16.8.1 of Release 12 of 3GPP TS 23.402 [9].

The UE and the network must conform to section 4.6 of GSMA PRD IR.51 [4].

4.6   PDN Connectivity Service

General

The UE and the network must conform to the requirements for PDN Connectivity Service as specified in section 5.6.2 of GSMA PRD IR.61 [3].

4.6.1 Multi-Connection Mode

The network (TWAN) must provide access to the EPC in Multi-Connection Mode as specified in 3GPP TS 23.402 [9].

The UE must support the Multi-Connection Mode as specified in 3GPP TS 23.402 [9].

4.6.2 Connectivity Services

The UE must establish a separate SWw instance (i.e. a separate tunnel) for the PDN connection to the IMS well-known APN and to the APN to be used for XCAP and HTTP Content Server requests. The UE must provide the F during the initial attach procedure and during the attach to additional PDN procedure as specified in 3GPP TS 23.402 [9]. The APN must be encoded as ID FQDN defined in IETF RFC 7296 [14]. The UE must use the same TWAG for all SWw instances.

4.6.3 UE initiated disconnect

The UE initiated disconnect procedure must be used by UE in the following scenarios:

- The UE is turned off and has one or more active SWw connections to TWAN;
- Wi-Fi connection is turned off and the UE has one or more active connections to TWAN that according to the UE/operator policy should not be handed over to cellular;

and

- Wi-Fi connection is turned off and UE has one or more active connections to TWAN and no cellular coverage.

For each PDN connection the UE should disconnect, the UE must send a PDN DISCONNECT REQUEST which contains the PTI and the PDN Connection ID corresponding to the PDN connection to be disconnected. The TWAN should reply with a PDN DISCONNECT ACCEPT. If the TWAN replies with a PDN DISCONNECT REJECT, the TWAN must indicate one of the values as specified in the 3GPP TS 24.244 [11].

4.6.4 Network initiated disconnect

The UE must be able to receive a PDN CONNECTION REQUEST, which contains PTI and the PDN Connection ID corresponding to the PDN connection to be disconnected as specified in 23.402 [9]. The UE must reply with a PDN DISCONNECT ACCEPT as specified in 23.402 [9].

> Note: The network that initiates the disconnect can be triggered by many reasons like subscription changes, network maintenance etc.

4.7   Mobility Management

A UE supporting trusted access in Multi-Connection Mode must:

- support seamless handover from LTE to Wi-Fi as described in 3GPP TS 23.402 [9];
- support seamless handover from Wi-Fi to LTE as described in 3GPP TS 23.402 [9].

The network can fulfil the requirements for mobility management as specified in section 6.2 of GSMA PRD IR.61 [3].

4.8   P-CSCF Discovery

The UE and the network must support the procedures for P-CSCF discovery via EPC via WLAN, as described in method IV of Annex R.2.2.1 of Release 13 3GPP TS 24.229 [8].

When establishing a PDN connection to the IMS well-known APN via WLAN, the UE must discover the P-CSCF address(es) as described in method IV of Annex R.2.2.1 of Release 13 3GPP TS 24.229 [8].

If P-CSCF address(es) were discovered using the method IV, the UE must use the P-CSCF address(es) discovered using the method IV as defined in section 5.1 and 3GPP TS 24.229 [8].

> Note :   It is FFS if a new method is to be used for the trusted access in the MultiConnection Mode.

After the UE has discovered the P-CSCF and registered to IMS, the UE must use this P-CSCF as long as the IMS registration is valid, as described in sections B.2.2.1, L.2.2.1 and R.2.2.1 of Release 13 3GPP TS 24.229 [8].

> Note :   The UE continues to use the selected P-CSCF also if the PDN connection to the IMS well-known APN is subject of handover from Wi-Fi to LTE, UTRAN and GERAN and vice versa.

5   Common Functionalities

5.1   IP Version

The UE and the network must support both IPv4 and IPv6 for all protocols used for the service: SIP, SDP, RTP, RTCP and XCAP/HTTP.

If both IPv4 and IPv6 addresses are assigned for the UE, the UE must prefer the IPv6 address type.

After the UE has discovered the P-CSCF and registered to IMS with a particular IPv4 or IPv6 address, the UE must use this IP address for all SIP communication, as long as the IMS registration is valid. For all SDP and RTP/RTCP communications, the UE must use the IPv4 address used for SIP communication or an IPv6 address with the IPv6 prefix same as the IPv6 prefix of the IPv6 address used for SIP communication.

> Note: There are certain situations where interworking between IP versions is required. These include, for instance, roaming and interconnect between networks using different IP versions. In those cases, the network needs to provide the interworking in a transparent manner to the UE.

5.2   IP Address Allocation

The UE and the network must conform to the requirements for the IP address allocation as specified in section 5.2 of GSMA PRD IR.51[4].

5.3   Emergency Service

The UE and the network must support the IMS emergency services as specified in 3GPP TS 24.229 [8], in section 6 and Annex K of 3GPP Release 14 TS 23.167 [12] and the emergency procedures as specified in 3GPP Release 14 TS 24.302 [10].

The UE must support the IMS emergency session as specified in section 5.2.1 of GSMA PRD IR.92 [1].

Additionally, the UE must support Annex J of 3GPP Release 14 TS 23.167 [12], Annex R of 3GPP Release 14 TS 24.229 [8], and Ssection 6.4 and section 7.2 of 3GPP Release 14 TS 24.302.

5.4   Roaming Considerations

This profile supports IMS roaming as described in GSMS PRD IR.65 [5] and GSMA PRD IR.88 [6].

5.5   Capability Discovery

The UE must conform to section 5.6 of GSMA PRD IR.51 [4].

5.6   HTTP Content Server

The UE must conform to section 5.7 of GSMA PRD IR.51 [4].

Annex A   Complementing IMS over Wi-Fi with CS

The UE and the network must fulfil the requirements regarding complementing IMS over Wi-Fi with CS as specified in Annex A of GSMA PRD IR.51 [4].

Annex B   MNO Provisioning and Late Customization

The UE and the network must conform to the requirements regarding MNO provisioning and late customization as specified in Annex B of GSMA PRD IR.51 [4].

> Note: It is FFS to identify the list of configuration parameters that apply to the trusted Wi-Fi access profile.

Annex C   USSI

The UE and the network must conform to Annex D of GSMA PRD IR.92 [1].

Annex D   Document Management

D.1   Document History

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
1.0	21/11/2016	New PRD	NG PSMC	Merieme El Orch / Orange
2.0	23/05/2017	Implementation of CR1001	NG #5	Merieme El Orch / Orange
3.0	04/07/2017	Implementation of CR1002 and CR1003	NG #5	Merieme El Orch / Orange
4.0	07/05/2018	Implementation of CR1004 and CR1005	NG#7	Javier Sendin/GSMA
5.0	16/04/2019	Implementation of CR1006 and CR1007	NG #9	Merieme El Orch / Orange
6.0	28/05/2021	Implementation of CR1008	NG #13	Merieme El Orch / Orange

D.2   Other Information

Type	Description
Document Owner	NG
Editor / Company	Merieme El Orch / Orange

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