IMS over Wi-Fi
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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), 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 networks.

"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, either trusted (S2a interface) or untrusted (S2b interface), as defined in 3GPP TS 23.402 [2].

The scope 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].

The conversational video services comprise 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 11 is taken as a basis.

It should be noted that not all the features specified in 3GPP Release 11 are required for compliance with this profile. Conversely, some features required for compliance with this profile are based on functionality defined in 3GPP Release 12 or higher releases. All such exceptions are explicitly mentioned in the following sections along with the relevant Release 11 or higher 3GPP release specifications.

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. This document is based on the IMS Voice and SMS profile described in PRD IR.92 [3] and on the IMS Profile for Conversational Video Service profile described in PRD IR.94 [x1]. The defined profile is compliant with 3GPP specifications. The scope of this version of the profile is the interface between UE and network.

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

2 Definitions

Term	Description
3GPP	3rd Generation Partnership Project
IM	IP Multimedia
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IPv4	Internet Protocol Version 4
IPv6	Internet Protocol Version 6
P-CSCF	Proxy - Call Session Control Function
RTCP	RTP Control Protocol
RTP	Real Time Protocol
SDP	Session Description Protocol
SIP	Session Initiation Protocol
UE	User Equipment
VoIP	Voice Over IP
XCAP	XML Configuration Access Protocol
XML	eXtensible Markup Language

3 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 TS.22	Recommendations for Minimal Wi-Fi Capabilities of Terminals
[5]	3GPP TS 24.229	IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3
[6]	3GPP TS 23.402	Architecture enhancements for non-3GPP accesses

Ref	Doc Number	Title
[7]	GSMA PRD IR.88	LTE Roaming Guidelines

4 IMS feature set

4.1 General

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

4.2 Support of generic IMS functions

4.2.1 SIP registration procedures

The UE and the network must fulfil the requirements on IMS feature set specified in section 2.2.1 of GSMA PRD IR.92 [1], with the exception that section L.3.1.2 of 3GPP TS 24.229 is not applicable in the scope of this document.

NOTE: PRD IR.92 [1] contains explicit statements when the UE must register with the IMS. Currently 3GPP specifications do not have similar statements regarding VoWi-Fi. It is for further study if explicit statements can be created for VoWi-Fi (in addition to what is specified in section 2.4.2.1).

A UE and a network supporting Conversational Video Service over Wi-Fi must fulfil the additional requirements on IMS feature set as specified in section 2.2.1 of GSMA PRD IR.94 [2].

4.3 Authentication

The UE and the network must fulfil the requirements on IMS feature set specified as specified in section 2.2.2 of GSMA PRD IR.92 [1].

4.4 Addressing

The UE and the network must fulfil the requirements on IMS feature set as specified in section 2.2.3 of GSMA PRD IR.92 [1].

4.5 Call establishment and termination

The UE and the network must fulfil the requirements on IMS feature set as specified in section 2.2.4 of GSMA PRD IR.92 [1].

A UE and a network supporting Conversational Video Service over Wi-Fi must fulfil the additional requirements on IMS feature set as specified in section 2.2.2 of GSMA PRD IR.94 [2].

4.6 Forking

The UE and the network must fulfil the requirements on IMS feature set as specified in section 2.2.5 of GSMA PRD IR.92 [1].

A UE and a network supporting Conversational Video Service over Wi-Fi must fulfil the additional requirements on IMS feature set as specified in section 2.2.3 of GSMA PRD IR.94 [2].

4.6.1 The use of signalling compression

The UE must not use SIGCOMP when the initial IMS registration is performed over Wi-Fi.

4.6.2 Hosted NAT traversal

The UE and the network shall support the procedures for traversal of a hosted NAT specified in 3GPP TS 24.229, Annex F.

The UE must send keepalives for each RTP media stream, as described in 3GPP TS 24.229, Annex F.5, if the normal RTP media stream packet sending frequency is too low to maintain the NAT bindings. The UE shall send RTP keep-alive as soon as an SDP offer or answer is received as described in 3GPP TS 24.229, Annex F.5.

The bandwidth used for RTCP shall be sufficient to keep NAT bindings open for the RTCP flow, as described in IETF RFC 6263.

4.7 Supplementary services

The UE and the network must fulfil the requirements on IMS feature set as specified in section 2.3 of GSMA PRD IR.92 [1].

A UE and a network supporting Conversational Video Service over Wi-Fi must fulfil the additional requirements on IMS feature set as specified in section 2.3 of GSMA PRD IR.94 [2].

4.7.1 Call set-up considerations

4.7.1.1 SIP precondition considerations

The UE and the network must fulfil the requirements on IMS feature set as specified in section 2.4.1 of GSMA PRD IR.92 [1].

4.7.1.2 Integration of resource management and SIP

1. Loss of Radio Connection

If the UE loses radio connectivity and the IMS registration expires prior to regaining radio connectivity, then upon regaining radio connectivity the UE must perform a new initial registration to IMS.

2. Voice Media Considerations

The UE and the network must fulfil the requirements on IMS feature set as specified in section 2.4.3 of GSMA PRD IR.92 [1].

3. Video Media Considerations

A UE and a network supporting Conversational Video Service over Wi-Fi must fulfil the requirements on IMS feature set as specified in section 2.4.2 of GSMA PRD IR.94 [2].

4.7.1.3 SMS over IP

The UE and network must fulfil the requirements on IMS feature set as specified in section 2.5 of GSMA PRD IR.92 [1].

5 IMS media

The UE and the network must fulfil the requirements on IMS media as specified in section 3 of GSMA PRD IR.92 [1].

A UE and a network supporting Conversational Video Service over Wi-Fi must fulfil the additional requirements on IMS media as specified in section 2.3 of GSMA PRD IR.94 [2].

6 Radio and packet core feature set

6.1 Radio capabilities

6.1.1 Alignment with Wi-Fi Alliance certification programmes

The UE must fulfil the requirements as specified in section 2 of GSMA PRD TS.22 [4].

6.1.2 WLAN policy provisioning

The UE must fulfil the requirements as specified in section 3 of GSMA PRD TS.22 [4].

6.1.3 Connection management

The UE must fulfil the requirements as specified in section 4 of GSMA PRD TS.22 [4].

6.2 Wi-Fi Access network selection

The UE must fulfil the requirements for Wi-Fi access network selection as specified in section 5.2 of GSMA PRD IR.61 [3].

6.3 Non-3GPP access, authentication and security

The UE and the network must fulfil the requirements as specified in section 5.3 of GSMA PRD IR.61 [3]

6.4 Multiple PDN connections

The UE must support multiple PDN connections.

NOTE: For Multi Access PDN Connectivity (MAPCON), see section 6.5 in IR.61 [3].

6.5 APN considerations for SIP signalling and XCAP

When a trusted non-3GPP IP access is used, the UE and the network must support the procedure to signal APNs, as specified in section 16.8.1 of Release 12 of 3GPP TS 23.402 [6].

For SIP signalling, the IMS application in the UE must use the IMS well-known APN as defined in PRD IR.88 [7]; the UE must prevent non-IMS applications from using this APN.

For XCAP requests, the UE must be preconfigured or provisioned by the home operator with the APN to be used for XCAP requests.

NOTE: In case the UE complies with IR.92.this is the same APN as the APN used for XCAP requests referred to in IR.92

6.6 ePDG PDN connectivity service

When an untrusted non-3GPP IP access is used, the UE and the network must fulfil the requirements for PDN Connectivity Service as specified in section 5.6.1 of GSMA PRD IR.61 [3].

When a trusted non-3GPP IP access is used, the UE and the network must fulfil the requirements for PDN Connectivity Service as specified in section 5.6.2 of GSMA PRD IR.61 [3].

6.7 Non-seamless Wi-Fi offload

The UE must fulfil the requirements for Non-seamless Wi-Fi Offload as specified in section 6.4 of GSMA PRD IR.61 [3].

6.8 Mobility management

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

6.9 P-CSCF discovery

The UE and the network must support the procedures for P-CSCF discovery via EPC via WLAN, as described in 3GPP TS 24.229 [5], Annex R.2.2.1 option III and option IV.

NOTE: If no P-CSCF contact information is available from configuration OR OPTION IV, a UE may rely on option I.

7 Common functions

7.1 IP Version

The UE and the network shall support both IPv4 and IPv6 for all protocols that are 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 IPv6 address type.

After the UE has discovered the P-CSCF and registered to IMS with a particular IP address (IPv4 or IPv6), the UE must use that same address for all SIP, SDP and RTP/RTCP communication, as long as the IMS registration is valid.

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.

7.2 IP Address Allocation

When an untrusted non-3GPP IP access is used, the UE and the network must support the IP address allocation as specified in section 4.7.3 of 3GPP TS 23.402 [6].

When a trusted non-3GPP IP access is used, the UE and the network must support the IP address allocation as specified in section 16.1.5.4 of 3GPP Release 12 TS 23.402 [6].

7.3 Emergency Service

The UE must use cellular access for emergency calls.

NOTE: Emergency calls over EPC-integrated Wi-Fi is not specified in 3GPP.

7.3.1 Roaming Considerations

This profile has been designed to support IMS roaming with both P-CSCF and PGW in the visited network. For more information on this roaming model see GSMA PRD IR.61 [3]. Other roaming models are out of the scope of this profile.

Annex A Document Management

A.1 Document History

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
1.0	17/10/2014	New PRD IR.51	IREG/PSMC	Vincent Danno (Orange)

A.2 Other Information

Type	Description
Document Owner	IREG RiLTE
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