TIM Specification for Gm Interface between an User Equipment and the Fixed IMS Network: MultiMedia Telephony Supplementary Services

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INDICE DEGLI ARGOMENTI

1. SCOPE

The present document specifies the requirements on Gm interface of Telecom Italia Fixed IMS core network (i.e. interface between User Equipment and P-CSCF according to IMS Architecture).
It provides detailed information for activation, deactivation, interrogation and invocation of MultiMedia Telephony (MMTel) Supplementary Services for a UE supposed to interoperate with TIM Fixed IMS core network. This document complements the baseline specification for registration, basic call procedures and FAX/POS/modem support contained in [DOC51].

This document is written in the form of a list of requirements. Mandatory requirements are market with **R.** Optional requirements, which a vendor may or may not decide to implement, are marked with **Q.**: the latter have been put in this specification in order to highlight features which can improve the quality of the service for the end customer, or/and more efficient ways to interoperate with the network.

This document defines the interface requirements for Supplementary Services in a “flat” manner, that is, by describing the requirements for each individual service. The actual bundling of Supplementary Services in TIM commercial profiles – that is, which Services are present in a specific Profile, and their possible interactions - is outside the scope of this document.

2. APPLICABILITY

The present document is applicable to User Equipments (UEs), e.g. Access Gateways, which are intended to support the TIM VoIP services based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP).

3. NORMATIVE REFERENCES

3.1 INTERNET RFCS

[DOC1] RFC 3261 - SIP: Session Initiation Protocol

[DOC2] RFC 3262 - Reliability of Provisional Responses in the Session Initiation Protocol (SIP)

[DOC3] RFC 3263 - Locating SIP Servers

[DOC4] RFC 3264 - An Offer / Answer Model with the Session Description Protocol (SDP)

[DOC5] RFC 3311 - The Session Initiation Protocol (SIP) UPDATE Method

[DOC6] RFC 3960 - Early Media and Ringing Tone Generation in the Session Initiation Protocol (SIP)

[DOC7] RFC 2617 - HTTP Authentication: basic and Digest Access Authentication

[DOC8] RFC 2833 - RTP Payload for DTMF Digits, telephony tones and telephony signals

[DOC9] RFC 4733 - RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals

[DOC10] RFC 4566 - SDP: Session Description Protocol

[DOC11] RFC 4028 - Session Timers in the Session Initiation Protocol (SIP)

[DOC12] RFC 3841 - Caller Preferences for the Session Initiation Protocol (SIP)

[DOC13] RFC 3325 - SIP Asserted Identity

[DOC14] RFC 3323 - Anonymous Tag Header

[DOC15] RFC 3515 - Refer

[DOC16] RFC 3891- The Session Initiation Protocol (SIP) “Replaces” Header

[DOC17] RFC 3892 - The Session Initiation Protocol (SIP) Referred-By Mechanism

[DOC18] RFC 3265 – Session Initiation Protocol (SIP) - Specific Event Notification

[DOC19] RFC 3842 - A Message Summary and Message Waiting Indication Event Package for the Session Initiation Protocol (SIP)

[DOC20] RFC3398 - "Integrated Services Digital Network (ISDN) User Part (ISUP) to Session Initiation Protocol (SIP) Mapping"

[DOC21] RFC3327 - Session Initiation Protocol (SIP) Extension Header Field for Registering Non-Adjacent Contacts

[DOC22] RFC5626 - Managing Client-Initiated Connection in the Session Initiation Protocol (SIP)

[DOC23] RFC3840 - Indicating User Agent Capabilities in the Session Initiation Protocol (SIP)

[DOC24] RFC5341 - The Internet Assigned Number Authority (IANA) tel Uniform Resource Identifier (URI) Parameter Registry

[DOC25] RFC5389 – Session Traversal Utilities for NAT

[DOC26] RFC7350 – Datagram Transport Layer Security (DTLS) as Transport for Session Traversal Utilities for NAT (STUN)

[DOC27] RFC2474 – Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 headers

[DOC28] RFC4961 - Symmetric RTP / RTP Control Protocol (RTCP)

[DOC29] RFC5009 - Private Header (P-Header) Extension to the Session Initiation Protocol (SIP) for Authorization of Early Media

[DOC30] RFC3407 - Session Description Protocol (SDP) Simple Capability Declaration

[DOC31] RFC5939 - Session Description Protocol (SDP) Capability Negotiation

[DOC32] RFC 3550 - RTP: A Transport Protocol for Real-Time Applications

[DOC33] RFC 3551 - RTP Profile for Audio and Video Conferences with Minimal Control

[DOC34] RFC 3605 - Real Time Control Protocol (RTCP) attribute in Session Description Protocol (SDP)

[DOC35] RFC 2198 - RTP Payload for Redundant Audio Data

3.2 3GPP STANDARDS

[DOC36] 3GPP TS 23.228 V8.8.0 (2009-03) - IP Multimedia Subsystem (IMS); Stage 2 (Release 8)

[DOC37] 3GPP TS 24.229 V8.7.0 (2009-03) - IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3 (Release 8)

[DOC38] 3GPP TS 23.003 V15.3.0 (2018-03) - Numbering, addressing and identification

[DOC39] 3GPP TS 24.604 V8.17.0 - Communication Diversion (CDIV) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification

[DOC40] 3GPP TS 24.607 V8.2.0 - Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification

[DOC41] 3GPP TS 24.615 V8.2.0 - Communication Waiting (CW) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification

[DOC42] 3GPP TS 24.605 V8.3.0 - Conference (CONF) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification

[DOC43] 3GPP TS 24.147 V8.2.0 - Conferencing using the IP Multimedia (IM) Core Network (CN) subsystem; Stage 3

[DOC44] 3GPP TS 24.610 V8.3.0 - Communication HOLD (HOLD) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification

[DOC45] 3GPP TS 24.611 V8.2.0 - Anonymous Communication Rejection (ACR) and Communication Barring (CB); using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification

[DOC46] 3GPP TS 24.642 V8.9.0 - Completion of Communications to Busy Subscriber (CCBS) Completion of Communications by No Reply (CCNR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification

3.3 ITU-T RECOMMENDATIONS

[DOC47] G.711 (11/09): Pulse code modulation (PCM) of voice frequencies

[DOC48] G.729 (06/12): Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear prediction (CS-ACELP)

[DOC49] G.722 (09/12): 7 kHz audio-coding within 64 kbit/s

[DOC50] T.38 (11/15): Procedures for real-time Group 3 facsimile communication over IP networks

3.4 TIM DOCUMENTS

[DOC51] TECH-2018-01533 TIM Specification for Gm Interface between an User Equipment and the Fixed IMS Network

4. MULTIMEDIA TELEPHONY (MMTEL) SUPPLEMENTARY SERVICES (SS)

4.1 USER PROCEDURES FOR SS ACTIVATION, DEACTIVATION AND INTERROGATION

The TelecomItalia user experience for activation, deactivation or query an SS is to make a call using a specific dial code. A generic service uses the following codes:

- *XY# for service activation
- #XY# for service deactivation
- *#XY# for service interrogation

Requirements for the UE are the same as a basic call (see [DOC51]). The network answers the call with early media and sends a speech message (announcement) to confirm (or not confirm) the procedure.

Notes: the '#' character must be escaped in SIP URL using '%23'.

4.2 OIP/OIR – ORIGINATING IDENTITY PRESENTATION/ RESTRICTION

R. 1.	The UE must support the P-Asserted-Identity header according to RFC3325.
R. 2.	The UE must support OIP (Originating Identity Presentation) and OIR (Originating Identity Restriction)[1] according to [DOC40]. In particular, for OIP service, in case of: • Both From and P-Asserted-Identity headers are present, the UE has to provide the Originating Identity Presentation giving priority to P-A-I header with respect to From header. • In case of multiple P-A-I headers are present in the incoming messages, the UE must provide OIP according to the P-A-I in tel-URI format

[1] TIM user experience for service activation, deactivation and status query is based on an outgoing call (INVITE) using some specific codes having the following format:

- *XY# for service activation;
- #XY# for service deactivation;
- *#XY# for service query.

Where XY is a number code. I.E. for OIR service the keypad procedure is *67# followed by the called number.

R. 3.	For the purpose of OIP Service, The UE must support ETSI EN 300 659 on FXS port. In particular, the UE shall properly handle the Service unsubscribed and OIP Restricted cases: • OIP unsubscribed: the incoming CLI contains, in the Username part, the strings "unsubscribed" or "null". In this case, no OIP information shall be sent to the FXS port. • OIP restricted: the incoming CLI contains, in the Username part, the string "anonymous". In this case, the OIP information to be sent to the FXS port is "Riservato".
Q. 1.	For the purpose of OIP service on FXS port, the UE should implement a manipulation of the incoming CLI, so that incoming CLI matching the country code already provisioned on the UE (+39) has to be removed.
R. 4.	For the purpose of OIP service on FXS port, the UE shall implement a manipulation of the incoming CLI in order to replace "+" with "00".

The IMS network supports the following user procedure:

IMS User Procedure	Alternative Procedure	Name of the Procedure
*67*Num#	*67*Num (without trailing #)	OIR Activation per call

For an explanation of user procedures, see §4.1.

It has to be highlighted that according to RFC2396 "#" must be escaped from SIP URI with %23 escape code. VoIP implementation unable to escape "#" in "%23" will be considered affected by a blocking Non Compliance.

4.3 CDIV – COMMUNICATION DIVERSION

R. 5.	The UE must support network based communication diversion (CDIV) services according to [DOC39] (Communication Diversion Unconditional, No Reply, On Busy, to Voice Mail).

4.3.1 COMMUNICATION FORWARDING UNCONDITIONAL

The IMS network supports the following user procedures:

IMS User Procedure	Name of the Procedure
*21*Num#	CFU Activation
#21#	CFU Deactivation
*#21#	CFU Interrogation
*#21*Num#	CFU Interrogation for a specific number

For an explanation of user procedures, see §4.1.

4.3.2 COMMUNICATION FORWARDING ON BUSY

The IMS network supports the following user procedures:

IMS User Procedure	Name of the Procedure
*22*Num#	CFB Activation
#22#	CFB Deactivation
*#22#	CFB Interrogation
*#22*Num#	CFB Interrogation for a specific number

For an explanation of user procedures, see §4.1.

4.3.3 COMMUNICATION FORWARDING ON NO REPLY

The IMS network supports the following user procedures:

IMS User Procedure	Name of the Procedure
*23*Num#	CFNR Activation
#23#	CFNR Deactivation
*#23#	CFNR Interrogation
*#23*Num#	CFNR Interrogation for a specific number

For an explanation of user procedures, see §4.1.
The IMS network uses a No reply timer set to 30 seconds.

4.3.4 COMMUNICATION FORWARDING NOT LOGGED-IN (CFNL)

The IMS network supports the following user procedures:

IMS User Procedure	Name of the Procedure
*24*Num#	CFNL Activation
#24#	CFNL Deactivation
*#24#	CFNL Interrogation
*#24*Num#	CFNL Interrogation for a specific number

For an explanation of user procedures, see §4.1.

4.3.5 COMMUNICATION FORWARDING TO (CENTRALIZED) VOICE MAIL

R. 6.	The UE must support RFC3842 “A message summary and Message Waiting Indication Event Package for the Session Initiation Protocol” ([DOC19]) in order to provide Centralized Voice Mail Service. In particular, the UE shall support implicit subscription, i.e. the possibility to receive unsolicited NOTIFY messages from the network.

The IMS network supports the following user procedures for activation:

IMS User Procedure	Alternative Procedure	Name of the Procedure
*61#	*63*1#	CFNR to Voice Mail Activation (default timing)
*61**RT#	*63*0*X#	CFNR to Voice Mail Activation (timing X=1-5 rings, whereas RT is in seconds)
*62#	*63*2#	CFB to Voice Mail Activation
*63#	*63#	CFB + CFNR + CFNL to Voice Mail (Full) Activation

The IMS network supports the following user procedures for deactivation:

IMS User Procedure	Alternative Procedure	Name of the Procedure
#61#	#63*1#	CFNR to Voice Mail Deactivation
#62#	#63*2#	CFB to Voice Mail Deactivation
#63#		CFB + CFNR + CFNL to Voice Mail (Full) Deactivation

The IMS network supports the following user procedure for interrogation:

IMS User Procedure	Name of the Procedure
*#63#	CFB + CFNR + CFNL to Voice Mail (Full) Interrogation

The IMS network supports the following user procedure for Voice Mail Access:

IMS User Procedure	Name of the Procedure
*#64#	Voice Mail access

For an explanation of user procedures, see §4.1.

4.4 CB - COMMUNICATION BARRING

R. 7.	The UE must support Communication Barring service according to [DOC45]

The IMS network supports the following user procedures:

IMS User Procedure	Name of the Procedure
*33#	CB Activation
#33*PIN#	CB Deactivation (with a specific PIN number)
*#33#	CB Interrogation

For an explanation of user procedures, see §4.1.

4.5 HOLD - COMMUNICATION HOLD

R. 8.	The UE must support Communication on hold according to [DOC44]. Keypad Procedures are described in §0 Keypad **Procedures.**
R. 9.	The UE must support Communication Resume according to [DOC44]. Keypad Procedures are described in §0 Keypad **Procedures.**

4.6 CW - COMMUNICATION WAITING

R. 10.	The UE must support Communication Waiting service according to [DOC41]. In particular, indicate if the UE is able to recognize an "INVITE on waiting" when the incoming INVITE has the specific XML CW indication. The ability to recognize the "INVITE on waiting" could be needed in order to avoid ringing all phones connected to UE when the Call Waiting service has to be provided. Keypad procedures are described in §0 Keypad **Procedures.**
Q. 2.	The UE should support configurable feature interaction between FAX/POS and Call Waiting service: if a FAX/POS call is ongoing a new incoming call has not to be served with call waiting service but rejected with a 4xx answer.
R. 11.	When required, the UE shall generate local Call Waiting tone according to the **Table 4-1**

Call Waiting	Frequency	425 ± 15 Hz
	Cadence (ms)	400 ± 10 on
		100 ± 10 off
		250 ± 10 on
		100 ± 10 off
		150 ± 10 on
		14000 ± 10 off
		(repeated)
	Level	-17 ± 0,5 dBm

Table 4-1 – Local Call Waiting tone characteristics

The IMS network use the following timer for the incoming waiting call

```
Timer_CW = 30 seconds
```

The IMS network supports the following user procedures:

IMS User Procedure	Name of the Procedure
*43#	CW Activation
#43#	CW Deactivation
*#43#	CW Interrogation

For an explanation of user procedures, see §4.1.

4.7 CONF – CONFERENCE

R. 12.	The UE must support N-way conference service according to [DOC43] with exception of the procedures described in 5.3.1.5.2. Keypad procedures are described in §0 Keypad **Procedures.** To activate a N-way conference, the UE has to use the following Conference Factory URI `sip:conference@factory.telecomitalia.it`

4.8 DND – DO NOT DISTURB

R. 13.	The UE must support Do Not Disturb service according to Incoming Call Barring service described in [DOC45]

The IMS network supports the following user procedures:

IMS User Procedure	Name of the Procedure
*70#	DND Activation
#70#	DND Deactivation
*#70#	DND Interrogation

For an explanation of user procedures, see §4.1.

4.9 ACR – ANONYMOUS CALL REJECTION

R. 14.	The UE must support Anonymous Call Rejection service according to [DOC45]

The IMS network supports the following user procedures:

IMS User Procedure	Name of the Procedure
*77#	ACR Activation
#77#	ACR Deactivation
*#77#	ACR Interrogation

For an explanation of user procedures, see §4.1.

4.10 CCBS – COMMUNICATION COMPLETION ON BUSY SUBSCRIBER

R. 15.	The UE must support CCBS service according to [DOC46]. The CCBS ring pattern shall be played in case the incoming INVITE contains the specific Alert-Info Header: `Alert-Info: <urn:alert:service:auto-callback>`

5. KEYPAD PROCEDURES

Keypad procedures, derived from current PSTN implementation.

KEYPAD PROCEDURE	USER AGENT STATE	ACTION
R (dial tone needed)	One active call	Hold-on Call
	One hold-on call	Call resume
R1	One active call One hold-on call	Hang up the active call
	One active call One waiting call	Answer the waiting call and hang up the active call
R2	One active call One hold-on call	Switching between two calls (hold-on the active call and active the hold-on call and vice versa)
	One active call One waiting call	Answer the waiting call and hold-on the active call
R3	One active call One hold-on call	CONF service activation
R0	One active call One waiting call	Hang up the waiting

6. MAPPING COMMERCIAL TIM SERVICES WITH IMS SERVICES

TIM Service	IMS Service
Trasferimento di chiamata - sempre	4.3 CDIV – Communication Diversion 0 Communication Forwarding unconditional
Trasferimento di chiamata – su occupato	4.3 CDIV – Communication Diversion 4.3.2 Communication Forwarding on Busy
Trasferimento di chiamata – su mancata risposta	4.3 CDIV – Communication Diversion 4.3.3 Communication forwarding on no reply
Trasferimento di chiamata – su numero non raggiungibile	4.3 CDIV – Communication Diversion 4.3.4 Communication Forwarding Not Logged-in (CFNL)
Disabilitazione a chiave numerica	4.4 CB - Communication Barring
Do Not Disturb	4.8 DND – Do Not Disturb
Chiamata in attesa	4.5 HOLD - Communication Hold 4.6 CW - Communication Waiting
Identificativo chiamante nascosto	4.2 OIP/OIR – Originating Identity Presentation/ Restriction
Memotel	4.3 CDIV – Communication Diversion 4.3.5 Communication Forwarding to (Centralized) Voice Mail
Chi è	4.2 OIP/OIR – Originating Identity Presentation/ Restriction
Servizio 5 richiamata su occupato	4.10 CCBS – Communication Completion on Busy Subscriber
Chiamata a tre	4.5 HOLD - Communication Hold 4.7 CONF – Conference
Anonymous Call Rejection	4.9 ACR – Anonymous Call Rejection

7. VOICE QUALITY MEASUREMENTS

Q. 3.	The UE should perform calculation of Voice QoS statistics such as Jitter, Delay and Packet Loss according to RFC3550.
Q. 4.	The UE should send Voice QoS statistics calculated call by call by UE in SIP BYE messages or in 200 OK Response to BYE, for instance, by means of the following headers: • P-RTP-Stat • X-RTP-Stat
Q. 5.	The UE should implement voice QoS reporting mechanism such as RTCP-XR (RFC3611) to be activated on UE in specific condition in order to retrieve information about the QoE of the customer.

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