ETSI TS 123 292 V18.0.0 (2024-04)

Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
LTE;
IP Multimedia Subsystem (IMS) centralized services;
Stage 2
(3GPP TS 23.292 version 18.0.0 Release 18)

Reference
RTS/TSGS-0223292vi00

Keywords
GSM,LTE,UMTS

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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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1 Scope

This document specifies the architectural requirements for delivery of consistent services to the user regardless of the attached access type (e.g. CS domain access, or IP-CAN). This is achieved by implementing the services in the IP Multimedia Subsystem (IMS).

Consideration is given to how to access specified IMS-based services (see clause 22.4 of TS 22.101 [9]) whilst still allowing other, bespoke services to be offered by the home operator.

IMS control of services related to those defined in clause 22.4 of TS 22.101 [9] are part of the present scope of this specification.

The scope of the specification includes:

- Session establishment when using CS access for media transmission for an IMS service.
- Support of Service Continuity as specified in TS 23.237 [12].
- Support of Single Radio Voice Call Continuity as specified in TS 23.216 [36].
- Access Domain Selection (ADS).
- IMS control of services where the media is transported via the CS network (e.g. managing of mid-call services).
- Service data management.

The solution is applicable for UEs with or without ICS functionality, and is applicable for the following deployment scenarios:

- An operator who supports for their subscribers only UEs that have ICS functionality.
- An operator who supports for their subscribers only UEs that do not have ICS functionality.
- An operator who supports for their subscribers UEs which do and do not have ICS functionality (to different subscribers and the same subscribers) ensuring the coexistence of UEs that have and do not have ICS functionality.
- Inbound roaming subscribers on an operator's network that supports either the same or different ICS functionality that the inbound roaming subscriber is using, ensuring the coexistence of UEs that have and do not have ICS functionality.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS)".

[3] 3GPP TS 23.002: "Network architecture".

[4] 3GPP TS 22.173: "IP Multimedia Core Network Subsystem (IMS) Multimedia Telephony Service and supplementary services".

[5] 3GPP TS 23.003: "Numbering, addressing and identification".

[6] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".

[7] 3GPP TS 23.218: "IP Multimedia (IM) session handling; IM call model; Stage 2".

[8] 3GPP TS 24.173: "IMS Multimedia Telephony Communication Service and Supplementary Services; Stage 3".

[9] 3GPP TS 22.101: "Services Aspects; Service Principles".

[10] 3GPP TS 23.221: "Architectural requirements".

[11] 3GPP TS 29.163: "Interworking between the IP Multimedia (IM) Core Network (CN) subsystem and Circuit Switched (CS) networks".

[12] 3GPP TS 23.237: "IP Multimedia Subsystem (IMS) service continuity".

[13] 3GPP TS 24.081: "Line Identification Supplementary Services - Stage 3".

[14] 3GPP TS 24.082: "Call Forwarding supplementary service; Stage 3".

[15] 3GPP TS 24.072: "Call Deflection (CS) Supplementary Service; Stage 3".

[16] 3GPP TS 24.088: "Call Barring (CB) Supplementary Service - Stage 3".

[17] 3GPP TS 26.114: "A IP Multimedia Subsystem (IMS); Multimedia Telephony; Media handling and interaction".

[18] 3GPP TS 24.083: "Call Waiting (CW) and Call Hold (HOLD) supplementary services; Stage 3".

[19] 3GPP TS 24.091: "Explicit Call Transfer (ECT) supplementary service; Stage 3".

[20] 3GPP TS 24.084: "Multi Party supplementary service - Stage 3".

[21] 3GPP TS 24.147: "Conferencing using the IP Multimedia (IM) Core Network (CN) subsystem; Stage 3".

[22] 3GPP TS 23.009: "Handover Procedures".

[23] 3GPP TS 25.413: "UTRAN Iu interface Radio Access Network Application Part (RANAP) signalling".

[24] OMA-ERELD-DM-V1_2-20060602-C: "Enabler Release Definition for OMA Device Management, Candidate Version 1.2".

[25] 3GPP TS 23.167: "IP Multimedia Subsystem (IMS) emergency sessions".

[26] 3GPP TS 24.604: "Communication Diversion (CDIV) using IP Multimedia (IM) Core Network (CN) subsystem Protocol specification".

[27] 3GPP2 C.S0001-D: "Introduction to cdma2000 Spread Spectrum Systems - Revision D".

[28] 3GPP TS 24.611: "Anonymous Communication Rejection (ACR) and Communication Barring (CB); using IP Multimedia (IM) Core Network (CN) subsystem Protocol specification".

[29] 3GPP TS 24.096: "Name identification supplementary services; Stage 3".

[30] 3GPP TS 24.010: "Mobile radio interface layer 3 Supplementary services specification; General aspects".

[31] 3GPP TS 24.229: "IP Multimedia Call Control Protocol based on SIP and SDP; Stage 3".

[32] 3GPP TS 33.203: "Access security for IP-based services".

[33] 3GPP TS 33.210: "Network Domain Security; IP network layer security".

[34] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[35] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description".

[36] 3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC); Stage 2".

[37] 3GPP TS 23.172: "Technical realization of Circuit Switched (CS) multimedia service; UDI RDI fallback and service modification; Stage 2".

[38] 3GPP2 C.S0042: "Circuit-Switched Video Conferencing Services".

[39] 3GPP TR 23.903: "Redial solution for voice-video switching".

[40] Void.

[41] 3GPP TS 22.004: "General on supplementary services".

[42] 3GPP TS 24.182: "IP Multimedia Subsystem (IMS) Customized Alerting Tones (CAT)".

[43] 3GPP TS 29.292: "Interworking between the IP Multimedia (IM) Core Network (CN) subsystem and MSC Server for IMS Centralized Services (ICS)".

[44] 3GPP TS 23.272: "Circuit Switched (CS) fallback in Evolved Packet System (EPS); Stage 2".

[45] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[46] 3GPP TS 23.083: "Call Waiting (CW) and Call Hold (HOLD) supplementary services; Stage 2".

[47] 3GPP TS 24.093: "Completion of Calls to Busy Subscriber (CCBS); Stage 3".

[48] 3GPP TS 29.328: "IP Multimedia (IM) Subsystem Sh Interface; Signalling flows and message contents".

[49] 3GPP TS 23.018: "Basic call handling; Technical realization".

[50] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS); Stage 2".

[51] 3GPP TS 23.204: "Support of Short Message Service (SMS) over generic 3GPP Internet Protocol (IP) access; Stage 2".

[52] 3GPP TS 24.341: "Support of SMS over IP networks; Stage 3".

[53] 3GPP TS 24.011:"Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface; Stage 3".

[54] 3GPP TS 23.278: "Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 4; Stage 2; IM CN Interworking; Stage 2".

[55] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

Access Leg: The call leg between the UE and the SCC AS.

Correlation MSISDN: An MSISDN used for correlation of sessions.

CS Bearer Control Signalling Path: Signalling path used to control the call established to set up the CS media bearer between the UE and IMS.

CS domain Routing Number (CSRN): A CS Domain Routing Number (CSRN) is a routable number that is used to route a call from the IM CN subsystem to the UE in the CS domain. See TS 23.003 [5] for more information.

ICS UE: An IMS capable UE with additional ICS-specific functionality.

ICS User: An ICS user is an IMS subscriber that receives communication services centralized in IMS, regardless of the attached access type (e.g. CS domain access, or IP-CAN).

IMS Centralized Services: See definition in TS 22.101 [9].

IP Multimedia Routing Number (IMRN): See definition in TS 23.237 [12].

MSC Server enhanced for ICS: An MSC Server that supports the network based ICS functionality.

Remote Leg: The call leg formed between the SCC AS and the remote end for presentation of the SIP UA behaviour to IMS on behalf of the UE. The TAS, and other Application Servers are invoked on the Remote Leg.

Service Control Signalling Path: Signalling path established between the UE and the SCC AS, either directly via an IP-CAN or via CS network elements for service control signalling.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

5GC	5G Core Network
ADS	Access Domain Selection
CAA	CS Access Adaptation
CGI	Cell Global Identifier
C-MSISDN	Correlation MSISDN
CSRN	CS domain Routing Number.
DN	Directory Number (e.g. MSISDN)
ICS	IMS Centralized Services
IMRN	IP Multimedia Routing Number.
IN	Intelligent Network
IUA	ICS User Agent
MMTel	Multimedia Telephony
SAI	Service Area Identification
SCC AS	Service Centralization and Continuity Application Server
T-ADS	Terminating ADS
TAS	Telephony Application Server
UDM	Unified Data Management
UE T-ADS	UE assisted Terminating ADS

4 High level principles and requirements

4.1 General

IMS Centralized Services (ICS) provides communication services such that all services, and service control, are only based on IMS mechanisms and enablers. It enables IMS services when using CS access (e.g. TS 24.008 [6], 3GPP2 C.S0001-D [27]) for the media bearer.

With ICS, the user services are provided by IMS only. User sessions are controlled in IMS via PS or CS access and can be any of those defined in clause 22.4 of TS 22.101 [9].

When using a CS access network, or when using a PS access network that does not support the full duplex speech/video component of an IMS-based service, the CS core network is utilized to establish a circuit bearer for use as media for IMS sessions. The transmission of both bidirectional and unidirectional real-time video media flows shall be supported.

NOTE: The establishment of unidirectional real-time video media flow for originating sessions requires the ICS UE capabilities.

If the PS access network does support the full duplex speech component of an IMS service then existing IMS session procedures are used as specified in TS 23.228 [2].

ICS provides mechanisms to support the use of CS media bearer for IMS sessions. With ICS, IMS sessions using CS media are treated as standard IMS sessions for the purpose of service control and service continuity.

ICS defines signalling mechanisms between the UE and IMS for transport of information required for service continuity when using CS access for media transport.

4.2 Service consistency

IMS services as defined in clause 22.4 of TS 22.101 [9] shall be consistently provided when using a CS or a PS access network for the media of the IMS service subject to the capability of the UE and the access network.

4.3 Service continuity

Service continuity shall be provided when underlying mobility results in a change of access network capabilities, e.g. support of Gm reference point in conjunction with CS bearer may not be possible after handover from UTRAN to GERAN.

4.4 Session scenarios

4.4.1 Overview

4.4.2 ICS UE Session Scenarios

When a user accesses IMS services over a CS network, or a PS network which does not support the full duplex speech or video media flow component of an IMS service, the following IMS session scenarios shall be supported according to the procedures specified in TS 23.228 [2], along with the solution specified in this document.

- Basic voice or voice and video service origination and terminating sessions.
- Voice or voice and video origination and termination service sessions with Line ID services (e.g. OIP, OIR, TIP, TIR) controlled in IMS.
- Voice or voice and video origination and termination service sessions with Communication Barring services controlled in IMS.
- Voice or voice and video termination service sessions with Communication Diversion services controlled in IMS.
- Voice or voice and video origination and termination service sessions with mid-call services (e.g. Hold/Resume, Conferencing, CW, ECT) controlled in IMS.
- Communication services setting modifications (e.g., changing forwarding info or activating barring services, etc).
- The solution shall provide for an ICS UE, generic capabilities to enable introduction of new IMS services utilizing CS bearers without further standardisation.
- Adding/removing real time video media flow over CS access to/from an IMS session (see TS 22.173 [4]).

4.5 Service settings data management

An ICS UE supporting multimedia telephony shall manage the IMS multimedia telephony communication service settings data as specified in TS 24.173 [8].