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Core Network and Interoperability Testing (INT); ISDN/SIP interworking; Protocol specification

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Core Network and Interoperability Testing (INT).

Modal verbs terminology

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1 Scope

The present document specifies the stage three protocol description of the signalling interworking between ISDN DSS1 protocol and SIP based on the concatenation of ETSI TS 129 163 [1], ETSI TS 124 229 [5] with ETSI EN 300 899-1 [2]. The concatenation method describes only the SIP/ISDN parameter mapping without ISUP procedures. In addition direct inter-working not supported by this concatenation of these existing inter-working documents will be described.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are necessary for the application of the present document.

- [1] ETSI TS 129 163 (V15.8.0): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Interworking between the IP Multimedia (IM) Core Network (CN) subsystem and Circuit Switched (CS) networks (3GPP TS 29.163 version 15.8.0 Release 15)".

NOTE: Available at https://www.etsi.org/deliver/etsi_ts/129100_129199/129163/15.08.00_60/ts_129163v150800p.pdf.

- [2] ETSI EN 300 899-1 (V1.1.2): "Integrated Services Digital Network (ISDN); Signalling System No.7; Interworking between ISDN User Part (ISUP) version 2 and Digital Subscriber Signalling System No. One (DSS1); Part 1: Protocol specification [ITU-T Recommendation Q.699, modified]".

[3] Void.

[4] Void.

- [5] ETSI TS 124 229 (V15.8.0): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3 (3GPP TS 24.229 version 15.8.0 Release 15)".

NOTE: Available at https://www.etsi.org/deliver/etsi_ts/124200_124299/124229/15.08.00_60/ts_124229v150800p.pdf.

- [6] ETSI TS 124 607 (V15.0.0): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification (3GPP TS 24.607 version 15.0.0 Release 15)".

NOTE: Available at https://www.etsi.org/deliver/etsi_ts/124600_124699/124607/15.00.00_60/ts_124607v150000p.pdf.

- [7] ETSI TS 124 608 (V15.0.0): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Terminating Identification Presentation (TIP) and Terminating Identification Restriction (TIR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification (3GPP TS 24.608 version 15.0.0 Release 15)".

NOTE: Available at
https://www.etsi.org/deliver/etsi_ts/124600_124699/124608/15.00.00_60/ts_124608v150000p.pdf.

- [8] ETSI TS 124 604 (V15.1.0): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Communication Diversion (CDIV) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification (3GPP TS 24.604 version 15.1.0 Release 15)".

NOTE: Available at
https://www.etsi.org/deliver/etsi_ts/124600_124699/124604/15.01.00_60/ts_124604v150100p.pdf.

- [9] ETSI TS 124 605 (V14.0.0): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Conference (CONF) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification (3GPP TS 24.605 version 14.0.0 Release 14)".

NOTE: Available at
https://www.etsi.org/deliver/etsi_ts/124600_124699/124605/14.00.00_60/ts_124605v140000p.pdf.

- [10] ETSI TS 124 083 (V14.0.0): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); Call Waiting (CW) and Call Hold (HOLD) supplementary services; Stage 3 (3GPP TS 24.083 version 14.0.0 Release 14)".

NOTE: Available
https://www.etsi.org/deliver/etsi_ts/124000_124099/124083/14.00.00_60/ts_124083v140000p.pdf.

- [11] ETSI EN 300 052-1: "Integrated Services Digital Network (ISDN); Multiple Subscriber Number (MSN) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".

- [12] ETSI EN 300 055-1: "Integrated Services Digital Network (ISDN); Terminal Portability (TP) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".

- [13] ETSI EN 300 058-1: "Integrated Services Digital Network (ISDN); Call Waiting (CW) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".

- [14] ETSI EN 300 061-1: "Integrated Services Digital Network (ISDN); Subaddressing (SUB) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".

- [15] ETSI EN 300 064-1: "Integrated Services Digital Network (ISDN); Direct Dialling In (DDI) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".

- [16] ETSI EN 300 092-1: "Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".

- [17] ETSI EN 300 093-1: "Integrated Services Digital Network (ISDN); Calling Line Identification Restriction (CLIR) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".

- [18] ETSI EN 300 097-1: "Integrated Services Digital Network (ISDN); Connected Line Identification Presentation (COLP) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".

- [19] ETSI EN 300 098-1: "Integrated Services Digital Network (ISDN); Connected Line Identification Restriction (COLR) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".
- [20] ETSI EN 300 130-1: "Integrated Services Digital Network (ISDN); Malicious Call Identification (MCID) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".
- [21] ETSI EN 300 138-1: "Integrated Services Digital Network (ISDN); Closed User Group (CUG) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".
- [22] ETSI EN 300 141-1: "Integrated Services Digital Network (ISDN); Call Hold (HOLD) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".
- [23] ETSI EN 300 185-1: "Integrated Services Digital Network (ISDN); Conference call, add-on (CONF) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".
- [24] ETSI EN 300 188-1: "Integrated Services Digital Network (ISDN); Three-Party (3PTY) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".
- [25] ETSI EN 300 196-1: "Integrated Services Digital Network (ISDN); Generic functional protocol for the support of supplementary services; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".
- [26] ETSI TS 183 006: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services; Message Waiting Indication (MWI); Protocol specification".
- [27] Void.
- [28] Void.
- [29] ETSI EN 300 403-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. One (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification [ITU-T Recommendation Q.931 (1993), modified]".
- [30] Void.
- [31] ETSI TS 183 047: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN IMS Supplementary Services; Advice Of Charge (AOC)".
- [32] ETSI TS 183 028: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Common Basic Communication procedures; Protocol specification".
- [33] Void.
- [34] ETSI EN 300 207-1: "Integrated Services Digital Network (ISDN); Diversion supplementary services; Digital Subscriber Signalling System No. One (DSS1); Part 1: Protocol specification".
- [35] ETSI EN 300 369-1: "Integrated Services Digital Network (ISDN); Explicit Call Transfer (ECT) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".
- [36] ETSI TS 183 029: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services: Explicit Communication Transfer (ECT); Protocol specification".
- [37] ETSI EN 300 182-1: "Integrated Services Digital Network (ISDN); Advice of Charge (AOC) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".

- [38] ETSI EN 300 286-1: "Integrated Services Digital Network (ISDN); User-to-User Signalling (UUS) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".
- [39] ETSI EN 300 359-1: "Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".
- [40] ETSI EN 301 065-1: "Integrated Services Digital Network (ISDN); Completion of Calls on No Reply (CCNR) supplementary service; Digital Subscriber Signalling System No. One (DSS1) protocol; Part 1: Protocol specification".
- [41] Void.
- [42] ETSI TS 183 043: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IMS-based PSTN/ISDN Emulation Stage 3 specification".
- [43] ETSI EN 301 798 (V1.1.1): "Services and Protocols for Advanced Networks (SPAN); Anonymous Call Rejection (ACR) Supplementary Service; Service description".
- [44] IETF RFC 4575 (2006): "A Session Initiation Protocol (SIP) Event Package for Conference State".
- [45] IETF RFC 4244: "An Extension to the Session Initiation Protocol (SIP) for Request History Information".
- [46] ETSI TS 183 016: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services; Malicious Communication Identification (MCID); Protocol Specification".
- [47] IETF RFC 3966: "The tel URI for Telephone Numbers".
- [48] IETF RFC 4825: "The Extensible Markup Language (XML) Configuration Access Protocol (XCAP)".
- [49] ETSI TS 183 023: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services; Extensible Markup Language (XML) Configuration Access Protocol (XCAP) over the Ut interface for Manipulating NGN PSTN/ISDN Simulation Services".
- [50] IETF RFC 4916: "Connected Identity in the Session Initiation Protocol (SIP)".
- [51] IETF RFC 4040: "RTP Payload Format for a 64 kbit/s Transparent Call".
- [52] IETF RFC 3264: "An Offer/Answer Model with Session Description Protocol (SDP)".
- [53] IETF RFC 3261: "SIP: Session Initiation Protocol".
- [54] Recommendation ITU-T Q.931: "ISDN user-network interface layer 3 specification for basic call control".
- [55] Recommendation ITU-T Q.939: "Typical DSS 1 service indicator codings for ISDN telecommunications services".
- [56] Recommendation ITU-T T.38: "Procedures for real-time Group 3 facsimile communication over IP networks".
- [57] ETSI EN 300 745-1 (V1.2.4): "Integrated Services Digital Network (ISDN); Message Waiting Indication (MWI) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- [58] ETSI TS 183 015: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN) NGN Signalling Control Protocol Communication Waiting (CW) PSTN/ISDN simulation services".

- [59] ETSI TS 124 642: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Completion of Communications to Busy Subscriber (CCBS) and Completion of Communications by No Reply (CCNR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification (3GPP TS 24.642 Release 8)".
- [60] Recommendation ITU-T G.711: "Pulse code modulation (PCM) of voice frequencies".
- [61] Recommendation ITU-T Q.850: "Usage of cause and location in the Digital Subscriber Signalling System No. 1 and the Signalling System No. 7 ISDN User Part".
- [62] ETSI TS 124 654 (V15.0.0): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Closed User Group (CUG) using IP Multimedia (IM) Core Network (CN) subsystem, Protocol Specification (3GPP TS 24.654 version 15.0.0 Release 15)".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] draft-johnston-sipping-cc-uu-02: "Transporting User to User Information for Call Centers using SIP".
- [i.2] Recommendation ITU-T Q.763: "Signalling System No. 7 - ISDN User Part formats and codes".
- [i.3] Recommendation ITU-T H.221: "Frame structure for a 64 to 1920 kbit/s channel in audiovisual teleservices".
- [i.4] Recommendation ITU-T G.725: "System aspects for the use of the 7 kHz audio codec within 64 kbit/s".
- [i.5] Recommendation ITU-T G.722: "7 kHz audio-coding within 64 kbit/s".
- [i.6] Recommendation ITU-T E.164 (2010-11): The international public telecommunication numbering plan.
- [i.7] Recommendation ITU-T E.163: "Numbering plan for the international telephone service".

NOTE: Former E.163/Q.11 bis (1984). The content of this Recommendation was incorporated in ITU-T E.164 (1991).

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the following terms apply:

en bloc receiving: procedure, used in call establishment of an incoming call, to enable the network to send called party number digits to the user in a single message

NOTE: See ETSI EN 300 403-1 [29].

en bloc sending: procedure, used in call establishment of an outgoing call, to enable the user to send called party number digits to the network in a single message

NOTE: See ETSI EN 300 403-1 [29].

incoming AGCF/VGW: physical entity, which can be combined with a SIP UNI or NNI, terminates incoming calls using SIP protocol and originates outgoing calls using the DSS1 protocol

outgoing AGCF/VGW: physical entity, which can be combined with an ISDN access device, terminates incoming calls using DSS1 and originates outgoing calls using the SIP protocol

overlap receiving: procedure, used in call establishment of an incoming call, to enable the network to send called party number digits to the user in successive messages, as and when they are made available from the remote network

NOTE: See ETSI EN 300 403-1 [29].

overlap sending: procedure, used in call establishment of an outgoing call, to enable the user to send called party number digits to the network in successive messages, as and when they are made available by the user

NOTE: See ETSI EN 300 403-1 [29].

SIP Phone 3,1 KHz: native SIP endpoint that supports the G.711 [60] codec

NOTE: Such an endpoint may inter-work with an ISDN user in the IMS/PSTN for the 3,1 KHz bearer service due to both endpoints commonly supporting the G.711 [60] codec.

SIP Phone 7 KHz: native SIP endpoint that supports the G.722 codec

NOTE 1: However, such an endpoint may not inter-work with an ISDN user in the IMS/PSTN for the 7 KHz bearer service as the VGW/AGCF/MGCF advertises the CLEARMODE codec (which enables a H.221 [i.3] structure to be carried transparently - as described in Recommendation ITU-T G.725 [i.4]).

NOTE 2: It is assumed that the CLEARMODE codec is not understood by the SIP endpoint.

user: DSS1 protocol entity at the user side of the user-network interface

NOTE: See ETSI EN 300 403-1 [29].

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACK	ACKnowledgement
ACR	Anonymous Call Rejection
AGCF	Access Gateway Control Function
AGW	Access GateWay
AOC	Advice Of Charge
AOC-D	Advice Of Charge During the call
AOC-E	Advice Of Charge at the End of the call
AOC-S	Advice Of Charge at call Set-up time
AS	Application Server
ATP	Access Transport
BC	Bearer Capability information element
BCI	Backward Call Indicator
BRI	Basic Rate Interface
CCBS	Call Completion to Busy Subscriber
CCNR	Call Completion on No Reply
CD	Call Deflection
CDIV	Communication Diverting