

ETSI TS 183 036 V2.1.1 (2009-01)

Technical Specification

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); ISDN/SIP interworking; Protocol specification

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Reference

DTS/TISPAN-03110-NGN-R2

Keywords

IMS, interworking, ISDN, SIP

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

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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 ES 283 027 [1] with 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

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
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2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] ETSI ES 283 027: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Endorsement of the SIP-ISUP Interworking between the IP Multimedia (IM) Core Network (CN) subsystem and Circuit Switched (CS) networks [3GPP TS 29.163 (Release 7), modified]".
- [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] ETSI ES 283 003 (V1.8.0): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Stage 3 [3GPP TS 24.229 (Release 7), modified]".
- [4] ETSI ES 282 007: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Functional architecture".
- [5] ETSI ES 283 003 (V2.5.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Stage 3 [3GPP TS 24.229 [Release 7], modified]".

- [6] ETSI TS 183 007: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services; Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR); Protocol specification".
- [7] ETSI TS 183 008: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services Terminating Identification Presentation (TIP) and Terminating Identification Restriction (TIR); Protocol specification".
- [8] ETSI TS 183 004: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN) PSTN/ISDN simulation services: Communication Diversion (CDIV); Protocol specification".
- [9] ETSI TS 183 005: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services: Conference (CONF); Protocol specification".
- [10] ETSI TS 183 010: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Signalling Control Protocol; Communication HOLD (HOLD) PSTN/ISDN simulation services; Protocol specification".
- [11] ETSI ETS 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 ETS 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 ETS 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 ETS 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 ETS 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 ETS 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 ETS 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 ETS 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 ETS 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 ETS 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 ETS 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 ETS 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 ETS 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 ETS 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] Void.
- [27] ETSI EN 300 485 (V1.2.3): "Integrated Services Digital Network (ISDN); Definition and usage of cause and location in Digital Subscriber Signalling System No. one (DSS1) and Signalling System No.7 ISDN User Part (ISUP) [ITU-T Recommendation Q.850 (1998), modified]".
- [28] ETSI TS 183 054: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services; Protocol specification Closed User Group (CUG)".
- [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] ITU-T Recommendation Q.951: "Digital Subscriber Signalling System No. 1 Stage 3 Description for Supplementary Services Using DSS 1".
- [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] ETSI TS 129 163: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Interworking between the IP Multimedia (IM) Core Network (CN) subsystem and Circuit Switched (CS) networks (3GPP TS 29.163 version 7.7.0 Release 7)".
- [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 ETS 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] ETSI TS 183 042: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN Simulation Services; Completion of Communications to Busy Subscriber (CCBS), Completion of Communications by No Reply (CCNR); Protocol Specification".
- [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 (August 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] ITU-T Recommendation Q.931: "ISDN user-network interface layer 3 specification for basic call control".
- [55] ITU-T Recommendation Q.939: "Typical DSS 1 service indicator codings for ISDN telecommunications services".
- [56] ITU-T Recommendation T.38: "Procedures for real-time Group 3 facsimile communication over IP networks".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

- [i.1] draft-johnston- sipping-cc-uui-02.txt.
- [i.2] ITU-T Recommendation Q.763: "Signalling System No. 7 - ISDN User Part formats and codes".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions 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 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 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 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 EN 300 403-1 [29].

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

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

3.2 Abbreviations

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

ACK	ACKnowledgement
AGCF	Access Gateway Control Function
BC	Bearer Capaability information element
BRI	Basic Rate Access
CLIP	Calling line Identification Presentation
CLIR	Calling line Identification Restriction
COLP	Connected Line Identification Presentation
COLR	Connected Line Identification Restriction
CUG	Closed User Group
HOLD	communication HOLD
IFC	Initial Filter Criteria
IMS	IP Multimedia Subsystem
IP	Internet Protocol
ISDN	Integrated Service Data Network
IWF	InterWorking Function
MCID	Malicious Communication IDentification
MRFC	Multimedia Resource Function Controller
NGN	Next Generation Network
OCB	Outgoing Communication Barring
OIP	Originating Identification Presentation
OIR	Originating Identification Restriction

PES	PSTN/ISDN Emulation Subsystem
PRI	Primary Rate Access
PSTN	Public Switched Telephone Network
S-CSCF	Server-Call Session Control Function
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SUB	SUBaddressing
TIP	Terminating Identification Presentation
TIR	Terminating Identification Restriction
UA	User Agent
UE	User Equipment
URI	Universal Resource Identifier
UUS	User User Service
VGW	Voice over IP GateWay
XCAP	PSTN/ISDN simulation services Extensible Markup Language (XML) Configuration Access Protocol
XML	eXtensible Markup Language

4 General

The present document describes guiding principles for implementing commonly deployed ISDN basic call and supplementary services using the IMS and IMS-based PES architecture.

- ISDN terminals are connected to VGW or access gateways AGCF using BRI or PRI interfaces. The protocol running on the interfaces between these gateways and the PES is the session initiation protocol (SIP).

The actual service logic resides in the Application Server and is outside the scope of standardization. This clause focuses on the interactions between the IWF.

Full support of supplementary services may be realized by exchanging service information between peer SIP signalling entities via SIP signalling. The DSS1 information necessary to support each individual service is specified by the corresponding ETSI or ITU-T supplementary service specification; see table 4-1. For the management of several supplementary services (e.g. activation or deactivation of a service), two possibilities exist. The usage of the Ut interface allows the transport of the content of the DSS1 Facility in PSTN XML instances as specified in the relevant simulation service to the XCAP server to manipulate the service. In addition, the usage of an empty INVITE to carry service code sequences is also applicable to manipulate the supplementary service. The applicability is a network provider option. The management of supplementary services in PES is out of scope of the present document.

In case of the interworking for IMS simulation the mapping of PSTN XML Attachment parameters ProgressIndicator HighLayerCapability, LowLayerCapability, BearerCapability, Display; CUGcallOperation and additional P-Early media header are a network provider option, in the IMS based PES they are mandatory.