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Digitalno omrežje z integriranimi storitvami (ISDN) - Signalizacija št. 7 - Digitalni celični telekomunikacijski sistem (faza 2+) - Aplikacija tretje različice ISDN-uporabniškega dela (ISUP) za signalizacijski vmesnik ISDN - javno kopensko mobilno omrežje (PLMN) - 3. del: Zgradba preskuśalnega niza in namen preskuśanja (TSS&TP)

Integrated Services Digital Network (ISDN); Signalling System No.7 (SS7); Digital cellular telecommunications system (Phase 2+); Application of ISDN User Part (ISUP) version 3 for the ISDN-Public Land Mobile Network (PLMN) signalling interface; Part 3: Test Suite Structure and Test Purposes (TSS&TP) specification

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**Integrated Services Digital Network (ISDN);
Signalling System No.7 (SS7);
Digital cellular telecommunications system (Phase 2+);
Application of ISDN User Part (ISUP) version 3 for the
ISDN-Public Land Mobile Network (PLMN)
signalling interface;
Part 3: Test Suite Structure and
Test Purposes (TSS&TP) specification**

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN).

The present document is part 3 of a multi-part EN covering the Integrated Services Digital Network (ISDN); Signalling System No.7; Digital cellular telecommunications system (Phase 2+); Application of ISDN User Part (ISUP) version 3 for the ISDN-Public Land Mobile Network (PLMN) signalling interface, as identified below:

Part 1: "Protocol specification" (GSM 09.14 version 7.0.2 Release 1998);

Part 2: "Protocol Implementation Conformance Statement (PICS) proforma specification";

Part 3: "Test Suite Structure and Test Purposes (TSS&TP) specification";

Part 4: "Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification".

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1 Scope

The present document contains the validation (conformance) test specification for the "Application of ISDN User Part (ISUP) version 3 for the ISDN - Public Land Mobile Network (PLMN) signalling interface" defined in EN 302 646-1 [1]. The present document applies only to exchanges having implemented the ISUP v3 protocol specification.

The present document presents the Test Suite Structure and Test Purposes (TSS&TP) for the ISDN-Public Land Mobile Network (PLMN) signalling interface defined in compliance with the relevant requirements and in accordance with the guidance given in ISO/IEC 9646-7 [18].

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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] ETSI EN 302 646-1: "Integrated Services Digital Network (ISDN); Signalling System No.7; Digital cellular telecommunications system (Phase2); Application of ISDN User part (ISUP) version 3 for the ISDN-Public Land Mobile Network (PLMN) signalling interface; Part 1: Protocol specification (GSM 09.14)".

[2] ETSI EN 300 356-1: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 1: Basic services [ITU-T Recommendations Q.761 to Q.764 (1997), modified]".

[3] ETSI EN 300 356-2: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 2: ISDN supplementary services [ITU-T Recommendation Q.730 (1997), modified]".

[4] ETSI EN 300 356-3: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 3: Calling Line Identification Presentation (CLIP) supplementary service [ITU-T Recommendation Q.731, clause 3 (1993), modified]".

[5] ETSI EN 300 356-4: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 4: Calling Line Identification Restriction (CLIR) supplementary service [ITU-T Recommendation Q.731, clause 4 (1993), modified]".

[6] ETSI EN 300 356-5: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 5: Connected Line Identification Presentation (COLP) supplementary service [ITU-T Recommendation Q.731, clause 5 (1993), modified]".

[7] ETSI EN 300 356-6: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 6: Connected Line Identification Restriction (COLR) supplementary service [ITU-T Recommendation Q.731, clause 6 (1993), modified]".

[8] ETSI EN 300 356-8: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 8: User-to-User Signalling (UUS) supplementary service [ITU-T Recommendation Q.737, clause 1 (1997), modified]".

[9] ETSI EN 300 356-11: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 11: Malicious Call Identification (MCID) supplementary service [ITU-T Recommendation Q.731, clause 7 (1997), modified]".

[10] ETSI EN 300 356-12: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 12: Conference call, add-on (CONF) supplementary service [ITU-T Recommendation Q.734, clause 1 (1993), modified]".

[11] ETSI EN 300 356-14: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 14: Explicit Call Transfer (ECT) supplementary service [ITU-T Recommendation Q.732, clause 7 (1997), modified]".

[12] ETSI EN 300 356-17: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 17: Call Waiting (CW) supplementary service [ITU-T Recommendation Q.733, section 1 (1992), modified]".

[13] ETSI EN 300 356-18: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface; Part 18: Completion of Calls to Busy Subscriber (CCBS) supplementary service [ITU-T Recommendation Q.733, clause 3 (1997), modified]".

[14] ETSI EN 300 356-19: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 19: Three party (3PTY) supplementary service [ITU-T Recommendation Q.734, clause 2 (1997), modified]".

[15] ETSI ETS 300 008: "Integrated Services Digital Network (ISDN); Signalling System No.7; Message Transfer Part (MTP) to support international interconnection".

[16] ISO/IEC 9646-1 (1994): "Information technology; Open Systems Interconnection; Conformance testing methodology and framework; Part 1: General concepts".

[17] ISO/IEC 9646-3 (1996): "Information technology; Open Systems Interconnection; Conformance testing methodology and framework; Part 3: The Tree and Tabular Combined Notation (TTCN)".

[18] ISO/IEC 9646-7 (1994): "Information technology; Open Systems Interconnection; Conformance testing methodology and framework; Part 7: Implementation Conformance Statements".

[19] ITU-T Recommendation Q.763 (1993): "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:

- terms defined in ISDN User Part (ISUP) reference specification (EN 300 356-1 [2] to EN 300 356-19 [14]);
- terms defined in ISO/IEC 9646-1 [16], ISO/IEC 9646-3 [17] and in ISO/IEC 9646-7 [18].

In particular, the following terms apply:

Abstract Test Case (ATC): complete and independent specification of the actions required to achieve a specific test purpose, defined at the level of abstraction of a particular Abstract Test Method, starting in a stable testing state and ending in a stable testing state (see ISO/IEC 9646-1 [16], subclause 3.3.3)

Abstract Test Method (ATM): description of how an IUT is to be tested, given at an appropriate level of abstraction to make the description independent of any particular realization of a Means of Testing, but with enough detail to enable abstract test cases to be specified for this method (see ISO/IEC 9646-1 [16], subclause 3.3.5)

Abstract Test Suite (ATS): test suite composed of abstract test cases (see ISO/IEC 9646-1 [16], subclause 3.3.6)

Implementation Under Test (IUT): implementation of one or more OSI protocols in an adjacent user/provider relationship, being part of a real open system which is to be studied by testing (see ISO/IEC 9646-1 [16], subclause 3.3.43)

Means of Testing (MOT): combination of equipment and procedures that can perform the derivation, selection, parameterization and execution of test cases, in conformance with a reference standardized ATS, and can produce a conformance log (see ISO/IEC 9646-1 [16], subclause 3.3.54)

PICS proforma: document, in the form of a questionnaire, which when completed for an implementation or system becomes the PICS

PIXIT proforma: document, in the form of a questionnaire, which when completed for the IUT becomes the PIXIT

Point of Control and Observation: point within a testing environment where the occurrence of test events is to be controlled and observed, as defined in an Abstract Test Method (see ISO/IEC 9646-1 [16], subclause 3.3.64)

Pre-test condition: setting or state in the IUT which cannot be achieved by providing stimulus from the test environment

Protocol Implementation Conformance Statement (PICS): statement made by the supplier of a protocol claimed to conform to a given specification, stating which capabilities have been implemented (see ISO/IEC 9646-1 [16], subclause 3.3.39 and 3.3.80)

Protocol Implementation eXtra Information for Testing (PIXIT): statement made by a supplier or implementor of an IUT (protocol) which contains or references all of the information related to the IUT and its testing environment, which will enable the test laboratory to run an appropriate test suite against the IUT (see ISO/IEC 9646-1 [16], subclause 3.3.41 and 3.3.81)

System Under Test (SUT): real open system in which the IUT resides (see ISO/IEC 9646-1 [16], subclause 3.3.103)

3.2 Abbreviations

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

3PTY	Three-Party
ACM	Address Complete Message
ATC	Abstract Test Case
ATM	Abstract Test Method
ATP	Access Transport Parameter
ATS	Abstract Test Suite
CCBS	Completion of Calls to Busy Subscriber
CFB	Call Forwarding Busy
CFNR	Call Forwarding No Reply
CFNRc	Call Forwarding on Mobile Subscriber Not Reachable
CFU	Call Forwarding Unconditional
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
COLP	Connected Line Identification Presentation
COLR	Connected Line Identification Restriction
CONF	Conference calling
CPG	Call Progress message
ECT	Explicit Call Transfer
GMSC	Gateway MSC
GSM	Global System for Mobile communications
HLC	High Layer Compatibility
HLR	Home Location Register
IAM	Initial Address Message
INN	Internal Network Number
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
IUT	Implementation Under Test
LAB	PCO for signalling Link AB
LAC	PCO for signalling Link AC
LT	Lower Tester
MAP	Mobile Application Part
MCID	Malicious Call Identification
MNT	Maintenance PCO
MOT	Means Of Testing
MPTY	MultiParty
MSC	Mobile-service Switching Centre
MSISDN	Mobile Station ISDN number
MSRN	Mobile Station Roaming Number
MTP	Message Transfer Part
PCO	Point of Control and Observation
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PLMN	Public Land Mobile Network
SP	Signalling Point
SUT	System Under Test
TCP	Test Co-ordination Procedures
TMR	Transmission Medium Requirement
TP	Test Purpose (context dependent)
TSS	Test Suite Structure
TTCN	Tree and Tabular Combined Notation
USI	User Service Information
UT	Upper Tester
UUInf	User-to-User Information
UUS	User-to-User Signalling
UUS1	User-to-User Signalling service 1

The ISUP message acronyms can be found in table 2 of ITU-T Recommendation Q.763 [19].

4 Implementation Under Test and test methods

4.1 Identification of the system and Implementation Under Test

The system under test (SUT) is an exchange. The Implementation Under Test (IUT) is the ISUP v3 implementation in this exchange, mainly the part responsible for the ISDN User part functionality in GMSC or Fixed Gateway exchange, as shown in figure 1.

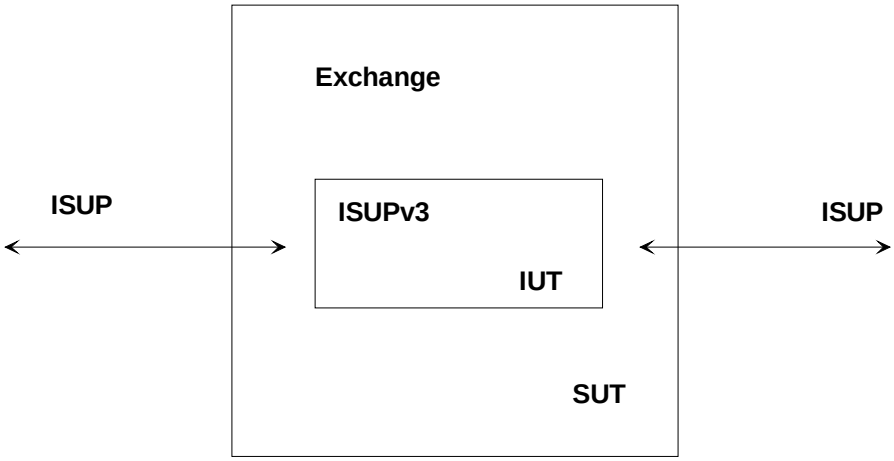

Figure 1: Implementation Under Test

4.2 ATM and testing configuration for ISUP v3

The Abstract Test Method (ATM) chosen for the ISDN - PLMN signalling interface testing specification is the distributed multi-party test method. The ATM is defined at an appropriate level of abstraction so that the test cases may be specified appropriately, without adding restrictions to the Implementation Under Test. The testing architectures are described in the following subclauses.

The ATS is written in concurrent TTCN.

4.3 PLMN-ISUP interface testing configuration

The configuration proposed for testing gateway exchanges is shown in figure 2. In order to test the protocol and functionality of gateway exchanges, one needs to consider the incoming and outgoing side of the SUT.

The IUT can be different configurations depending of test purposes. Alternatives for roles of IUT in network are Fixed gateway exchange with HLR connection, Gateway MSC exchange, or national/international Gateway exchange.

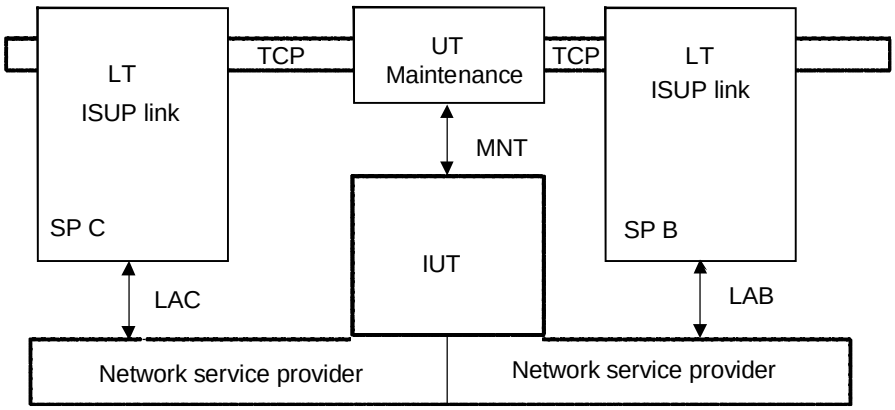

Figure 2: Testing configuration

The IUT is observed and controlled from two ISUP links with associated circuits. The Points of Control and Observation (PCO) are labelled LAB on the one side, LAC on the other.

The LAB and LAC PCO's are used by the Lower Testers (LT) for controlling the ISUP signalling link.

The MNT PCO is used by the upper tester (UT) to control and observe the maintenance functions of the test suite and exchange.

The Test Co-ordination Procedures (TCP) allow for communication between the testers. The test components are mostly implicitly co-ordinated (asynchronously); the TCPs are only used when it is necessary to obtain the verdict from the parallel test components.

The ISUP PDU's to be sent and observed on the LAB/LAC PCO's side allow for PDU constraints to be specified and coded down to the bit level.

The underlying network service provider is the Message Transfer Part (MTP) protocol as specified in reference ETS 300 008 [15].

4.4 Master-slave aspects in the test configuration

The figure 1 and figure 2 show the logical test components of the adopted test configuration. The main test component is located between two low tester components, which contains the ISUP parts.

As mentioned above, these test specification include tests for both - the IUT given as gateway. At test execution exactly one of these configurations will be chosen - based on the information provided in the PICS and PIXIT.

The message flow in the test cases is designed in such a way that the verdict is assigned based on observing the behaviour on the right side and left side, respectively. Both sides will in this case mainly act as a slave stimulus/acceptor.