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Technical Specification

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network Integration Testing between SIP and ISDN/PSTN network signalling protocols; Part 2: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification

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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).

The present document is part 2 of a multi-part deliverable covering the Network Integration Testing between SIP and ISDN/PSTN network signalling protocols, as identified below:

Part 1:   "Test Suite Structure and Test Purposes (TSS&TP) for SIP-ISDN";

Part 2:   "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification";

Part 3:   "Test Suite Structure and Test Purposes (TSS&TP) for SIP-SIP".

1   Scope

The present document specifies the Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma based on the Test Suite Structure and Test Purposes defined in [1].

The TSS&TP have been developed Network Integration Testing between SIP and ISDN/PSTN network signalling protocols. The ATS is sometimes referred to in the present document as "SIP-ISDN-Interworking ATS".

The test notation used in the ATS is TTCN-3 ([3]).

The following test specification- and design considerations can be found in the body of the present document:

- the overall test suite structure;

- the testing architecture;

- the test methods and port definitions;

- the test configurations;

- the design principles, assumptions, and used interfaces to the TTCN3 tester (System Simulator);

- TTCN styles and conventions;

- the partial PIXIT proforma;

- the modules containing the TTCN-3 ATS.

Annex A provides the Partial Implementation Extra Information for Testing (IXIT) Proforma of the ATS.

Annex B provides the Testing and Test Control Notation (TTCN-3) part of the ATS.

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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    - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;

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For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

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

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 TS 186 001 (Parts 1 and 3): "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Network Integration Testing between SIP and ISDN/PSTN network signalling protocols".

[2]   ETSI TS 102 351 (V2.1.1): "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT); IPv6 Testing: Methodology and Framework".

[3]   ETSI ES 201 873-1 (V3.1.1): "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 1: TTCN-3 Core Language".

[4]   ETSI ES 201 873-5 (V3.1.1): "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 5: TTCN-3 Runtime Interface (TRI)".

[5]   ETSI ES 201 873-6 (V3.1.1): "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 6: TTCN-3 Control Interface (TCI)".

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

[7]   ISO/IEC 9646-7 (1995): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".

[8]   ITU-T Recommendation Q.931 (1998): "ISDN user-network interface layer 3 specification for basic call control".

[9]   ETSI TS 102 027-3 (V3.1.1): "Methods for Testing and Specification (MTS); Conformance Test Specification for SIP (IETF RFC 3261); Part 3: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma".

[10]   IETF RFC 3261 (2002): "SIP: Session Initiation Protocol".

[11]   ETSI EN 383 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Interworking between Session Initiation Protocol (SIP) and Bearer Independent Call Control (BICC) Protocol or ISDN User Part (ISUP) [ITU-T Recommendation Q.1912.5, modified]".

[12]   ITU-T Recommendations Q.761 to Q.764 (1999): "Signalling System No.7 - ISDN User Part (ISUP)".

[13]   ITU-T Recommendation E.164 (2005): "The international public telecommunication numbering plan".

[14]   IETF RFC 4575: "A Session Initiation Protocol (SIP) Event Package for Conference State".

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]   ETSI TS 102 237-1 (V4.1.1): "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Interoperability test methods and approaches; Part 1: Generic approach to interoperability testing".

[i.2]   ETSI ES 201 873-6 (V1.1.1): "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 6: TTCN-3 Control Interface (TCI)".

[i.3]   ISO/IEC 9646-2 (1994): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract Test Suite specification".

[i.4]   ISO/IEC 9646-3 (1998): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 3: The Tree and Tabular Combined Notation (TTCN)".

[i.5]   ISO/IEC 9646-5 (1994): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 5: Requirements on test laboratories and clients for the conformance assessment process".

[i.6]   ITU-T Recommendation Q.921 (1997): "ISDN user-network interface - Data link layer specification".

[i.7]   ITU-T Recommendation I.431 (1993): "Primary rate user-network interface - Layer 1 specification".

3   Definitions and abbreviations

3.1   Definitions

For the purposes of the present document, the terms and definitions given in SIP/ISUP interworking reference specification [11], ISDN layer 3 reference specification [8], ISDN User Part (ISUP) reference specification [12], [6], [7], [3] (TTCN-3) and the following 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

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

Abstract Test Suite (ATS): test suite composed of abstract test cases

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

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

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 (PCO): point within a testing environment where the occurrence of test events is to be controlled and observed, as defined in an Abstract Test Method

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

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

SIP number: number conforming to the numbering and structure specified in ITU-T Recommendation E.164 [13]

System Under Test (SUT): real open system in which the IUT resides

3.2 Abbreviations

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

ASP	Abstract Service Primitive (exchanged between entities inside the TS or between the user of the ATS (operator) and the TS)
ATC	Abstract Test Case
ATM	Abstract Test Method
ATS	Abstract Test Suite
DSS1	Digital Subscriber System No. 1
IETF	Internet Engineering Task Force
ISDN	Integrated Services Digital Network
IUT	Implementation Under Test
IWU	Interworking Unit
MOT	Means Of Testing
MTC	Main Test Component
NGN	Next Generation Network
PCO	Point of Control and Observation
PDU	Protocol Data Unit (message exchanged between TS and SUT at a signalling interface)
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PTC	Parallel Test Component
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SUT	System Under Test
TC	Test Case
TCI	TTCN-3 Control Interface
TCP	Test Coordination Procedures
TD	Test Description
TE	Test Equipment
TP	Test Purpose
TS	Test System
TSS	Test Suite Structure
TSS&TP	Test Suite Structure and Test Purposes
TTCN	Tree and Tabular Combined Notation
TTCN-3	Testing and Test Control Notation edition 3

4 Abstract Test Method (ATM)

4.1 Network architecture

Figures 1 and 2 show the network architecture for SIP-ISDN Interworking Units (IWU).

Figure 1 shows the network architecture for SIP-ISDN Interworking.
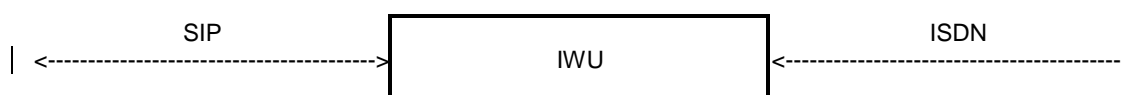
Figure 1: Interworking between SIP and ISDN

4.2   Protocol architecture

Figure 1 shows that there are 2 interfaces of the IWU (representing the SUT in the testing environment described in the present document): a SIP interface and an ISDN interface.
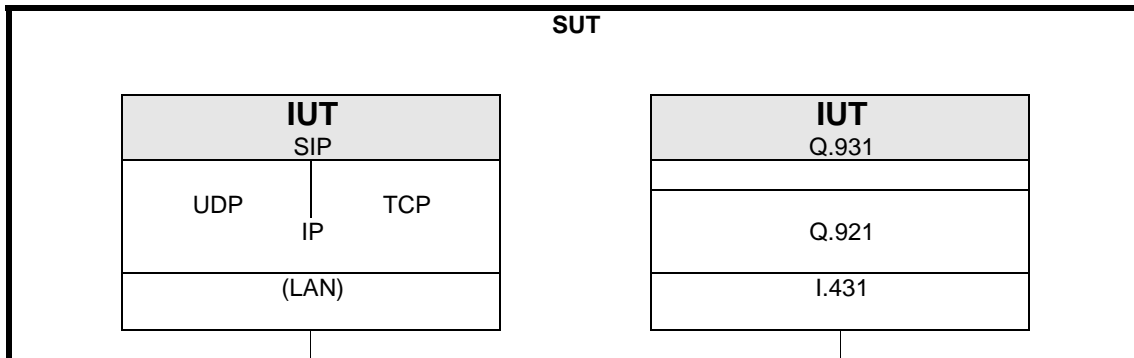
Figure 2 shows the protocol architecture:

Figure 2: Protocol architecture of the SIP-ISDN-Interworking ATS

4.3   Test architecture

4.3.1   Interconnection of TS and SUT

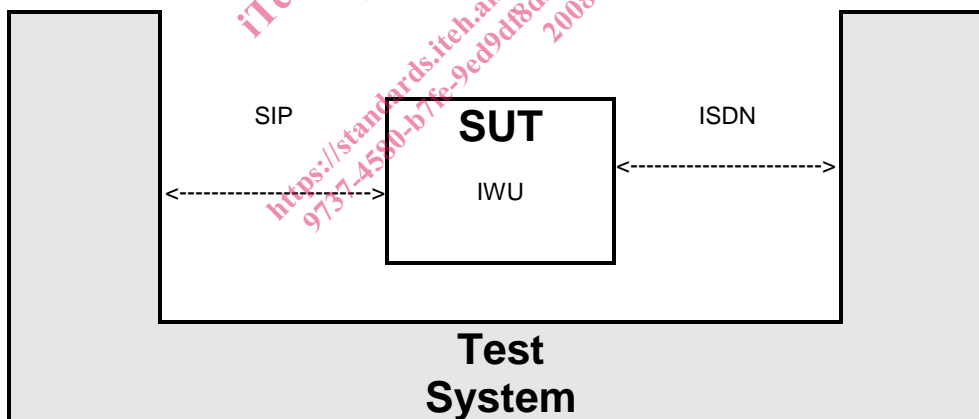Figure 3 shows the interconnection of TS and SUT in terms of signalling message flows.

Figure 3: Interconnection of TS and SUT

4.3.2   Test System architecture

An abstract architecture for a Test System (TS) implementing a TTCN-3 ATS is displayed in figure 4 and also stated in [4].
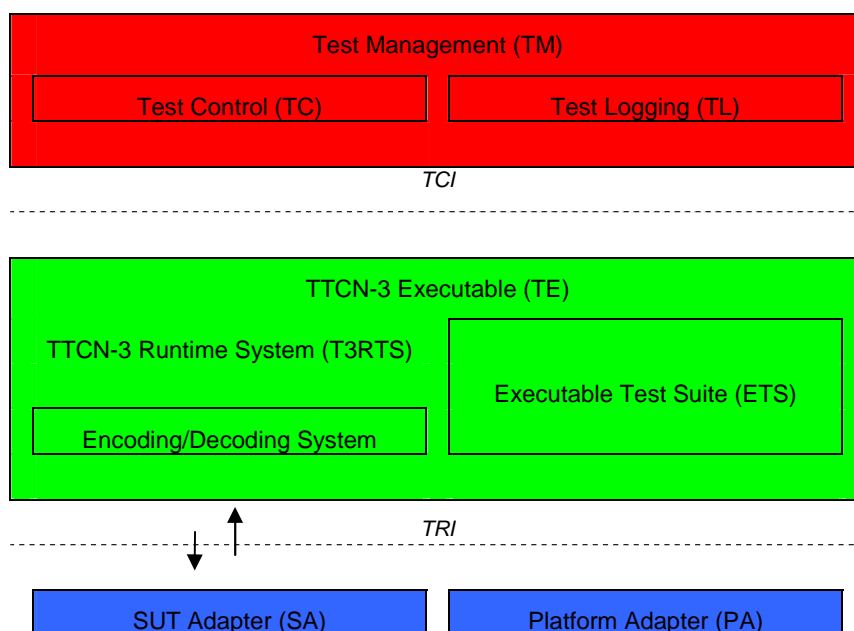
Figure 4: Abstract Test System Architecture

A TS has two interfaces, the TTCN-3 Control Interface (TCI) and the TTCN-3 Runtime Interface (TRI), which specify the interface between Test Management (TM) and TTCN-3 Executable (TE) entities, and TE, SUT Adapter (SA) and Platform Adapter (PA) entities, respectively. Out of these two interfaces the TRI has been standardized in [4], whereas the specification and implementation of the TCI is in [5].

The part of TS that deals with interpretation and execution of TTCN-3 modules, i.e. the Executable Test Suite (ETS), is shown as part of the TTCN-3 Executable (TE). This ETS corresponds either to the executable code produced by a TTCN-3 compiler or a TTCN-3 interpreter from the TTCN-3 ATS in a TS implementation. The remaining part of the TS, which deals with any aspects that cannot be concluded from information being present in the TTCN-3 ATS alone, can be decomposed into Test Management (TM), SUT Adapter (SA), and Platform Adapter (PA) entities. In general, these entities cover a TS user interface, test execution control, test event logging, communication of test data with the SUT, and timer implementation.

The part of SA used for SIP message transfer shall implement the TRI adaptation as well as the SIP transport protocol architecture described in clause 4.2.

The Encoding/Decoding System (EDS) entity, as far as applied to SIP messages, with the TE and Test Logging (TL) entity within the TM shall comply with the conventions defined in clause 4.3.2 of [9].

The part of SA used for ISDN message transfer shall implement the *TRI* adaptation as well as the ISDN transport protocol architecture described in clause 4.2.

The Encoding/Decoding System (EDS) entity, as far as applied to ISDN messages, shall comply with the conventions and requirements defined in the following clauses.

5 The ATS development process

5.1 Requirements and Test Purposes

For each test purpose there is a table defined in clause 6 of [1]. The requirements applicable to this TP are given by a reference to the relevant base specification. There are no explicit formulations of requirements.