ETSI TS 186 007-3 V1.1.1 (2008-09)

Technical Specification

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Communication HOLD (CH); Part 3: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification

Reference

DTS/TISPAN-06021-3-NGN-R1

Keywords

ATS, SIP, ISUP, testing, TTCN, PIXIT, HOLD

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

Individual copies of the present document can be downloaded from:
http://www.etsi.org

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
http://portal.etsi.org/tb/status/status.asp

If you find errors in the present document, please send your comment to one of the following services:
http://portal.etsi.org/chaircor/ETSI_support.asp

Copyright Notification

Contents

Intellectual Property Rights 4
Foreword 4
1 Scope 5
2 References 5
2.1 Normative references 6
2.2 Informative references 8
3 Definitions and abbreviations 8
3.1 Definitions 8
3.2 Abbreviations 9
4 Abstract Test Method (ATM) 10
4.1 Network architecture 10
4.2 Protocol architecture 11
4.3 Test architecture 12
4.3.1 Interconnection of TS and SUT 12
4.3.2 Test system architecture 12
4.3.2.1 General 12
4.3.2.2 Structure 12
4.3.2.3 Interaction between TTCN-3 Executable (TE) and SUT Adapter (SA) 13
4.3.2.3.1 Control of the SUT Adapter (SA) by using ASPs 13
4.3.2.3.2 Sending and receiving SIP and ISUP/BICC messages 17
4.3.2.3.3 Logging conventions 19
5 The ATS development process 20
5.1 Requirements and Test Purposes 20
5.2 ATS structure 20
5.2.1 Test case grouping 20
5.2.2 Test case identifiers 20
5.3 ATS specification framework 21
5.3.1 ATS Library 21
5.3.2 Use of TTCN-3 22
5.3.2.1 General 22
5.3.2.2 TTCN-3 naming conventions 22
5.4 ATS archive 24
Annex A (normative): Partial PIXIT proforma 25
A.1 Introduction 25
A.2 PIXIT items 25
A.2.1 SIP-related PIXIT 25
A.2.2 ISUP/BICC-related PIXIT 28
Annex B (informative): TTCN-3 library modules 32
B.1 Electronic annex, zip file with TTCN-3 code 32
History 33

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://webapp.etsi.org/IPR/home.asp).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

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 3 of a multi-part deliverable covering Communication HOLD, as identified below:

Part 1: "Protocol Implementation Conformance Statement (PICS)";

Part 2: "Test Suite Structure and Test Purposes (TSS&TP)";

Part 3: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification".

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 TS 186 007-2 [3].

The TSS&TP have been developed to test the communication HOLD PSTN/IDSN simulation services.

The test notation used in the ATS is TTCN-3 (ES 201 873-1 [8]).

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.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
  - 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;
  - for informative references.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

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

NOTE 2: References have been used both in the present document and in the TTCN-3 library modules (annex B).

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 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".

[2] ETSI TS 186 007-1: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Communication HOLD (CH); Part 1: Protocol Implementation Conformance Statement (PICS)".

[3] ETSI TS 186 007-2: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Communication HOLD (CH); Part 2: Test Suite Structure and Test Purposes (TSS&TP)".

[4] ETSI TS 186 002-4: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Interworking between Session Initiation Protocol (SIP) and Bearer Independent Call Control Protocol (BICC) or ISDN User Part (ISUP); Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) for Profile A and B".

[5] 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]".

[6] 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".

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

[8] 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".

[9] 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)".

[10] 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)".

[11] ETSI TS 181 002: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Multimedia Telephony with PSTN/ISDN simulation services".

[12] ETSI ES 283 003: "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]".

[13] 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]".

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

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

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

[17] 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".

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

[19] ITU-T Recommendation Q.1912.5 (2004): "Interworking between Session Initiation Protocol (SIP) and Bearer Independent Call Control protocol or ISDN User Part".

[20] ITU-T Recommendation Q.2150.1 (2001): "Signalling Transport Converter on MTP3 and MTP3b".

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

[22] ITU-T Recommendation Q.761 (1999): "Signalling System No.7 - ISDN User Part functional description".

[23] ITU-T Recommendation Q.762 (1999): "Signalling System No.7 - ISDN User Part general functions of messages and signals".

[24] ITU-T Recommendation Q.763 (1999): "Signalling System No.7 - ISDN User Part formats and codes".

[25] ITU-T Recommendation Q.764 (1999): "Signalling System No.7 - ISDN User Part signalling procedures".

[26] ITU-T Recommendation Q.732.4 (1999): "Stage 3 description for call offering supplementary services using Signalling System No. 7: Call Forwarding Unconditional (CFU)".

[27] ITU-T Recommendation Q.733.2 (1993): "Stage 3 description for call completion supplementary services using Signalling System No. 7: Call hold (HOLD)".

[28] ITU-T Recommendation Q.850 (1998): "Usage of cause and location in the Digital Subscriber Signalling System No. 1 and the Signalling System No. 7 ISDN User Part".

[29] ITU-T Recommendation Q.9: "Vocabulary of switching and signalling terms".

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

[31] IETF RFC 4566 (2006): "SDP: Session Description Protocol".

[32] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".

[33] IETF RFC 2617 (1999): "HTTP Authentication: Basic and Digest Access Authentication".

[34] IETF RFC 3966 (2004): "The tel URI for Telephone Numbers".

[35] IETF RFC 3262 (2002): "Reliability of Provisional Responses in the Session Initiation Protocol (SIP)".

[36] IETF RFC 3264 (2002): "An Offer/Answer Model with the Session Description Protocol (SDP)".

[37] IETF RFC 3311 (2002): "The Session Initiation Protocol (SIP) UPDATE Method".

[38] IETF RFC 3312 (2002): "Integration of Resource Management and Session Initiation Protocol (SIP)".

[39] IETF RFC 3323 (2002): "A Privacy Mechanism for the Session Initiation Protocol (SIP)".

[40] IETF RFC 3515: "The Session Initiation Protocol (SIP) Refer Method".

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.

Not applicable.

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 [5], ISDN User Part (ISUP) reference specifications [22] to [25], ISO/IEC 9646-1 [14], ISO/IEC 9646-7 [18], (TTCN-3) ES 201 873-1 [8] 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

address identity: See ITU-T Recommendation E.164 [21] or/and RFC 3966 [34].

call: See ITU-T Recommendation Q.9 [29], definition 2201.

call state: state as defined in clause 2.1 of the present document, for either the user side or network side as appropriate

NOTE: A call state may exist for each call reference value (and at the network side for each additional responding CEI in the incoming call states).

identity information: includes all the information (RFC 3966 [34]/RFC 3986 [32]/ITU-T Recommendation E.164 [21]) identifying a user, including trusted (network generated) and/or untrusted (user generated) addresses

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

SIP number: number conforming to the numbering and structure specified in ITU-T Recommendation E.164 [21]

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: 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

supplementary service: service that modifies or supplements a basic Telecommunication service

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

trusted identity: network generated user address information

untrusted identity: user generated user address information

voice session: existing voice connection between two terminal equipments

EXAMPLE: Via RTP.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in table 2 of ITU-T Recommendation Q.762 [23] (ISUP messages) and the following apply:

NOTE: Abbreviations have been used both in the present document and in the TTCN-3 library modules (annex B).

ASP	Abstract Service Primitive

NOTE: 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
ATP	Access Transport Parameter
ATS	Abstract Test Suite
BC	Bearer Capability
BCI	Backward Call Indicators
CIC	Circuit Identification Code
CPS	Calling Party's Category
CN	Core Network
CS	Circuit Switched
DSS1	Digital Subscriber System No. 1
ETS	Executable Test Suite
FCI	Forward Call Indicators
HOLD	Communication session Hold
HLC	High Layer Compatibility
ICS	Implementation Conformance Statement
IE	Information Element
IETF	Internet Engineering Task Force
IM	IP Multimedia
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
IUT	Implementation Under Test
IWU	Interworking Unit
LLC	Low Layer Compatibility
LT	Lower Tester
MOT	Means Of Testing
MTC	Main Test Component
MTP	Message Transfer Part
NCI	Nature of Connection Indicators
NGN	Next Generation Network
NNI	Network-Network Interface
OBCI	Optional Backward Call Indicators
OLE	Originating Local Exchange
PA	Platform Adapter

PCO	Point of Control and Observation
PCTR	Protocol Conformance Test Report
PDU	Protocol Data Unit

NOTE: Message exchanged between TS and SUT at a signalling interface.

PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PSTN	Public Switch Telephone Network
PTC	Parallel Test Component
SA	SUT Adapter
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SN	Signalling Node
SS#7	Signalling System No. 7
STC	Signalling Transport Converter

NOTE According to ITU-T Recommendation Q.2150.1 [20].

SUT	System Under Test
TC	Test Case
TCI	TTCN-3 Control Interface
TCP	Test Coordination Procedures
TD	Test Description
TE	Test Equipment
TISPAN	Telecommunications and Internet converged Services and Protocols for Advanced Networking
TL	Test Logging
TMR	Transmission Medium Requirement
TMU	Transmission Medium Used
TP	Test Purpose
TRI	TTCN-3 Runtime Interface
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
UE	User Equipment

4 Abstract Test Method (ATM)

4.1 Network architecture

Two different network configurations have been assumed in the scope of the test purpose description defined in TS 186 007-2 [3], SIP-SIP and SIP-ISUP. The test purposes from the latter configuration are also covered in TS 186 002-4 [4]; they have been adopted and integrated to the present document and its related TTCN-3 test code specification.

Figures 1 and 2 show the network architecture for SIP-SIP and SIP-ISUP configuration.

Figure 1 shows the network architecture for SIP-SIP UE Interworking.

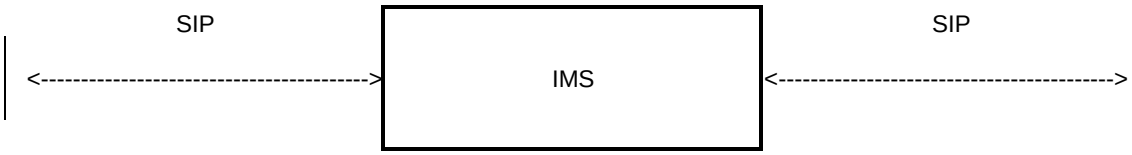

Figure 1: Interworking between two SIP UEs

Figure 2 shows the network architecture for SIP-ISUP Interworking.

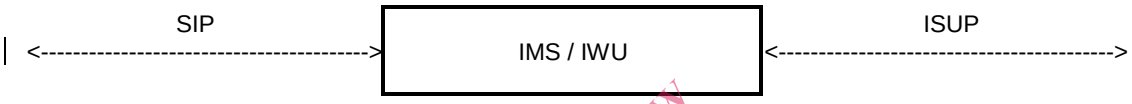

Figure 2: Interworking between SIP and ISUP

4.2 Protocol architecture

Figures 1 and 2 show that there are two configurations of the SUT (representing the SUT in the testing environment described in the present document): a SIP UE interface and either a second SIP UE or an ISUP- or BICC interface.

Since the ISUP and BICC protocols are very similar (the latter one being derived from ISUP), they are treated here as one protocol.

NOTE: No signalling is used within the SIP-ISUP-Interworking ATS to control the ATM bearer in case of BICC (ASPs are used).

Figure 3 shows the protocol architecture regarding the two interfaces.

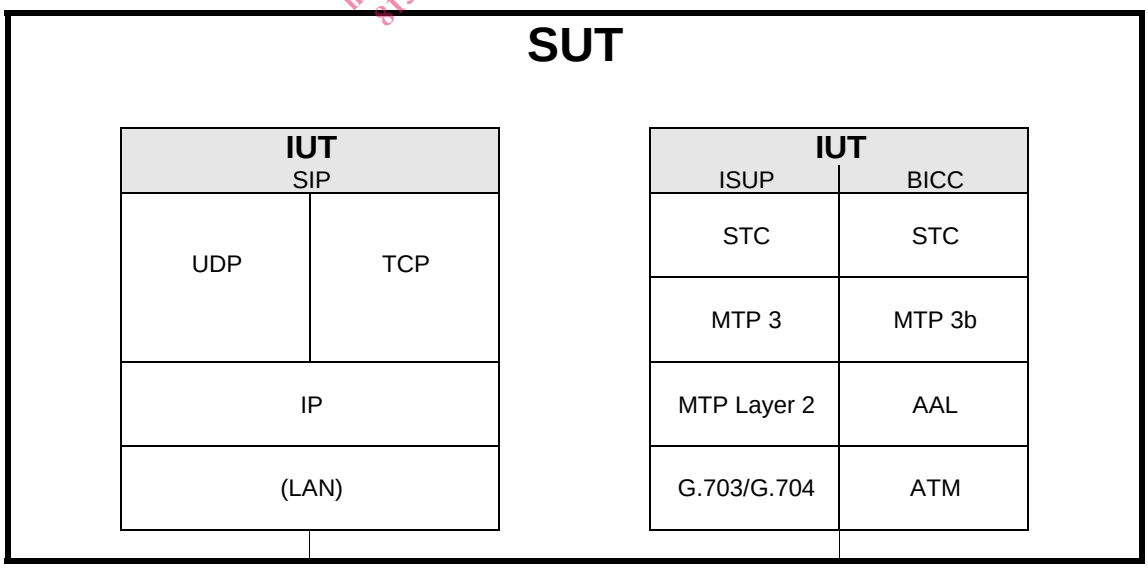

Figure 3: Protocol architecture of the SIP and ISUP interfaces