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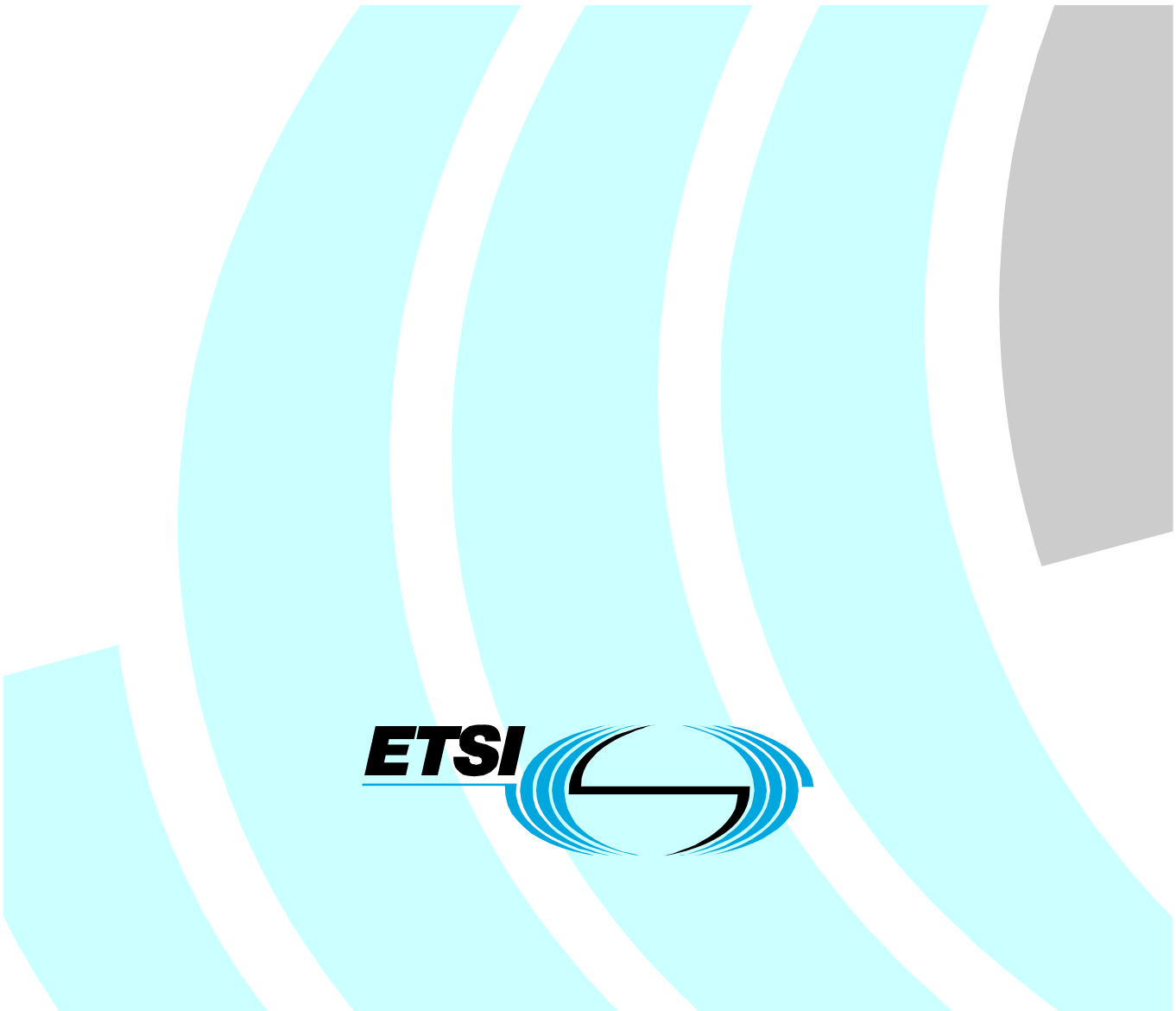
Technical Specification

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.
- 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: 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.

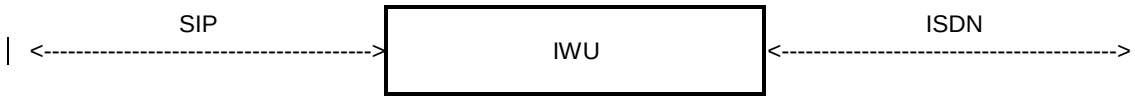

Figure 1: Interworking between SIP and ISDN

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:

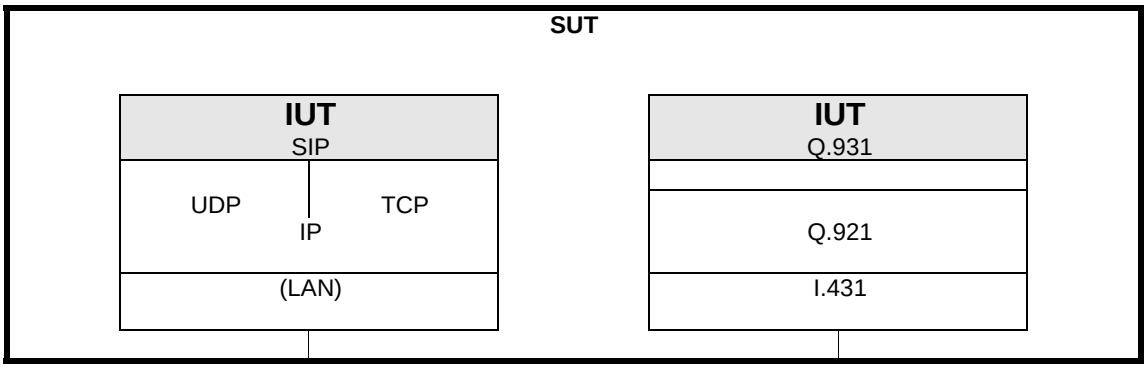

Figure 2: Protocol architecture of the SIP-ISDN-Interworking ATS

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.

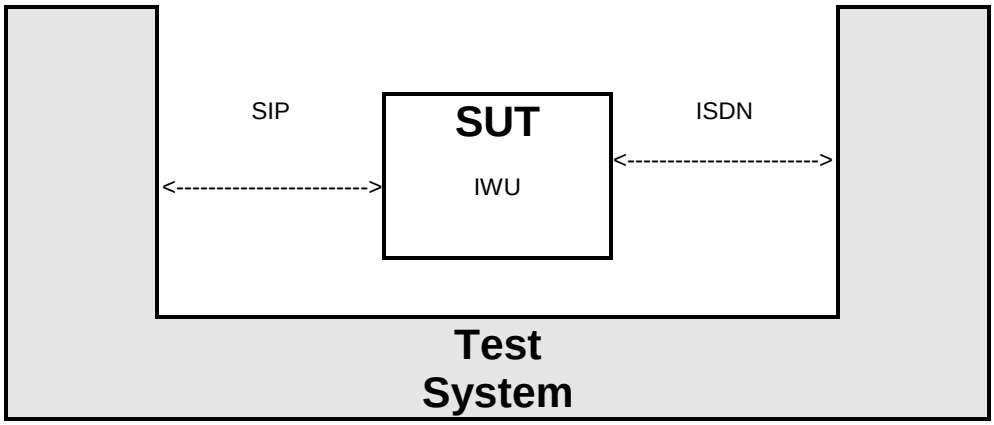

Figure 3: Interconnection of TS and SUT

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].

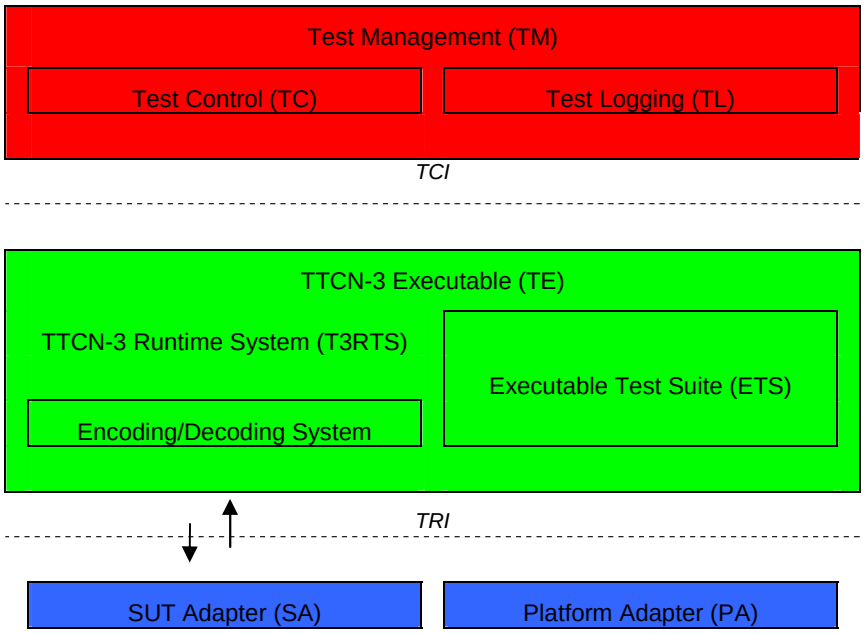

Figure 4: Abstract Test System Architecture

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.

5.2 ATS structure

5.2.1 Test case grouping

The ATS structure defined in table 1 is based on the structuring of Test Purposes in clause 6 of [1]. The group names in columns 1 to 3 of table 1 are those assigned in the ATS; they are based on the names provided in clause 6 of [1], but use the naming conventions defined for the ATS (see clause 5.3.2.2).

Table 1: ATS structure

Group	Subgroup	Sub-Subgroup	Group Index
ISDN-SIP			1
	Basic call		11
		Successful - Speech	1101
		Codec negotiation	1102
		Successful - UPDATE	1103
		Successful - DTMF Tests	1104
		Successful - UDI	1105
		Unsuccessful	1106
	Sup. Services		12
		CLIP	1201
		CLIR	1202
		COLP/COLR	1203
		CFU	1204
		CFB	1205
		CFNR	1206
		CFNL	1207
		CD	1208
		HOLD	1209
		3PTY	1210
		CONF	1211
SIP-ISDN			2
	Basic call		21
		Successful 3.1 kHz audio	2101
		Codec negotiation	2102
		DTMF	2103
		UDI	2104
		Unsuccessful	2105
	Sup. Services		22
		CLIP/OIP	2201
		OIR/CLIR	2202
		TIP/COLP	2203
		TIR/COLR	2204
		CFU	2205
		CFB	2206
		CFNR	2207
		CD	2208
		TP	2209
		3PTY	2210
		HOLD	2211
		CONF	2212
		CW	2213
		ACR	2214
		CUG	2215
SIP-SIP			5
	Basic call		51
		Successful	5101
		Codec negotiation	5102
		Update	5103
		Unsuccessful	5104
	Sup. Services		53
		OIP	5201
		OIR	5202
		TIP	5203

Group	Subgroup	Sub-Subgroup	Group Index
		TIR	5204
		HOLD	5205
		CFU	5206
		CFB	5207
		CFNR	5208
		CFNL	5209
		CD	5210
		CONF	5211

5.2.2 Test case identifiers

The test case names are built up according to the following scheme:

<"TC"><Group path index>"_"<TC number>

where:

a) double quotes (") are used to enclose literal strings;

b) <Group path index> is the 4-digit number which uniquely identifies the path of groups/subgroups;

c) <TC number> is the identifier from the TSS&TP document.

EXAMPLE: TC1101_IS___XX__001:

i) the identifier has Group index "1101", i.e. it is in the subgroup having complete path: SIP-ISDN/BasicCall/Successful - Speech/;

ii) the identifier is the first test case of this group/subgroup.

NOTE: This naming scheme provides a 1-1 correspondence of TP identifiers as defined in [1] and test case names.

5.3 ATS specification framework

5.3.1 ATS Library

For this interworking ATS there are 2 applicable base protocols:

a) SIP protocol ([10]); and

b) ISDN protocol (ITU-T Recommendation Q.931 [8] series, plus associated standards for supplementary services etc.).

Since e.g. the data structures of these 2 base protocols are independent, and other objects like test cases are common, the TTCN-3 library modules are basically organized as:

1) SIP modules;

2) ISDN modules;

3) Common modules (generated for the present ATS);

4) LibCommon modules (taken from [2]).

Table 2 shows the organization of the ATS as library of modules.

Table 2: Library of modules

Module Class	Module Id	Description
LibCommon	LibCommon_AbstractData	Generic data types for a stack and its operations.
	LibCommon_BasicTypesAndValues	Basic type and value definitions (integer and Boolean).
	LibCommon_DataStrings	Bit and Octet string types.
	LibCommon_Sync	Co-ordination/synchronization of test components.
	LibCommon_TextStrings	Basic character and string types with fixed length.
	LibCommon_Time	Time handling functions and moduleparameter.
	LibCommon_VerdictControl	Basic functions for setting of test component verdicts.
AtsCommon	General_Types	Definitions are based on component type definitions from IPv6, SCOP and common synchronization libraries.
	SipIsdn_PICS	Module Parameter declarations associated with PICS.
	SipIsdn_PIXITS	SIP-ISDN common Module Parameter declarations associated with PIXIT.
	SipIsdn_Testcases	Test case functions.
	SipIsdn_TestConfiguration	Functions which implement the configuration of the SUT adapter and mapping of test components for establishing and tearing down different test configurations.
	SipIsdn_TestExecution	Module control: execute test cases depending on selection conditions; repeat parameterized test cases based on the "Variant-tables" defined in the test prose.
	SipIsdn_TestSystem	Common functions, components, ASPs controlling the test system.
SipAts	SipIsdn_SIP_SDPTypes	SIP SDP data types.
	SipIsdn_SIP_TCFunctions	PTC root functions for SIP-to-ISDN test cases.
	SipIsdn_SIPSIP_TCFunctions	PTC root functions for SIP-to-SIP test cases.
	SipIsdn_SIP_Types	SIP data types (messages, header fields) and parallel test component (according to [9]).
	SipIsdn_SIP_Templates	Templates for SIP messages and header fields (according to [10]).
	SipIsdn_SIP_Steps	SIP auxiliary functions.
	SipIsdn_SIP_XMLTypes	SIP data types defined in XML (message body according to RFC 4575 [14]).
	XSDAUX	Generic XML type system for TTCN-3
IsdnAts	SipIsdn_ISDN_Types	ISDN data types (information element and message types according to ITU-T Recommendation Q.931 [8] and ASP type declarations).
	SipIsdn_ISDN_Templates	Templates for ISDN information elements, messages and ASPs.
	SipIsdn_ISDN_Steps	Test step declarations, including preambles, postambles and default.
	SipIsdn_ISDN_TCFunctions	Test case functions running on the Isdn component.
	SipIsdnASN1Types	ASN.1 definitions for ISDN message parts (ASN.1 and TTCN-3 notation).

5.3.2 Use of TTCN-3

5.3.2.1 General

TTCN-3 as defined in [3] is used as ATS specification language.

A number of requirements have been identified for the development and production of the TTCN-3 specification for the SIP/ISUP Interworking ATS:

1) Top-down design.

2) A uniquely defined testing architecture and test method.

3) Uniform TTCN-3 style and naming conventions.

4) TTCN-3 is human-readability.

5) TTCN-3 specification is feasible, implementable, compilable and maintainable.

6) Test cases shall be designed in a way to be easily adaptable, upwards compatible with the evolution of the base protocol and protocol interworking of future releases.

7) The test declarations, data structures and data values shall be largely reusable.

8) Modularity and modular working method.

9) Minimizing the requirements of intelligence on the emulators of the lower testers.

10) Giving enough design freedom to the test equipment manufacturers.

Fulfilling these requirements should ensure the investment of the test equipment manufacturers and users of the ATS having stable testing means for a relatively long period.

5.3.2.2 TTCN-3 naming conventions

Like in other software projects using a programming language, the use of naming conventions supports or increases:

a) the readability;

b) the detection of semantic errors;

c) the shared work of several developers;

d) the maintainability.

The naming conventions applied to the SIP/ISUP Interworking ATS are based on the following underlying principles:

- when constructing meaningful identifiers, the general guidelines specified for naming in clause 9 of [2] should be followed;
- for the SIP ATS part, which is based on a subset of [9], with extensions, the naming conventions defined in [9] should be followed;
- the names of TTCN-3 objects being associated with standardized data types (e.g. in the base protocols) should reflect the names of these data types as close as possible (of course not conflicting with syntactical requirements or other conventions being explicitly stated);
- the subfield names of TTCN-3 objects being associated with standardized data type should also be similar to corresponding element names in the base standards (be recognizable in the local context);
- in most other cases, identifiers should be prefixed with a short alphabetic string (specified in table 3) indicating the type of TTCN-3 element it represents;
- prefixes should be separated from the body of the identifier with an underscore ("_");
- only test case names, module names, data type names and module parameters should begin with an upper-case letter. All other names (i.e. the part of the identifier following the prefix) should begin with a lower-case letter.

Table 3 specifies the naming guidelines for each element of the TTCN-3 language indicating the recommended prefix and capitalization.

Table 3: TTCN-3 naming conventions

Language element	Naming convention	Prefix	Example	Notes
Module	Use upper-case initial letter	none	SipIsdn_ISDN_Types	
TSS grouping	Use all upper-case letters as specified in clause 7.1.2.1.1	none	TP_RT_PS_TR	
Item group within a module	Use lower-case initial letter	none	messageGroup	
ISDN message type	Use prefix PDU_DSS1 and upper-case initial letter and message name abbreviations	none	PDU_DSS1_Setup	
ISDN parameter type	Use prefix DSS1 and upper-case initial letter and parameter name	none	DSS1_CallReference	
SIP message type	Use upper-case initial letter	none	Request, Response	note 4
SIP header type	Use upper-case initial letter	none	MaxForwards	note 4
Basic common data types (e.g. bit string types of fixed length)	Use upper-case initial letter	none	Take from common module	
Other Data types	Use upper-case initial letter	none	SetupContents	
Template	None	m_	m_IAM_Basic	note 1
Message template with wildcard or matching expression	None	mw_	mw_AnyUserReply	note 2
Signature template	Use lower-case initial letter	s_	s_callSignature	
Port instance	Use lower-case initial letter	none	signallingPort	
Test component ref	Use lower-case initial letter	none	userTerminal	
Constant	Use lower-case initial letter	c_	c_maxRetransmission	
External constant	Use lower-case initial letter	cx_	cx_macId	
Function	Use lower-case initial letter	f_	f_authentication()	
External function	Use lower-case initial letter	fx_	fx_calculateLength()	
Altstep (incl. Default)	Use lower-case initial letter	a_	a_receiveSetup()	
Test case	Use naming as specified in clause 5.2.2	TC_	TC_101_001	
Variable (local)	Use lower-case initial letter	v_	v_macId	
Variable (defined within a component)	Use lower-case initial letters	vc_	vc_systemName	
Timer (local)	Use lower-case initial letter	t_	t_wait	
Timer (defined within a component)	Use lower-case initial letters	tc_	tc_authMin	
Module parameter	Use initial upper case letters	PX	PX_MAC_ID	note 3
Parameterization	Use lower-case initial letter	p_	p_macId	
Enumerated Value	Use lower-case initial letter	e_	e_syncOk	

NOTE 1: This prefix must be used for all template definitions which do not assign or refer to templates with wildcards or matching expressions, e.g. templates specifying a constant value, parameterized templates without matching expressions, etc.
NOTE 2: This prefix must be used in identifiers for templates which either assign a wildcard or matching expression (e.g. ?, *, value list, ifpresent, pattern, etc.) or reference another template which assigns a wildcard or matching expression.
NOTE 3: In this case it is acceptable to use underscore as a word delimiter.
NOTE 4: This convention has been used in [9] (SIP ATS).

5.4 ATS archive

Annex B contains the ATS archive (.zip file expanding to text files with TTCN-3 code).

Annex A (normative): Partial PIXIT proforma

A.1 Introduction

This partial PIXIT proforma contained in the present document is provided for completion, when the related Abstract Test Suite is to be used against the Implementation Under Test (IUT).

The completed partial PIXIT will normally be used in conjunction with the completed PICS, as it adds precision to the information provided by the PICS.

A.2 PIXIT items

According to the interworking type of ATS defined in the present document, the PIXIT are divided in SIP-related PIXIT and ISDN-related PIXIT.

A.2.1 SIP-related PIXIT

The SIP-related PIXIT of table A.1 apply, which have been provided for the particular purposes of this ATS. Each PIXIT item corresponds to a Module Parameter of the ATS.

Table A.1: SIP-related PIXIT items

Item	Module Parameter	Description	Type	Value
SDP Parameter				
1.1	PX_SIP_SDP_dyn	SDP dynamic port	integer	
1.2	PX_SIP_SDP_b_modifier	SDP bandwidth modifier	charstring	
1.3	PX_SIP_SDP_b_bandwidth	SDP bandwidth value	integer	
1.4	PX_SIP_SDP_encoding	SDP media attribute encoding supported by the IUT.	charstring	
1.5	PX_SIP_SDP_encoding_unavail	SDP media attribute encoding unavailable at the IUT.	charstring	
1.6	PX_SIP_SDP_encoding_unsup	SDP media attribute encoding unsupported by the IUT.	charstring	
1.7	PX_SIP_SDP_transport	SDP media T.38 transport (used in TC2101_IS___AU__09)	charstring	
Supported options				
1.8	PX_SIP_100rel	True if 100rel mechanism is supported in SIP.	boolean	
1.9	PX_SIP_precondition	True if precondition mechanism is supported in SIP.	boolean	
1.10	PX_SIP_UDP	True if UDP Transport is used by the IUT to run campaign.	boolean	
1.11	PX_SIP_TRANSPORT	Used Transport in upper case, i.e. "UDP" or "TCP".	charstring	
Ports and addresses of the IUT				
1.12	PX_SIP_IUT_PORT	IUT port number to exchange SIP messages.	integer	
1.13	PX_SIP_IUT_IPADDR	IUT IP address to exchange SIP messages.	charstring	
1.14	PX_SIP_IUT_HOME_DOMAIN	IUT domain.	charstring	

Item	Module Parameter	Description	Type	Value
1.15	PX_SIP_IUT_HOME_DOMAIN_UNKNOWN	Unknown IUT domain.	charstring	
1.16	PX_SIP_IUT_USER	User identity at ISDN side.	charstring	
1.17	PX_SIP_IUT_USER_UNKNOWN	Unknown user identity at ISDN side.	charstring	
Ports and addresses of the ETS (tester), first access, used for SIP-ISDN and SIP-SIP testing				
1.18	PX_SIP_ETS_PORT	Port number used by the ETS to exchange SIP messages.	integer	
1.19	PX_SIP_ETS_IPADDR	IP address used by the ETS to exchange SIP messages.	charstring	
1.20	PX_ETS_LOCAL_DOMAIN	Identity of the tester local domain.	charstring	
1.21	PX_ETS_LOCAL_USER	Identity of the tester local user.	charstring	
1.22	PX_ETS_LOCAL_USER_DIV	Identity of the user with active call diversion service.	charstring	
1.23	PX_SIP_ETS_LOCAL_USER_FULL	Identity of the tester local user (format "+"cc+ndc+sn).	charstring	
1.24	PX_SIP_ETS_BEARER_PORT	Port number used by the ETS to exchange media streams.	integer	
1.25	PX_SIP_ETS_BEARER_PORT2	Second Port number used by the ETS to exchange media streams.	integer	
1.26	PX_SIP_ETS_BEARER_IPADDR	IP address used by the ETS to exchange media streams.	charstring	
Ports and addresses of the ETS2 (tester), second access, used for SIP-SIP testing only				
1.27	PX_SIP_ETS2_PORT	Port number used by the ETS2 to exchange SIP messages.	integer	
1.28	PX_SIP_ETS2_IPADDR	IP address used by the ETS2 to exchange SIP messages.	charstring	
1.29	PX_ETS2_LOCAL_DOMAIN	Identity of the tester local domain.	charstring	
1.30	PX_ETS2_LOCAL_USER	Identity of the tester local user.	charstring	
1.31	PX_ETS2_LOCAL_USER_DIV	Identity of the user with active call diversion service.	charstring	
1.32	PX_SIP_ETS2_LOCAL_USER_FULL	Identity of the tester local user (format "+"cc+ndc+sn).	charstring	
1.33	PX_SIP_ETS2_BEARER_PORT	Port number used by the ETS2 to exchange media streams.	integer	
1.34	PX_SIP_ETS2_BEARER_PORT2	Second Port number used by the ETS2 to exchange media streams.	integer	
1.35	PX_SIP_ETS2_BEARER_IPADDR	IP address used by the ETS2 to exchange media streams.	charstring	
Ports and addresses of the ETS3 (tester), second access, used for SIP-SIP (CONF) testing only				
1.36	PX_SIP_ETS3_PORT	Port number used by the ETS2 to exchange SIP messages.	integer	
1.37	PX_SIP_ETS3_IPADDR	IP address used by the ETS2 to exchange SIP messages.	charstring	
1.38	PX_ETS3_LOCAL_DOMAIN	Identity of the tester local domain.	charstring	
	PX_ETS3_LOCAL_USER	Identity of the tester local user.	charstring	
Registration parameters				
1.39	PX_SIP_REGISTRATION	Does the SIP user have to register itself before executing a test case?	boolean	
1.40	PX_SIP_REGISTRAR_PORT	Registrar port number to exchange SIP messages.	integer	
1.41	PX_SIP_REGISTRAR_DOMAIN	Registrar domain.	charstring	
Release cause				
1.42	PX_SIP_BYE_CAUSE	Release cause to be used in BYE and in Failure messages.	integer	
RTP stream control and check				
1.43	PX_SIP_CheckConversation	True, if conversation check is implemented.	boolean	
1.44	PX_SIP_CheckDTMF	True, if DTMF check is implemented.	boolean	
1.45	PX_SIP_SendAnnouncement	True, if Announcement sending is implemented.	boolean	
1.46	PX_SIP_CheckRinging	True, if ringing check is implemented.	boolean	

Item	Module Parameter	Description	Type	Value
Parameters for HTTP authentication				
1.47	PX_SIP_REGISTRATION_AUTHENTICATION_ENABLED	Option controlling if authentication is enabled/disabled for registration messages.	boolean	
1.48	PX_SIP_RFC2617_QOP	Quoted string of one or more tokens indicating the "quality of protection" values supported by the server. The value "auth" indicates authentication; the value "auth-int" indicates authentication with integrity protection.	charstring	
1.49	PX_SIP_RFC2617_USERNAME	The name of user in the specified realm.	charstring	
1.50	PX_SIP_RFC2617_PASSWD	A known shared secret, the password of user of the specified username.	charstring	
1.51	PX_SIP_RFC2617_URI	URI for HTTP authentication.	charstring	
1.52	PX_SIP_RFC2617_USERNAME_T	The name of terminating user in the specified realm.	charstring	
1.53	PX_SIP_RFC2617_PASSWD_T	A known shared secret, the password of terminating user of the specified username.	charstring	
1.54	PX_SIP_RFC2617_URI_T	URI for HTTP authentication (terminating user).	charstring	
1.55	PX_SIP_RFC2617_USERNAME_T3	The name of 3rd user in the specified realm.	charstring	
1.56	PX_SIP_RFC2617_PASSWD_T3	A known shared secret, the password of 3rd user of the specified username.	charstring	
1.57	PX_SIP_RFC2617_URI_T3	URI for HTTP authentication (3rd user).	charstring	
SIP Timers				
1.58	PX_SIP_T1	T1 RTT estimate.	float	
1.59	PX_T2	T2 Maximum retransmit interval for non-INVITE requests and INVITE response.	float	
1.60	PX_T4	4 Maximum duration a message will remain in the network.	float	
1.61	PX_SIP_TWAIT	TWait default value for waiting an operator action.	float	
1.62	PX_SIP_TACK	TAck default value for waiting an acknowledgement.	float	
1.63	PX_SIP_TRESP	TResp default value for waiting for a response from the IUT.	float	
1.64	PX_SIP_TNOACT	TNoAct default value for waiting no message from the IUT.	float	
1.65	PX_SIP_TSYN	TSYNC default value to synchronize ptc.	float	
1.66	PX_SIP_TGUARD	TGUARD default value for an extra long timer to limit test execution.	float	
1.67	PX_TRespRetention	TRespRetention minimum time that a Proxy will wait before sending a final response.	float	
Test Case variant management				
1.68	PX_TC_VA	Testcase variant according to table entry in table to test purpose description, if present.	integer	
1.69	PX_TC_HistoryInfoUsage	testcase variant on the use of the HistoryInfo-header field.	boolean	
1.70	PX_TC_VA_NO180	testcase variant that do not use of 180 response for user-C (SSS-tests).	boolean	
1.71	PX_TC_VA_NO181	testcase variant that do not expect of 181 response for SUT (SSS-tests).	boolean	
1.72	PX_VA_IS___XX_U14	Value to choose SIP message from table below IS___XX_U14. 1 = 415 Unsupported Media type 2 = 420 Bad Extension 3 = 421 Extension Required.	integer	

Item	Module Parameter	Description	Type	Value
1.73	PX_VA_IS___XX_U14_CV_SIP	Cause value for SIP message sent in IS___XX_U14.	integer	
1.74	PX_VA_IS___XX_U14_CV_ISDN	Cause value for ISDN RELEASE message received in IS___XX_U14.	integer	
1.75	PX_VA_IS___XX_U15	Value to choose SIP message from table below IS___XX_U15. 1 = 415 Unsupported Media type 2 = 420 Bad Extension 3 = 421 Extension Required.	integer	
1.76	PX_VA_SIP_IS___XXSSCOLP01_MSG	Value to choose SIP message from table below IS___XXSSCOLP01. 1 = 180 Ringing 2 = 183 Session Progress.	integer	
1.77	PX_VA_SIP_IS___XXSSCOLP02_MSG	Value to choose SIP message from table below IS___XXSSCOLP02. 1 = 180 Ringing 2 = 183 Session Progress.	integer	
1.78	PX_VA_SIP_IS___XXSSCOLP03_MSG	Value to choose SIP message from table below IS___XXSSCOLP03. 1 = 180 Ringing 2 = 183 Session Progress.	integer	
1.78	PX_VA_SIP_IS___XXSSCOLP04_MSG	Value to choose SIP message from table below IS___XXSSCOLP04. 1 = 180 Ringing 2 = 183 Session Progress.	integer	
1.79	PX_VA_SIP_IS___XXSSCOLP07_PRIV	Value to choose SIP Privacy header to be sent from table below IS___XXSSCOLP07. 1 = Id 2 = User 3 = Header.	integer	
1.80	PX_VA_SIP_IS___XXSSCOLP08_MSG	Value to choose SIP message from table below IS___XXSSCOLP08. 1 = 180 Ringing 2 = 183 Session Progress.	integer	
1.81	PX_VA_SIP_IS___XXSSCOLP09_MSG	Value to choose SIP message from table below IS___XXSSCOLP09. 1 = 180 Ringing 2 = 183 Session Progress.	integer	
1.82	PX_VA_SIP_IS___XXSSCOLP10_MSG	Value to choose SIP message from table below IS___XXSSCOLP10. 1 = 180 Ringing 2 = 183 Session Progress.	integer	
1.83	PX_VA_SIP_IS___XXSSCOLP11_MSG	Value to choose SIP message from table below IS___XXSSCOLP11. 1 = 180 Ringing 2 = 183 Session Progress.	integer	
1.84	PX_VA_SIP_IS___XXSSCOLP14_PRIV	Value to choose SIP Privacy header to be sent from table below IS___XXSSCOLP14. 1 = Id 2 = User 3 = Header.	integer	

Item	Module Parameter	Description	Type	Value
1.85	PX_VA_SIP_IS___XXSSCOLP16_PRIV	Value to choose SIP Privacy header to be sent from table below IS___XXSSCOLP16. 1 = Id 2 = User 3 = Header.	integer	
1.86	PX_VA_SIP_IS___XXSSCOLP17_MSG	Value to choose SIP message from table below IS___XXSSCOLP17. 1 = 180 Ringing 2 = 183 Session Progress.	integer	
1.87	PX_VA_SIP_IS___XXSSCOLP19_MSG	Value to choose SIP message from table below IS___XXSSCOLP19. 1 = 180 Ringing 2 = 183 Session Progress.	integer	
1.88	PX_VA_SIP_SS___XX__01_SDP	Value to choose SDP parameters to be sent from table below SS___XX__04 for use in SS___XX__01.	integer	
1.89	PX_VA_SIP_SS___XX__01_CODEC	Value to choose codec to be sent from table below SS___XX__04 for use in SS___XX__01.	integer	
1.90	PX_VA_SIP_SS___XX__02_SDP	Value to choose SDP parameters to be sent from table below SS___XX__04 for use in SS___XX__02.	integer	
1.91	PX_VA_SIP_SS___XX__02_CODEC	Value to choose codec to be sent from table below SS___XX__04 for use in SS___XX__02.	integer	
1.92	PX_VA_SIP_SS___XX__03_SDP	Value to choose SDP parameters to be sent from table below SS___XX__04 for use in SS___XX__03.	integer	
1.93	PX_VA_SIP_SS___XX__03_CODEC	Value to choose codec to be sent from table below SS___XX__04 for use in SS___XX__03.	integer	
1.94	PX_VA_SIP_SS___XX__04_SDP	Value to choose SDP parameters to be sent from table below SS___XX__04 for use in SS___XX__04.	integer	
1.95	PX_VA_SIP_SS___XX__04_CODEC	Value to choose codec to be sent from table below SS___XX__04 for use in SS___XX__04.	integer	
1.96	PX_SIP_CallClearingMsg	Value to choose call clearing message to be sent from table below SI___XX__U10. Valid choices are: 404, 500, 410, 484.	integer	
1.97	PX_SIP_phonecontext	SIP URL should include phone-context (compare SIP parameter value).	boolean	

A.2.2 ISDN-related PIXIT

Tables A.2 to A.5 list the ISDN-related PIXIT items associated with the ATS. Each PIXIT item corresponds to a Module Parameter of the ATS. Default values are not provided.

Table A.2: General SS/SUT-related ISDN PIXIT items

Item	IModule Parameter	Description	Type	Value
2.1	PX_Isdn_Basic1	Select whether basic or primary rate access applies on the ISDN side for the first ISDN access. True = Basic access False = Primary Rate Access	boolean	
2.2	PX_Isdn_PtP1	Select whether point-to-point or point-to-multipoint configuration applies on the ISDN side for the first ISDN access. True = point-to-point False = point-to-multipoint	boolean	
2.3	PX_Isdn_Basic2	Select whether basic or primary rate access applies on the ISDN side for the second ISDN access. True = Basic access False = Primary Rate Access	boolean	
2.4	PX_Isdn_PtP2	Select whether point-to-point or point-to-multipoint configuration applies on the ISDN side for the second ISDN access. True = point-to-point False = point-to-multipoint	boolean	
2.5	PX_Isdn_L2Init	Select whether the data link has to be released and re-established at the start of each test on the ISDN side. True = Data link reset afor each test False = Keep data link established	boolean	
2.6	PX_Isdn_WaitRestart	Select whether the IUT sends RESTART messages after re-establishment of the multiple frame operation. True = Wait for RESTART False = Do not wait for RESTART	boolean	

Table A.3: Timer-related ISDN PIXIT items

Item	IModule Parameter	Description	Type	Value
3.1	PX_Isdn_TAC	Time to control the reception of a message.	float	
3.2	PX_Isdn_TNOAC	Time to control that IUT sends nothing.	float	
3.3	PX_Isdn_TWAIT	Time to control that IUT reacts prior to Upper Tester action.	float	
3.4	PX_Isdn_TSYNC	Time to control synchronization.	float	
3.5	PX_TDelay	Time to delay messages before sending.	float	
3.6	PX_Isdn_WaitRestart_Duration	Time to wait for RESTART messages after L2 re-establishment.	float	
3.7	PX_Isdn_T301	Maximum time for ISDN protocol timer T301, T301 is started on receipt of ALERTING and stopped on receipt of CONNECT.	float	
3.8	PX_Isdn_T304	Maximum time for ISDN protocol timer T304, T304 is started on sending of SETUP ACKNOWLEDGE and stopped on receipt of INFORMATION.	float	
3.9	PX_Isdn_T307	Maximum time for ISDN protocol timer T307, T307 is started on sending of SUSPEND ACKNOWLEDGE and stopped on receipt of RESUME.	float	
3.10	PX_Isdn_T_CFNR	Maximum time for ISDN protocol timer T_CFNR, T_CFNR is started on receipt of ALERTING, if CFNR is activated and stopped on receipt of CONNECT.	float	

Table A.4: Operator-check-related ISDN PIXIT items

Item	IModule Parameter	Description	Type	Value
4.1	PX_Isdn_CheckConversation	True if conversation check is implemented and used. Otherwise false (see note 1).	boolean	
4.2	PX_Isdn_CheckRinging	True if ringing check is implemented and used. Otherwise false (see note 2).	boolean	
4.3	PX_Isdn_CheckDTMF	True if DTMF tone check is implemented and used. Otherwise false (see note 3).		

NOTE 1: If true, test execution will stop at positions where the TP indicates "conversation" until the operator enters the check result.
NOTE 2: If true, test execution will stop at positions where the TP indicates "ringing" until the operator enters the check result.
NOTE 3: If true, test execution will stop at positions where the TP indicates "DTMF" until the operator enters the check result.

Table A.5: ISDN PIXIT items associated with message fields

Item	Module Parameter	Description	Type	Value
Called Party Number				
5.1.1	PX_Isdn_CDPN_numberingPlanIdentificationDefault	Default value of the numbering plan field of the called party number information.	bitstring(4)	
5.1.2	PX_Isdn_CDPN_TypeOfNumber_SIP_Access	Default value of the type of number field of the called party number information to call a (first) SIP access.	bitstring(3)	
5.1.3	PX_Isdn_CDPN_SIP_Access	Default value of the digits field of the called party number information to call a (first) SIP access.	charstring	
5.1.4	PX_Isdn_CDPN_DigitsFirstPortion	Value of the digits field of an incomplete called party number information. The number digits do not allow routing to the SIP side.	charstring	
5.1.5	PX_Isdn_CDPN_DigitsSecondPortion	Value of the digits field of a called party number information complementing the number given in PX_Isdn_CDPN_DigitsFirstPortion.	charstring	
5.1.6	PX_Isdn_CDPN_TypeOfNumber_1stISDN_Access	Default value of the type of number field of the called party number information to call the first ISDN access.	bitstring(3)	
5.1.7	PX_Isdn_CDPN_1stISDN_Access	Default value of the digits field of the called party number information to call the first ISDN access.	charstring	
5.1.8	PX_Isdn_CDPN_TypeOfNumber_2ndISDN_Access	Default value of the type of number field of the called party number information to call the second ISDN access.	bitstring(3)	
5.1.9	PX_Isdn_CDPN_2ndISDN_Access	Default value of the digits field of the called party number information to call the second ISDN access.	charstring	
5.1.10	PX_Isdn_CDPN_TypeOfNumber_3rdISDN_Access	Default value of the type of number field of the called party number information to call the third ISDN access.	bitstring(3)	
5.1.11	PX_Isdn_CDPN_3rdISDN_Access	Default value of the digits field of the called party number information to call the third ISDN access.	charstring	
5.1.12	PX_Isdn_CDPN_TypeOfNumber_2ndSIP_Access	Default value of the type of number field of the called party number information to call a second SIP access.	bitstring(3)	
5.1.13	PX_Isdn_CDPN_2ndSIP_Access	Default value of the digits field of the called party number information to call a (second) SIP access.	charstring	
Calling Party Number and Subaddress				
5.2.1	PX_Isdn_CGPN_numberingPlanIdentificationDefault	Default value of the numbering plan field of the calling party number information.	bitstring(4)	
5.2.2	PX_Isdn_CGPN_TypeOfNumberDefault	Default value of the type of number field of the calling party number information.	bitstring(3)	
5.2.3	PX_Isdn_CGPN_DigitsDefault	Default value of the digits field of the calling party number information.	charstring	
5.2.4	PX_Isdn_CGPS_DigitsDefault	Default value of the digits field of the calling party subaddress information.	charstring	
5.2.5	PX_Isdn_CGPS_TypeDefault	Default value of the type of subaddress field of the calling party subaddress information.	bitstring(3)	

Item	Module Parameter	Description	Type	Value
Connected number				
5.3.1	PX_Isdn_CODN_numberingPlanIdentificationDefault	Default value of the numbering plan field of the connected number information.	bitstring(4)	
5.3.2	PX_Isdn_CODN_TypeOfNumberDefault	Default value of the type of number field of the connected number information.	bitstring(3)	
5.3.3	PX_Isdn_CODN_DigitsDefault	Default value of the digits field of the connected number information.	charstring	
Bearer Capability				
5.4.1	PX_Isdn_BCAP_TransferCapability_tx	Default value of the transfer capability of the bearer capability information (to be sent when the TP does not specify a specific value for that field).	bitstring(5)	
5.4.2	PX_Isdn_BCAP_TransferCapability_rx	Default value of the transfer capability of the bearer capability information (to be received when the TP does not specify a specific value for that field).	bitstring(5)	

A.2.3 General PIXIT

The PIXIT of table A.6 are general timer items that control the synchronization between the SIP and the ISDN test components. Each PIXIT item corresponds to a Module Parameter of the ATS.

Table A.6: General PIXIT items

Item	IModule Parameter	Description	Type	Value
6.10	PX_TSYNC_TIME_LIMIT	Default time limit for a sync client to reach a synchronization point.	float	
6.11	PX_TSHUT_DOWN_TIME_LIMIT	Default time limit for a sync client to finish its execution of the shutdown default.	float	

Annex B (informative): TTCN-3 library modules

B.1 Electronic annex, zip file with TTCN-3 code

The TTCN-3 library modules are contained in ts_06012_2_v_1.01.zip (contained in archive ts_18600102v010101p0.zip) which accompanies the present document.

History

Document history		
V1.1.1	July 2008	Publication