# ETSI TS 186 006-3 V1.1.1 (2008-09)

Technical Specification

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR); Part 3: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification
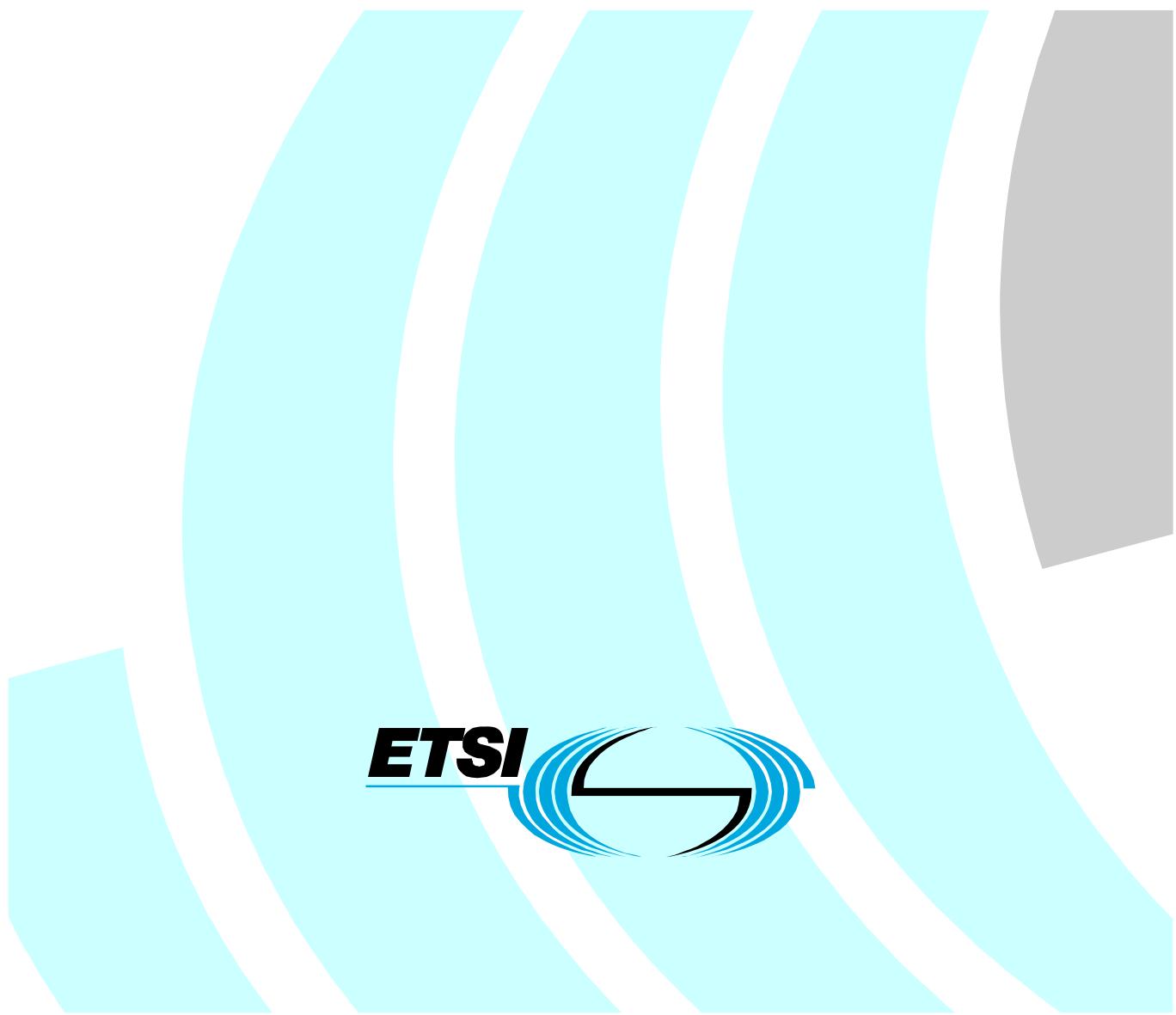
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Reference

DTS/TISPAN-06020-3-NGN-R1

Keywords

ATS, SIP, ISUP, testing, TTCN, PIXIT, OIP, OIR

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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 3 of a multi-part deliverable covering the Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR), 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 186 006-2 [3].

The TSS&TP have been developed to test the Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR) NGN Basic Service service.

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.

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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 183 007: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services; Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR); Protocol specification".

[2]   ETSI TS 186 006-1: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR); Part 1: Protocol Implementation Conformance Statement (PICS)".

[3]   ETSI TS 186 006-2: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR) 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 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]".

[12]   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]".

[13]   ISO/IEC 9646-1 (1992): "Information Technology - Open Systems Interconnection - Conformance Testing Methodology and Framework - Part 1: General concepts".

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

[15]   ISO/IEC 9646-3 (1992): "Information Technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 3: The Tree and Tabular Combined Notation".

[16]   Void.

[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 (1994): "Information Technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statement".

[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 (2000): "Specifications of Signalling System No.7 ISDN User Part (ISUP); functional description".

[23]   ITU-T Recommendation Q.762 (2000): "Specifications of Signalling System No.7 ISDN User Part (ISUP); general functions of messages and signals".

[24]   ITU-T Recommendation Q.763 (2000): "Specifications of Signalling System No.7 ISDN User Part (ISUP); formats and codes".

[25]   ITU-T Recommendation Q.764 (2000): "Specifications of Signalling System No.7 ISDN User Part (ISUP); 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.9: "Vocabulary of switching and signalling terms".

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

[30]   IETF RFC 2327 (1998): "SDP: Session Description Protocol".

[31]   IETF RFC 3325: "Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks".

[32]   IETF RFC 3966: "The tel URI for Telephone Numbers".

[33]   IETF RFC 2396: "Uniform Resource Identifiers (URI): Generic Syntax".

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

[35]   IETF RFC 2806 (2000): "URLs for Telephone Calls".

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

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

[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".

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

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], [23], [24] and [25]), ISO/IEC 9646-1 [13], ISO/IEC 9646-7 [18] and ES 201 873-1 [8] (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

address identity: See Recommendation E.164 [21] and/or RFC 2806 [35].

call: See ITU-T Recommendation Q.9 [28], 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 2806 [35]/RFC 2396 [33]/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 (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

supplementary service: a 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 following 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
EDS   Encoding/Decoding System
ETS   Executable Test Suite
FCI   Forward Call Indicators
OIP   Originating Identification Presentation
OIR   Originating Identification Restriction
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 (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	TTCN-3 Executable
TISPAN	ETSI Technical Committee 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 186 006-2 [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.
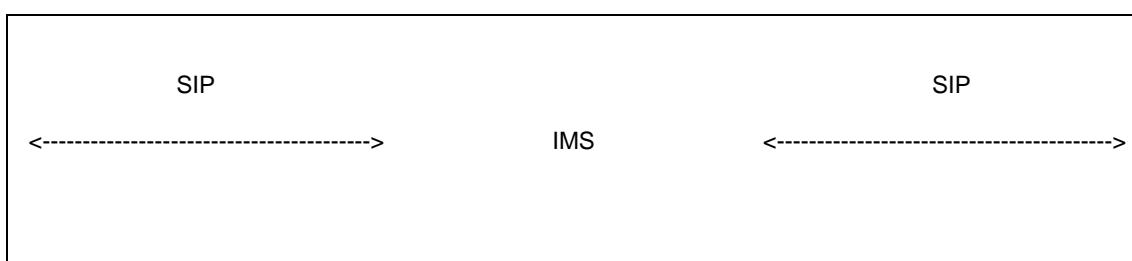
Figure 1: Interworking between two SIP UEs

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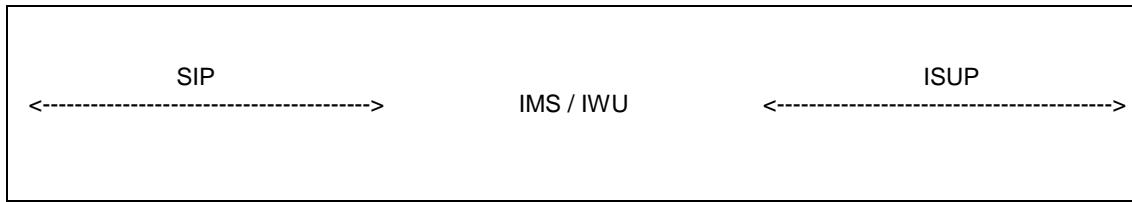
Figure 2: Interworking between SIP and ISUP

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.
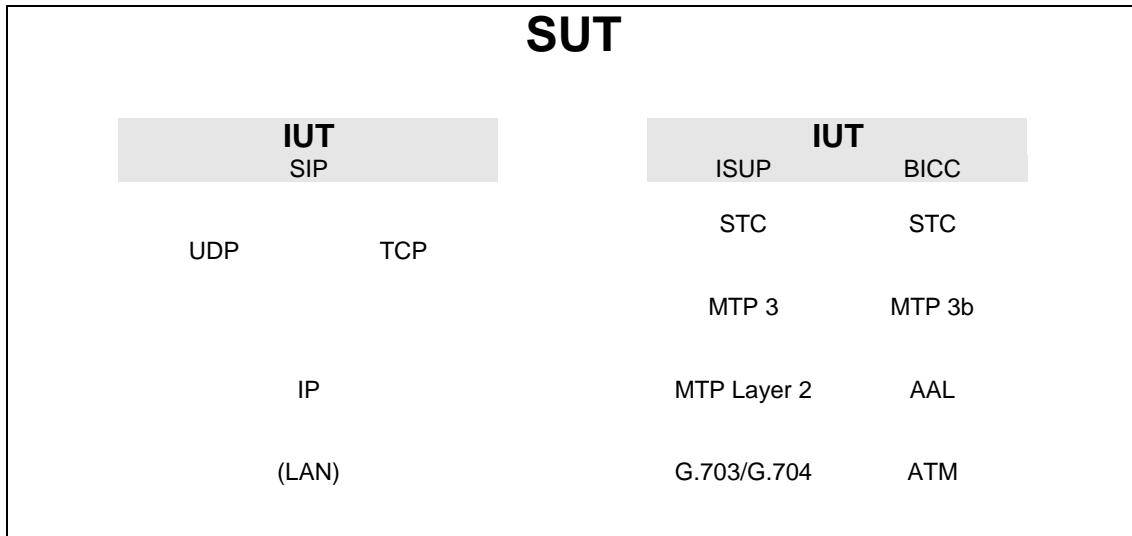
Figure 3: Protocol architecture of the SIP and ISUP interfaces

4.3 Test architecture

4.3.1 Interconnection of TS and SUT

Figure 4 shows the interconnection of TS and SUT in terms of signalling message flows.
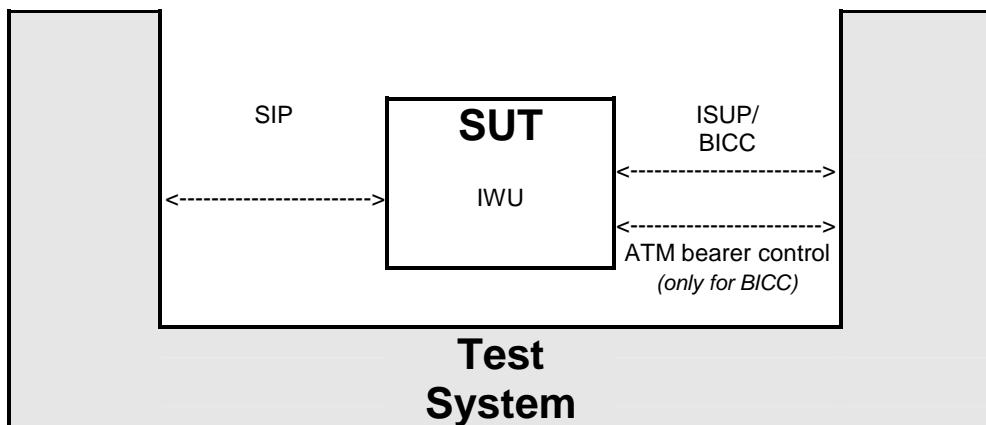
Figure 4: Interconnection of TS and SUT

4.3.2 Test system architecture

4.3.2.1 General

Test systems that implement this ATS shall conform to the requirements as defined in this clause.

4.3.2.2 Structure

An abstract architecture for a test system (TS) implementing a TTCN-3 ATS is displayed in figure 5 and also stated in ES 201 873-5 [9].
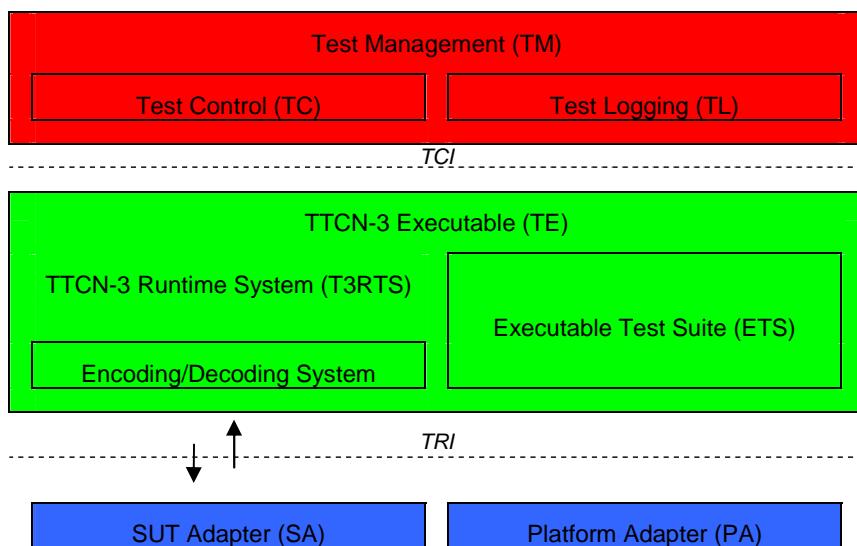
Figure 5: Abstract Test System Architecture

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 ES 201 873-5 [9], whereas the specification and implementation of the TCI is in ES 201 873-6 [10].

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 TS 102 027-3 [6].

The part of SA used for ISUP/BICC message transfer shall implement the *TRI* adaptation as well as the ISUP/BICC transport protocol architecture described in clause 4.2. For BICC, in addition, the ATM bearer control shall be implemented.

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

4.3.2.3 Interaction between TTCN-3 Executable (TE) and SUT Adapter (SA)

4.3.2.3.1 Control of the SUT Adapter (SA) by using ASPs

Table 1 lists the ASPs used in the SIP-ISUP-Interworking ATS. Detailed descriptions of the ASPs together with their parameters follow.

Table 1: List of ASPs

ASP Name	Short description
InitializeIsupBicc_req	Initialize ISUP/BICC part of the test system.
InitializeIsupBicc_cnf	Answer whether all necessary ISUP/BICC test system initializations have been successfully performed.
ISUP_BICC_MSG_req	Used to send an ISUP/BICC message.
ISUP_BICC_MSG_ind	Used to receive an ISUP/BICC message.
s_IsupBicc_conversation	Check that conversation is possible on the bearer.
s_IsupBicc_ringing	Check that ringing occurs.

Tables 2 to 13 contain the descriptions of the ASPs used in the present document, including the ASP parameters (if any) and the types of values these may assume. No ASP parameter is optional.

Table 2: ISUP_BICC_MSG_req ASP structure

ASP Name:	ISUP_BICC_MSG_req	
Port:	sysPort	
Direction:	TE->SA	
Description:	ASP used to send an ISUP/BICC message.	
Parameter	**Type**	**Description**
isupBiccSelection	SelectIsupOrBicc	Selector used to distinguish between ISUP and BICC testing. '00000000'B means 'ISUP' and any other value means BICC.
serviceIndicatorOctet	ServiceIndicatorOctet	The contents of this ASP parameter is evaluated in SA only if ISUP has been selected in 'isupBiccSelection'.
routingLabel	RoutingLabel	The contents of this ASP parameter is evaluated in SA only if ISUP has been selected in 'isupBiccSelection'.
circuitIdentityCode	CircuitIdentityCode	The contents of this ASP parameter is evaluated in SA only if ISUP has been selected in 'isupBiccSelection'.
callInstanceCode	CallInstanceCode	The contents of this ASP parameter is evaluated in SA only if BICC has been selected in 'isupBiccSelection'.
iSUP_BICC_MSG	ISUP_BICC_MSG	ISUP_BICC_MSG is a union over all ISUP/BICC message body types, where a message body starts with the 'message type' field. This body is common for ISUP and BICC messages. When using this ASP, a particular message(body) template is selected from the union for transmission.
Comments:		
The SA takes from the ASP, depending on the value of parameter 'isupBiccSelection', either the ordered combination of 'serviceIndicatorOctet', 'routingLabel' and 'circuitIdentityCode' (ISUP), or 'callInstanceCode' (BICC), puts it in front of encoded parameter 'iSUP_BICC_MSG', and sends the so constructed message at the ISUP or BICC interface respectively.		

Table 3: ISUP_BICC_MSG_ind ASP structure

ASP Name:	ISUP_BICC_MSG_ind	
Port:	sysPort	
Direction:	SA->TE	
Description:	ASP used to receive an ISUP/BICC message.	
Parameter	**Type**	**Description**
isupBiccSelection	SelectIsupOrBicc	Selector used to distinguish between ISUP and BICC testing. '00000000'B means 'ISUP' and any other value means BICC.
serviceIndicatorOctet	ServiceIndicatorOctet	The contents of this ASP parameter is evaluated in TE only if ISUP has been selected in 'isupBiccSelection'.
routingLabel	RoutingLabel	The contents of this ASP parameter is evaluated in TE only if ISUP has been selected in 'isupBiccSelection'.
circuitIdentityCode	CircuitIdentityCode	The contents of this ASP parameter is evaluated in TE only if ISUP has been selected in 'isupBiccSelection'.
callInstanceCode	CallInstanceCode	The contents of this ASP parameter is evaluated in TE only if BICC has been selected in 'isupBiccSelection'.
iSUP_BICC_MSG	ISUP_BICC_MSG	ISUP_BICC_MSG is a union over all ISUP/BICC message body types, where a message body starts with the 'message type' field. This body is common for ISUP and BICC messages. When using this ASP, a particular message(body) template is selected from the union for receive matching.
Comments:		
The SA takes from the received message, depending on the value of parameter 'isupBiccSelection', either the ordered combination of 'serviceIndicatorOctet', 'routingLabel' and 'circuitIdentityCode' (ISUP), or 'callInstanceCode' (BICC), and puts it into the associated ASP parameters. The complementary ASP parameters 'callInstanceCode' (ISUP) and combination of 'serviceIndicatorOctet', 'routingLabel' and 'circuitIdentityCode' (BICC) are filled by the SA with '0'-bits according to the lengths of their types. The TE does not evaluate the contents of the complementary parameters (but needs the correct lengths to identify the start of 'iSUP_BICC_MSG'. The received message (body) is put by the SA into parameter 'iSUP_BICC_MSG' and is matched in the ATS with an according receive template.		

Table 4: InitializeIsupBicc_req ASP structure

ASP Name:	InitializeIsupBicc_req	
Port:	IsupBiccPort	
Direction:	TE->SA	
Description:	Initialize ISUP/BICC part of the test system.	
Parameter	**Type**	**Description**
isupBiccSelection	SelectIsupOrBicc	Selector used to distinguish between ISUP and BICC testing. '00000000'B means 'ISUP' and any other value means BICC.
ts_pointCode	Bit14	Signalling point code of the TS (ISUP).
sut_pointCode	Bit14	Signalling point code of the SUT (ISUP).
ts_address_sip	octetstring	Address (e.g. IP) of the TS (SIP side). The use of this address is to enable the TS to communicate with the SUT at the SIP side to establish and maintain the lower layer connections.
ts_address_isup_bicc	octetstring	Address (e.g. IP) of the TS (ISUP/BICC side). The use of this address is to enable the TS to communicate with the SUT at the ISUP/BICC side to establish and maintain the lower layer connections.
sut_address_isup_bicc	octetstring	Address (e.g. IP) of the SUT (ISUP/BICC side). The use of this address is to enable the TS to communicate with the SUT at the ISUP/BICC side to establish and maintain the lower layer connections.

Comments:
This ASP is used at the beginning of each test case to initiate the necessary initialization of the test system, particularly the interfaces to the SUT.
If parameter isupBiccSelection indicates bicc, the values of parameters 'ts_pointCode' and 'sut_pointCode' shall be ignored by the SA.
If parameter isupBiccSelection indicates 'isup', the values of parameters 'ts_address_isup_bicc' and 'sut_address_isup_bicc' may be ignored, if they are not necessary.
Among the initializing actions there shall be:
    a) Verification that the ISUP/BICC link is operable between SUT and TS.
    b) Verification that the TS is ready to send and receive SIP messages.
NOTE: It is a matter of TS implementation whether the TS, upon this request, sets up and initializes lower layer connections, if these are not setup.
Other initialization actions may be TS-specific.

Table 5: InitializeIsupBicc_cnf ASP STRUCTURE

ASP Name:	InitializeIsupBicc_cnf	
Port:	sysPort	
Direction:	LT->TTCN	
Description:	Answer whether all necessary ISUP/BICC test system initializations have been successfully performed. The result can be positive or negative. The result will be positive only if the TS is able to send and receive messages at the ISUP/BICC-interface of the SUT.	
Parameter	**Type**	**Description**
result	boolean	Indicating success or non-success of the whole initialization.
Comments:		

Table 6: BearerSetup_req ASP structure

ASP Name:	BearerSetup_req	
Port:	IsupBiccPort	
Direction:	TE->SA	
Description:	For BICC: request TS to setup the bearer connection between TS and SUT.	
Parameter	**Type**	**Description**
cic	CallInstanceCode	Call Instance Code identifying the bearer connection.
Comments:		

Table 7: BearerSetup_acc ASP structure

ASP Name:	BearerSetup_acc	
Port:	IsupBiccPort	
Direction:	SA->TE	
Description:	For BICC: answer to BearerSetup_req.	
	The answer can be positive (bearer connection setup successful) or negative (bearer connection setup failed).	
Parameter	**Type**	**Description**
cic	CallInstanceCode	Call Instance Code identifying the bearer connection.
result	boolean	The answer is positive when the bearer connection setup was successful and negative when the bearer connection setup failed.
Comments:		

Table 8: BearerSetup_ind ASP structure

ASP Name:	BearerSetup_ind	
Port:	IsupBiccPort	
Direction:	SA->TE	
Description:	For BICC: indication that the bearer has been setup.	
Parameter	**Type**	**Description**
cic	CallInstanceCode	Call Instance Code identifying the bearer connection.
Comments:		

Table 9: BearerRelease_req ASP structure

ASP Name:	BearerRelease_req	
Port:	bcPort	
Direction:	TE->SA	
Description:	For BICC: request to release the established bearer connection	
Parameter	**Type**	**Description**
cic	CallInstanceCode	Call Instance Code identifying the bearer connection.
Comments:		

Table 10: BearerRelease_cnf ASP structure

ASP Name:	BearerRelease_cnf	
Port:	bcPort	
Direction:	SA->TE	
Description:	For BICC: confirmation that the requested bearer is released.	
Parameter	**Type**	**Description**
cic	CallInstanceCode	Call Instance Code identifying the bearer connection.
result	boolean	Indication of whether the bearer is successfully released.
Comments:		
At release collision the result is still 'true'.		

Table 11: BearerRelease_ind ASP structure

ASP Name:	BearerRelease_ind	
Port:	bcPort	
Direction:	SA->TE	
Description:	For BICC: indication that the bearer has been released (when no BearerRelease_req has been issued before).	
Parameter	Type	Description
cic	CallInstanceCode	Call Instance Code identifying the bearer connection.
Comments:		

Table 12: s_IsupBicc_conversation ASP structure

ASP Name:	s_IsupBicc_conversation	
Port:	operatorPort_IsupBicc	
Direction:	SA-<>TE	
Description:	Check that conversation is possible on the through-connected bearer.	
Parameter	Type	Description
text	charstring	Request operator to check the conversation.
answer	boolean	Check result entered by the operator.
Comments:		
This ASP has been implemented as a signature. "text" is an "input" parameter and "answer" is an output parameter.		

Table 13: s_IsupBicc_ringing ASP structure

ASP Name:	s_IsupBicc_ringing	
Port:	operatorPort_IsupBicc	
Direction:	SA-<>TE	
Description:	Check that ringing occurs on the through-connected bearer.	
Parameter	Type	Description
text	charstring	Request operator to check the ringing.
answer	boolean	Check result entered by the operator.
Comments:		
This ASP has been implemented as a signature. "text" is an "input" parameter and "answer" is an output parameter.		

4.3.2.3.2   Sending and receiving SIP and ISUP/BICC messages

4.3.2.3.2.1   General

Before starting a test case, the SA shall be prepared to provide the transport of SIP and ISUP/BICC messages by establishing appropriate connections on the lower layers (see figure 3).

4.3.2.3.2.2   Encoding/Decoding System requirements

4.3.2.3.2.2.1   Encoding/Decoding System requirements for SIP

The Encoding/Decoding System (EDS) entity, as far as applied to SIP messages, shall comply with the conventions defined in clause 6.1 of TS 102 027-3 [6].

4.3.2.3.2.2.2   Encoding/Decoding System requirements for ISUP/BICC

4.3.2.3.2.2.2.1   General

ISUP/BICC messages are sent and received in the test suite by embedding them in ASPs ISUP_BICC_MSG_req and ISUP_BICC_MSG_ind respectively.

The ASPs contain all information to route the ISUP/BICC messages to/from the SUT.

ISUP messages and parameters are structured by using tables (see ITU-T Recommendation Q.763 [24]).

NOTE 1:   The term 'parameter' is used as defined in the ISUP protocol context. It corresponds e.g. to the term 'Information Element' in other protocols.

All structure elements are bitstrings, hexstrings or octetstrings.

For ISUP message/parameter elements a specific way is defined to extend bitstring or hexstring elements over octet boundaries. This is known as 'LowToHigh encoding', as shown in the following example:

EXAMPLE 1:

Coding of element 'Circuit Identity Code' (CIC), consisting of 12 bits.

Octet #	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
Octet 1	CIC (LSB)							
Octet 2	spare				CIC (MSB)			

Figure 6: Bit field structure of the 'CIC' parameter

The 8 least significant bits of the CIC value fill octet 1 (the least significant bit of CIC is assigned to bit 1 of octet 1), and the 4 most significant bits of the CIC value fill the lower 4 bits of octet 2.

NOTE 2:   When a bitstring (hexstring) is presented as a sequence of bits (semi-octets) from left to right, the leftmost bit (semi-octet) is the most significant and the rightmost bit (semi-octet) is the least significant.

EXAMPLE 2:

Address digits

Several ISUP parameters have an element 'Address digits', where the individual digits are BCD-encoded (e.g. digit '0' is encoded as '0000'B, digit '9' is encoded as '1001'B).

When an address string is given as a sequence of ASCII digits, as a user would type them in, e.g. "0123456789", the encoded value is as shown on figure 7.

Octet #	Bits 8 7 6 5	Bits 4 3 2 1
Octet 1	0001	0000
Octet 2	0011	0010
Octet 3	0101	0100
Octet 4	0111	0110
Octet 5	1001	1000

Figure 7: Hex (BCD) field structure of an 'address digits' element

This also corresponds to a 'LowToHigh' encoding. In this particular case however, for the sake of ATS user convenience, a conversion function is used in the ATS in the following way:

- All module parameters containing address digits have type 'charstring' (resp. IA5String), which means that the user enters digits as ASCII characters '1', '2' and so on.

- Inside the address parameter templates the conversion function converts the ASCII string into a BCD-coded octetstring, taking also care of:

  - 'sending complete' digit (only applicable to the Called Party Number);

  - filler (final semi-octet, if the number of coded digits is odd).

The encoding of octetstrings however is not LowToHigh, as shown in the following example:

EXAMPLE 3:

octetstring value

The octetstring value '01234ABCDE'O is encoded as shown on figure 8.

Octet #	Bits 8 7 6 5	Bits 4 3 2 1
Octet 1	0000	0001
Octet 2	0010	0011
Octet 3	0100	1010
Octet 4	1011	1100
Octet 5	1101	1110

Figure 8: Octetstring field encoding

4.3.2.3.2.2.2.2   Decoding of parameters containing strings of variable length

Typical fields addressed here are e.g. the 'address digits' field in the 'Called Party Number' parameter, or the 'diagnostics' field in the 'Cause Indicators' parameter.

The above mentioned strings of variable length are the last elements of the related parameter, which has a preceding length field. A 'real' decoder deduces the length (and thereby the value) of such fields from the value of the 'length' field of the parameter and the position of the decoder where the field starts.

The decoder of the test system shall also be able to decode such fields when the value of the template is '?' or '*'.

In order to support this encoding the relevant types have a trailing "with { encode ..." statement, like in the following example (Called Party Number):

EXAMPLE 4:

```
 ....
with { encode (paramLen) "tag=""CDN_paramLen"";";
     encode (addressSignals) "length=valueOf(getTag(""CDN_paramLen"")).toInt()-2;"; }
```

4.3.2.3.2.2.2.3   Decoding of parameters containing extension bits

Some parameters transport IEs from the DSS1 protocol [41], such as the Bearer Capability IE:

IEs of this kind contain extension bits specifying the presence of succeeding octets.

The decoder shall be able to evaluate the extension bits to deduce the presence of optional octets in case wildcards '?' or '*' are specified in templates of such IEs.

4.3.2.3.2.2.2.4   Receipt of unknown ISUP/BICC messages

Unknown messages in this context are messages not defined in the dated version of [24] referred to in the present document.

Unknown messages shall not be passed to TE by the test system.

4.3.2.3.2.2.2.5   Receipt of unknown ISUP/BICC parameters

Unknown parameters in this context are parameters not defined in the dated version of ITU-T Recommendation Q.763 [24] referred to in the present document, or defined parameters not being assigned in ITU-T Recommendation Q.763 [24] to the particular received message carrying this parameter.

Unknown parameters shall not be passed to TE by the test system (i.e. they shall be removed from the carrying known message before passing this message to TE).

4.3.2.3.2.2.2.6   Ordering of optional ISUP/BICC parameters and multiple occurrence of parameters

According to ITU-T Recommendation Q.763 [24] optional parameters may occur in any order in a message, and some (few) parameters may occur more than once.

For the controlled test environment specified in this ATS the following assumption has been made:

Parameters that may occur more than once appear at most two times in a message.

For each message that may contain optional parameters the list of parameters has been specified in the ATS as a **set**.

The decoder shall be able to decode the parameters of a received message correctly, even if they appear in an order different from the one specified in the message template (and type).

4.3.2.3.3   Logging conventions

As the ATS defines on an abstract level the message exchange between TS and SUT the messages encoded messages send and received shall be logged. The TM entity in the TS shall provide access to this log.

5   The ATS development process

5.1   Requirements and Test Purposes

For each test purpose there is a table defined in clause 6 of TS 186 006-2 [3]. The requirements applicable to this TP are given by a reference to RFC 3261 [29] (SIP) and ITU-T Recommendations Q.1912.5 [19] or EN 383 001 [5] (ISUP). There are no explicit formulations of requirements.

5.2   ATS structure

5.2.1   Test case grouping

The ATS structure defined in table 14 is based on the structuring of Test Purposes in clause 5 of TS 186 006-2 [3]. The group names in columns 1 to 3 of table 14 are those assigned in the ATS; they are based on the names provided in clause 5 of TS 186 006-2 [3], but use the naming conventions defined for the ATS (see clause 5.3.2.2).

Table 14: ATS structure

Group	Subgroup	Sub-Subgroup		Group Index
SIP to SIP	OriginatingUser	CallingUser	SyntaxReq	OIP_U01_xxx
			OrigUser	OIP_U02_xxx
			DestUser	OIP_U03_xxx
	Originating_Netw	OrigP CSCF		OIP_N01_xxx
		OrigS CSCF		OIP_N02_xxx
		AS_OrigUser		OIP_N03_xxx
		NotTrusNetw		OIP_N04_xxx
		AS_TermUser		OIP_N05_xxx
		TermS CSCF		OIP_N06_xxx
SIP to ISUP				501
ISUP to SIP				601

5.2.2   Test case identifiers

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

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

where:

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

   b)   <Group path index> is the group index in column 4 of table 14 (which uniquely identifies the path of groups/subgroups);

   d)   <TC number> is a running 3-digit decimal number, starting in each subgroup path with "001".

EXAMPLE:

OIP_U01_001:

i)   the identifier has Group index " OIP_U01 ", i.e. it is in the subgroup having complete path:
        SIPtoSIP/OriginatingUser/CallingUser/SyntaxReq;

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 TS 186 006-2 3. and
        test case names.
        The TP identifier of TC_501_001 is OI501001.

5.3   ATS specification framework

5.3.1   ATS Library

For this interworking ATS there are 2 applicable base protocols:

a)   SIP protocol (IETF RFC 3261 [29]), and

b)   ISUP protocol (ITU-T Recommendation Q.76n series [22], [23], [24], and [25], 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)   ISUP modules,

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

4)   LibCommon modules (taken from TS 102 351 [7]).

Table 15 shows the organization of the ATS as library of modules.

Table 15: 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 module parameter.
	LibCommon_VerdictControl	Basic functions for setting of test component verdicts.
CommonAts	SipSS_PICS	Module Parameter declarations associated with PICS.
	SipSS_PIXITS	SIP-ISUP common Module Parameter declarations associated with PIXIT.
	SipSS_OI_TestCases	Test case functions.
	SipSS_TestConfiguration	Functions which implement the configuration of the SUT adapter and mapping of test components for establishing and tearing down different test configurations.
	SipSS_TestExecution	Module control: execute test cases depending on selection conditions; repeat parameterized test cases based on the "Variant-tables" defined in the test prose (see note).
	SipSS_TestSystem	Common functions, components, ASPs controlling the test system.
	General_Types	Definitions are based on component type definitions from IPv6, SCOP and common synchronization libraries.
	SipSS_TestCases	Test case functions (see note).
SIPAts	OI_SIPSIP_TCFunctions	PTC root functions for SIP behaviour of test cases without ISUP behaviour (SIP-SIP configuration)
	OI_SIPISUP_SIP_TCFunctions	PTC root functions for SIP behaviour of test cases with ISUP components (SIP-ISUP configuration)
	SipSS _SIP_Types	SIP data types (messages, header fields) and parallel test component (according to TS 102 027-3 [6]).
	SipSS _SIP_Templates	Templates for SIP messages and header fields (according to RFC 3261 [29]).
	SipSS _SIP_Steps	SIP auxiliary functions.
	SipSS _SDPTypes	SIP SDP data types
ISUPAts	OI_SIPISUP_ISUP_TCFunctions	Test case functions running on the Isup/Bicc component.
	SipSS _ISUP_Constants	Constant declarations, mostly corresponding to field values of ISUP messages/parameters.
	SipSS _ISUP_ParamTypes	ISUP data types (parameter types according to ITU-T Recommendation Q.763 [24] and types required for ASPs)
	SipSS _ISUP_MsgTypes	ISUP data types (message types according to ITU-T Recommendation Q.763 [24] and ASP type declarations).
	SipSS _ISUP_ParamTemplates	Templates for ISUP message parameters.
	SipSS _ISUP_MsgTemplates	Templates for ISUP messages.
	SipSS _ISUP_Steps	Test step declarations, including preambles, postambles and default.
NOTE:	This module also addresses test case definition for additional supplementary services and is provided for common test execution to simplify test management.	

5.3.2   Use of TTCN-3

5.3.2.1   General

TTCN-3 as defined in ES 201 873-1 [8] 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 [7] 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 16 specifies the naming guidelines for each element of the TTCN-3 language indicating the recommended prefix and capitalization.

Table 16: TTCN-3 naming conventions

Language element	Naming convention	Prefix	Example	Notes
Module	Use upper-case initial letter	none	IPv6Templates	
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	
ISUP message type	Use upper-case initial letter and message name abbreviations as defined in ITU-T Recommendation Q.762 [23].	none	IAM	
ISUP parameter type	Use upper-case initial letter and parameter name abbreviations taken from ITU-T Recommendation Q.763 [24].	none	CalledPartyNumber	
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 note 5
Message template with wildcard or matching expression	None	mw_	mw_AnyUserReply	note 2 note 5
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, if present, 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 TS 102 027-3 [6] (SIP ATS).

NOTE 5: Names of ISUP messages and parameters (IEs) start with a syllable being composed of capital letters only, like IAM e.g. This is different for SIP. Naming conventions concerning the first letter of a template (after prefix 'm_' or 'mw_', may be handled differently for ISUP/BICC and SIP respectively.

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 ISUP/BICC-related PIXIT (there are no common PIXIT defined, but a set of integer values due to the possibility to select test case variants, if appropriate to the test case definition only).

NOTE: The tables in this clause have been generated automatically from the TTCN-3 modules.

A.2.1 SIP-related PIXIT

For the SIP side of the ATS the PIXIT defined in TS 102 351 [7] apply. In addition the SIP-related PIXIT of tables A.1 to A.7 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 (SDPParameter)

Index / Identifier	Type / Description
1) PX_SIP_SDP_DYN	charstring for SDP dynamic port
2) PX_SIP_SDP_B_MODIFIER	charstring for SDP bandwidth modifier
3) PX_SIP_SDP_B_BANDWIDTH	integer for SDP bandwidth value
4) PX_SIP_SDP_ENCODING	charstring for SDP media attribute encoding supported by the IUT
5) PX_SIP_SDP_TRANSPORT	charstring for SDP media attribute encoding unavailable by the IUT charstring for SDP media attribute encoding unsupported by the IUT charstring for SDP media T

Table A.2: SIP-related PIXIT items (SupportedOptions)

Index / Identifier	Type / Description
6) PX_SIP_100REL	boolean for True if 100rel mechanism is supported in SIP
7) PX_SIP_PRECONDITION	boolean for True if precondition mechanism is supported in SIP
8) PX_SIP_UDP	boolean for True if UDP Transport is used by the IUT to run campaign
9) PX_SIP_TRANSPORT	charstring for Used Transport in upper case "UDP"/"TCP"

Table A.3: SIP-related PIXIT items (Ports and addresses of IUT)

Index / Identifier	Type / Description
10)PX_SIP_IUT_PORT	integer for IUT port number to exchange SIP messages
11)PX_SIP_IUT_IPADDR	charstring for IUT IP address to exchange SIP messages
12)PX_SIP_IUT_HOME_DOMAIN	charstring for IUT domain
13)PX_SIP_IUT_HOME_DOMAIN_UNKNOWN	charstring for unknown IUT domain
14)PX_SIP_IUT_HOME_DOMAIN_DEFAULT	characterstring for IUT default domain
15)PX_SIP_IUT_USER	charstring for user identity at ISUP side
16)PX_SIP_IUT_USER_UNKNOWN	charstring for unknown user identity at ISUP side
17)PX_SIP_IUT_USER_DEFAULT	characterstring for default user identity at SIP side
18)PX_SIP_CONFFACTORY_PORT	integer for IUT port number to Conference Factory
19)PX_SIP_CONFFACTORY_IPADDR	charstring for IUT IP address to Conference Factory
20)PX_SIP_CONFFACTORY_USER	charstring for user identity (number) to Conference Factory

Table A.4: SIP-related PIXIT items (Ports and addresses of ETS)

Index / Identifier	Type / Description
21)PX_SIP_ETS_PORT	integer for port number used by the ETS to exchange SIP messages
22)PX_SIP_ETS_IPADDR	charstring for IP address used by the ETS to exchange SIP messages
23)PX_SIP_ETS_LOCAL_DOMAIN	charstring for identity of the tester local domain
24)PX_SIP_ETS_LOCAL_USER	charstring for identity of the tester local user
25)PX_SIP_ETS_LOCAL_USER_FULL	charstring for identity of the tester local user (format "+"cc+ndc+sn)
26)PX_SIP_ETS_BEARER_PORT	integer for port number used by the ETS to exchange media streams
27)PX_SIP_ETS_BEARER_IPADDR	charstring for IP address used by the ETS to exchange media streams
28)PX_SIP_ETS2_PORT	integer for port number used by the ETS2 to exchange SIP messages
29)PX_SIP_ETS2_IPADDR	charstring for IP address used by the ETS2 to exchange SIP messages
30)PX_SIP_ETS2_LOCAL_DOMAIN	charstring for identity of the tester local domain
31)PX_SIP_ETS2_LOCAL_USER	charstring for identity of the tester local user
32)PX_SIP_ETS2_LOCAL_USER_FULL	charstring for identity of the tester local user (format "+"cc+ndc+sn)
33)PX_SIP_ETS2_BEARER_PORT	integer for port number used by the ETS to exchange media streams
34)PX_SIP_ETS2_BEARER_IPADDR	charstring for IP address used by the ETS to exchange media streams
35)PX_SIP_ETS3_PORT	integer for Port number used by the ETS3 to exchange SIP messages
36)PX_SIP_ETS3_IPADDR	charstring for IP address used by the ETS3 to exchange SIP messages
37)PX_SIP_ETS3_LOCAL_DOMAIN	charstring for identity of the tester local domain
38)PX_SIP_ETS3_LOCAL_USER	charstring for identity of the tester local user

Table A.5: SIP-related PIXIT items (Registration and Authentication Parameters)

Index / Identifier	Type / Description
39)PX_SIP_REGISTRATION	boolean for the SIP user if it have to register itself before executing a test case
40)PX_SIP_REGISTRAR_PORT	integer for REGISTRAR port number to exchange SIP messages
41)PX_SIP_REGISTRAR_DOMAIN	charstring for REGISTRAR domain
42)PX_SIP_REGISTRATION_AUTHENTICATION _ENABLED	boolean flag on option controlling if authentication is enabled/disabled for registration messages.
43)PX_SIP_RFC2617_QOP	characterstring for IUT port number to register SIP user RFC 2617 (3-2-1) qop options: 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; example: "auth, auth-int"
44)PX_SIP_RFC2617_USERNAME	characterstring for name of user in the specified realm.
45)PX_SIP_RFC2617_PASSWD	characterstring for a known shared secret, the password of user of the specified username
46)PX_SIP_RFC2617_URI	characterstring for URI used for the calculation of the digists (external function)
47)PX_SIP_RFC2617_USERNAME_T	characterstring for name of user in the specified realm.
48)PX_SIP_RFC2617_PASSWD_T	characterstring for A known shared secret, the password of user of the specified username
49)PX_SIP_RFC2617_URI_T	characterstring for URI used for the calculation of the digits (external function)
50)PX_SIP_RFC2617_USERNAME_T3	characterstring for name of user in the specified realm.
51)PX_SIP_RFC2617_PASSWD_T3	characterstring for A known shared secret, the password of user of the specified username
52)PX_SIP_RFC2617_URI_T3	characterstring for URI used for the calculation of the digits (external function)

Table A.6: SIP-related PIXIT items (Message body)

Index / Identifier	Type / Description
53)PX_SIP_BYE_CAUSE	integer for Release cause to be used in BYE and in Failure messages
54)PX_SIP_CheckConversation	boolean for True, if conversation check is implemented
55)PX_SIP_CheckDTMF	boolean for True, if DTMF check is implemented
56)PX_SIP_SendAnnouncement	boolean for True, if Announcement sending is implemented
57)PX_SIP_CheckRinging	boolean for True, if ringing check is implemented
58)PX_SIP_URI_PHONE_CONTEXT_PREFIX	charstring identity of phone content prefix - the local address of telephone (format "+"prefix)
59)PX_SIP_URI_PHONE_CONTEXT_DOMAIN	charstring identity of phone content domain - explicit default domain (format "example.com")
60)PX_SIP_URI_ISUB	charstring identity of isdn sub address (format 321)
61)PX_SIPURL_CGPN	charstring for received calling party number (From field) used in TP601
62)PX_SIPURL_CGPN_DISPLAY	charstring calling display name only (From field, display name) for sip:
63)PX_SIPURL_CGPN_PASSERTED	charstring calling party number or name (P-AssertedID line1) for sip
64)PX_SIPURL_CGPN_PASSERTED2	charstring calling party number or name (P-AssertedID line2) for tel:
65)PX_SIPURL_CNN_PASSERTED_tx	charstring sent number (for connected party number)
66)PX_SIPURL_CNN_PASSERTED_rx	charstring received number (from connected party number)
67)PX_SIPURL_CGPN_PASSERTED_DISPLAY	charstring calling display name only (PAsserted field, display name) for sip:
68)PX_SIPURL_CGPN_PASSERTED_DOMAIN	charstring calling party domain (P-AssertedID) for sip:
69)PX_SIPURL_CGPN_PASSERTED_R	charstring for received calling party number or name for tel:
70)PX_SIPURL_CGPN_PASSERTED_DOMAIN_R	charstring for received calling party domain (P-AssertedID) for sip:
71)PX_SIP_ETS2_P_CALLED	charstring for received P-called party ID for sip:
72)PX_SIP_phonecontext	boolean used for SIP URL - True if SIP URL should include phone-context (compare SIP parameter value)
73)PX_SIP_CallInfoSupport	boolean used for the SDP dynamic port - flag decide on the support of the callInfo header field use in case of announcements

Table A.7: SIP-related PIXIT items (Timer)

Index / Identifier	Type / Description
74)PX_SIP_T1	float for T1 RTT estimate (500 ms)
75)PX_T2	float for T2 Maximum retransmit interval for non-INVITE requests and INVITE response (4 000 ms)
76)PX_T4	float for T4 Maximum duration a message will remain in the network
77)PX_SIP_TWAIT	float for TWait default value for waiting an operator action
78)PX_SIP_TACK	float for TAck default value for waiting an acknowledgement
79)PX_SIP_TRESP	float for TResp default value for waiting for a response from the IUT
80)PX_SIP_TNOACT	float for TNoAct default value for waiting no message from the IUT Value given for PX_TNOACT should be less than value of SHORT_REGISTRATION constant (which is currently "3" (seconds))
81)PX_SIP_TSYNC	float for TSYNC default value to synchronise ptc
82)PX_SIP_TGUARD	float for TGUARD default value for an extra long timer to limit test execution
83)PX_TRespRetention	float for TRespRetention minimum time that a Proxy will wait before sending a final response

A.2.2 ISUP/BICC-related PIXIT

Tables A.8 to A.10 list the ISUP/BICC-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.8: ISUP-related PIXIT items (Timer)

Index / Identifier	Type / Description
84)PX_TDelay	Time (float value) to delay a message before sending
85)PX_ISUP_TAC	Time (float value) to control the reception of a message
86)PX_ISUP_TWAIT	Time (float value) to control that IUT reacts prior to Upper Tester action
87)PX_ISUP_TSYNC_TIME_LIMIT	Time (float value) to control that IUT reacts prior to Upper Tester action

Table A.9: ISUP-related PIXIT items (General)

Index / Identifier	Type / Description
88)PX_ISUP_IsupOrBicc	Select whether ISUP or BICC testing is done (selectIsup, selectBicc)
89)PX_ISUP_Isup	Flag (boolean) if ISUP is used
90)PX_ISUP_NW_IND	Network indicator (2 bits) inside the Service Indicator octet (SIO)
91)PX_ISUP_PC_TS	Point code (14 bits) of the TS (ISUP interface)
92)PX_ISUP_PC_SUT	Point code (14 bits) of the SUT (ISUP interface)
93)PX_ISUP_SLS	Signalling Link Selection (SLS) value (4 bits) of the ISUP link between TS and SUT
94)PX_TS_ADRESS_ISUP_BICC	octetstring for address (eg IP) of the TS (ISUP/BICC side) - The use of this address is to enable the TS to communicate with the SUT at the ISUP/BICC side to establish and maintain the lower layer connections
95)PX_SUT_ADRESS_ISUP_BICC	octetstrinng for address (eg IP) of the SUT (ISUP/BICC side) - The use of this address is to enable the TS to communicate with the SUT at the ISUP/BICC side to establish and maintain the lower layer connections
96)PX_ISUP_TX_CIC_cicv1	Default Circuit Identity Code value (12 bits) for signalling connection 1)
97)PX_ISUP_TX_CIC_cicv2	Default Circuit Identity Code value (12 bits) for signalling connection 2)
98)PX_ISUP_TX_CIC_caicv1	Default Call Instance Code value (octetstring) for signalling connection 1)
99)PX_ISUP_TX_CIC_caicv2	Default Call Instance Code value (octetstring) for signalling connection 2)
100) PX_IsupBicc_CheckConversation	boolean value is true if conversation check is used
101) PX_IsupBicc_CheckRinging	boolean value is true if ringing check is used

Table A.10: ISUP-related PIXIT items (Message parameter)

Index / Identifier	Type / Description
102) PX_ISUP_IAM_CLI_digits_rxInat	characterstring for default 'address digits' value received in the 'Calling party number' parameter in the IAM message, when the Called party number is 'international'.
103) PX_ISUP_IAM_CLI_digits_rxNat	characterstring for default 'address digits' value received in the 'Calling party number' parameter in the IAM message, when the Called party number is 'national (sign) number'.
104) PX_ISUP_IAM_CLI_digits_rxDef	characterstring for default 'address digits' value received in the 'Calling party number' parameter in the IAM message, when the Nature of address is not explicitly specified.
105) PX_ISUP_IAM_CLI_numIncmplInd_rxDef	1 bit for default 'Number incomplete indicator' value received in the 'Calling party number' parameter in the IAM message.
106) PX_ISUP_IAM_CLI_digits_txInat	characterstring for default 'address digits' value sent in the 'Calling party number' parameter in the IAM message, when the Called party number is 'international'.
107) PX_ISUP_IAM_CLI_digits_txNat	characterstring for default 'address digits' value sent in the 'Calling party number' parameter in the IAM message, when the Called party number is 'national (sign) number'.
108) PX_ISUP_TX_BCI_v_chargeInd	2 bits for default value for element chargeIndicator inside Backward call indicators parameter (BCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
109) PX_ISUP_TX_BCI_v_cldPStatInd	2 bits for default value for element calledPartysStatusIndicator inside Backward call indicators parameter (BCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
110) PX_ISUP_TX_BCI_v_cldPCatInd	2 bits for default value for element calledPartysCategoryIndicator inside Backward call indicators parameter (BCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
111) PX_ISUP_TX_BCI_v_eTOeMethodInd	2 bits for default value for element end_to_endMethodIndicator inside Backward call indicators parameter (BCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
112) PX_ISUP_TX_BCI_v_interwInd	1 bit for default value for element interworkingIndicator inside Backward call indicators parameter (BCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).

Index / Identifier	Type / Description
113) PX_ISUP_TX_BCI_v_eTOeInfoInd	1 bit for default value for element end_to_endInformationIndicator inside Backward call indicators parameter (BCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
114) PX_ISUP_TX_BCI_v_iSDNUserPartInd	1 bit for default value for elemet iSDNUserPartIndicator inside Backward call indicators parameter (BCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
115) PX_ISUP_TX_BCI_v_holdingInd	1 bit for default value for element holdingIndicator inside Backward call indicators parameter (BCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
116) PX_ISUP_TX_BCI_v_iSDNAccessInd	1 bit for default value for element iSDNAccessIndicator inside Backward call indicators parameter (BCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
117) PX_ISUP_TX_BCI_v_echoContrDevInd	1 bit for default value for element echoControlDeviceIndicator inside Backward call indicators parameter (BCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
118) PX_ISUP_TX_BCI_v_sCCPMethodInd	2 bits for default value for element sCCPMethodIndicator inside Backward call indicators parameter (BCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
119) PX_ISUP_TX_CDN_natOfAddressInd	7 bit for default value for element natureOfAddressIndicator inside Called party number parameter (CDN); Variable(V) format (to be sent when the TP does not specify a specific value for that field).
120) PX_ISUP_TX_CDN_numbPlanInd	3 bits for default value for element numberingPlanIndicator inside Called party number parameter (CDN); Variable(V) format (to be sent when the TP does not specify a specific value for that field).
121) PX_ISUP_TX_CDN_iNN	1 bit for default value for element iNN inside Called party number parameter (CDN); Variable(V) format (to be sent when the TP does not specify a specific value for that field).
122) PX_ISUP_TX_CDN_addrSignals	characterstring for default value for element addressSignals inside Called party number parameter (CDN); Variable(V) format (to be sent when the TP does not specify a specific value for that field).
123) PX_ISUP_TX_CGC_cliPCategory	8 bits for default value for element callingPartysCategory inside Calling party's category parameter (CGC); Optional(O) format (to be sent when the TP does not specify a specific value for that field).
124) PX_ISUP_TX_CPN_natOfaddressind	7 bits for default value for element natureOfaddressindicator inside Connected number parameter (CPN); Optional(O) format (to be sent when the TP does not specify a specific value for that field).
125) PX_ISUP_TX_CPN_screenInd	2 bits for default value for element screeningIndicator inside Connected number parameter (CPN); Optional(O) format (to be sent when the TP does not specify a specific value for that field).
126) PX_ISUP_TX_CPN_addrPresRestrInd	2 bits for default value for element APRI = 'presentation allowed' inside Connected number parameter (CPN); Optional(O) format (to be sent when the TP does not specify a specific value for that field).
127) PX_ISUP_TX_CPN_numbplanInd	3 bits for default value for element numbering plan Indicator inside Connected number parameter (CPN); Optional(O) format (to be sent when the TP does not specify a specific value for that field).
128) PX_ISUP_TX_CPN_addrSignals_txNat	characterstring for default valuefor element 'addressSignals' (national format) inside 'Connected number' parameter; (to be sent when the TP does not specify a specific value for that field).
129) PX_ISUP_TX_CPN_addrSignals_txInat	characterstring for default value for element 'addressSignals' (international format) inside 'Connected number' parameter; (to be sent when the TP does not specify a specific value for that field).
130) PX_ISUP_TX_CPN_addrSignals_rxNat	characterstring for default 'addressSignals' value received in the 'Connected number' parameter in the ANM or CON message when the Called party number is 'national'.
131) PX_ISUP_TX_CPN_addrSignals_rxInat	characterstring for default 'addressSignals' value received in the 'Connected number' parameter in the ANM or CON message when the Called party number is 'international'.
132) PX_ISUP_TX_FCI_natInternatCallInd	1 bit for default value for element natInternatCallIndicator inside Forward call indicators parameter (FCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
133) PX_ISUP_TX_FCI_endToEndMethodInd	2 bits for default value for element endToEndMethodIndicator inside Forward call indicators parameter (FCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).

Index / Identifier	Type / Description
134) PX_ISUP_TX_FCI_interwInd	1 bit for default value for element interworkingIndicator inside Forward call indicators parameter (FCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
135) PX_ISUP_TX_FCI_eTOeInfoIndic	1 bit for default value for element endToEndInfoIndicator inside Forward call indicators parameter (FCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
136) PX_ISUP_TX_FCI_iSDNUserPartInd	1 bit for default value for element iSDNUserPartIndicator inside Forward call indicators parameter (FCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
137) PX_ISUP_TX_FCI_iSDNUserPartPrefInd	2 bits for default value for element iSDNUserPartPrefIndicator inside Forward call indicators parameter (FCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
138) PX_ISUP_TX_FCI_iSDNAccessInd	1 bit for default value for element iSDNAccessIndicator inside Forward call indicators parameter (FCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
139) PX_ISUP_TX_FCI_sCCPMethodInd	2 bits for default value for element sCCPMethodIndicator inside Forward call indicators parameter (FCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
140) PX_ISUP_IAM_GEN_digits_rxInat	characterstring for 'address digits' value received in the 'Generic number' parameter in the IAM message, when the Nature of Address is 'international number'.
141) PX_ISUP_IAM_GEN_digits_txInat	characterstring for 'address digits' value sent in the 'Generic number' parameter in the IAM message, when the Nature of Address is 'international number'.
142) PX_ISUP_IAM_GEN_digits_txNat	characterstring for 'address digits' value sent in the 'Generic number' parameter in the IAM message, when the Nature of Address is 'national number'.
143) PX_ISUP_IAM_GEN_digits_rxNat	characterstring for 'address digits' value received in the 'Generic number' parameter in the IAM message, when the Nature of Address is 'national (sign.
144) PX_ISUP_TX_GEN_addrSignals_txInat	characterstring for 'address digits' value sent in the 'Generic number' parameter, when the Nature of Address is 'international number'.
145) PX_ISUP_TX_GEN_addrSignals_txNat	characterstring for 'address digits' value sent in the 'Generic number' parameter, when the Nature of Address is 'national (sign) number'.
146) PX_ISUP_TX_NCI_satelliteInd	2 bits for default value for element satelliteIndicator inside Nature of connection indicators parameter (NCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
147) PX_ISUP_TX_NCI_contCheckInd	2 bits for default value for element continuityCheckIndicator inside Nature of connection indicators parameter (NCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
148) PX_ISUP_TX_NCI_echoContrDevInd	1 bit for default value for element echoControlDeviceIndicator inside Nature of connection indicators parameter (NCI); Fixed(F) format (to be sent when the TP does not specify a specific value for that field).
149) PX_ISUP_TX_TMR_transmMedReq	8 bits for default value for element transmissionMediumRequirement inside Transmission medium requirement prime parameter (TMRP); Optional(O) format (to be sent when the TP does not specify a specific value for that field).
150) PX_ISUP_TX_HPC_hopCounter	characterstring for default 'address digits' value received in the 'Calling party number' parameter in the IAM message, when the Called party number is 'international'.

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 archive ts_18600603v010101p0.zip which accompanies the present document.

History

Document history		
V1.1.1	September 2008	Publication