



**IMS Network Testing (INT);  
IMS specific use of Session Initiation Protocol (SIP)  
and Session Description Protocol (SDP);  
Conformance Testing;  
Part 3: Abstract Test Suite (ATS) and partial Protocol  
Implementation eXtra Information for Testing (PIXIT)  
proforma specification**

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**Reference**

RTS/INT-00067-3

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**Keywords**

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# Contents

Intellectual Property Rights .....	4
Foreword.....	4
1 Scope .....	5
2 References .....	5
2.1 Normative references .....	5
2.2 Informative references.....	6
3 Definitions and abbreviations.....	7
3.1 Definitions .....	7
3.2 Abbreviations .....	7
4 Abstract Test Method (ATM).....	8
4.1 Network architecture .....	8
4.2 Protocol architecture.....	8
4.3 Test architecture .....	9
4.3.1 Test configuration .....	9
4.3.1.1 Configurations using Gm interface only .....	9
4.3.1.2 Configurations using the Mw interface .....	10
4.3.1.3 Configurations using the Ic interface .....	10
4.3.1.4 Configurations using the ISC interface .....	11
4.3.2 Interconnection of TS and SUT .....	12
4.3.3 Test system architecture.....	12
4.3.3.1 General .....	12
4.3.3.2 Structure .....	13
4.3.3.3 Interaction between TTCN-3 Executable (TE) and SUT Adapter (SA).....	13
4.3.3.3.1 Sending and receiving SIP/IMS messages .....	13
4.3.3.3.2 Security & messages compression feature.....	13
4.3.3.4 Encoding/Decoding requirements .....	14
4.3.3.4.1 Encoding/Decoding System requirements for basic SIP messages/headers .....	14
4.3.3.4.2 Encoding/Decoding System requirements for basic SIP and SIP/IMS specific messages and headers.....	15
5 The ATS development process.....	16
5.1 Requirements and Test Purposes.....	16
5.2 ATS structure .....	16
5.2.1 Test case grouping .....	16
5.2.2 Test case identifiers .....	18
5.3 ATS specification framework.....	18
5.3.1 ATS Library.....	18
5.3.2 Use of TTCN-3 .....	19
5.3.2.1 General .....	19
5.3.2.2 TTCN-3 naming conventions.....	20
5.3.2.3 Test Suite documentation.....	22
<b>Annex A (normative): Partial PIXIT proforma .....</b>	<b>23</b>
A.1 Introduction .....	23
A.2 PIXIT items .....	23
A.2.1 SIP/IMS-related PIXIT.....	24
<b>Annex B (informative): TTCN-3 library modules.....</b>	<b>31</b>
B.1 Electronic annex, zip file with TTCN-3 code .....	31
History .....	32

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## Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee IMS Network Testing (INT).

The present document is part 3 of a multi-part deliverable covering the IMS specific use of Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Conformance Testing, as identified below:

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

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

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

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# 1 Scope

The purpose of the present document is to provide the Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma for conformance tests of the IP Multimedia core network Subsystem (IMS) equipment supporting the Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) as specified in TS 124 229 [2] in compliance with the relevant requirements and in accordance with the relevant guidance given in ISO/IEC 9646-7 [5] and ETS 300 406 [6].

The content of the present document follows the requirements that have been first collected in an internal unpublished requirements catalogue and is written according to the guidelines of TS 102 351 [12], ISO/IEC 9646-1 [4] and ETS 300 406 [6].

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 (PIXIT) Proforma of the ATS.

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

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# 2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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## 2.1 Normative references

The following referenced documents are necessary for the application of the present document.

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

- [1] ETSI TS 102 790-2: "IMS Network Testing (INT); IMS specific use of Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Conformance Testing; Part 2: Test Suite Structure (TSS) and Test Purposes (TP)".
- [2] ETSI TS 124 229 (V10.7.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3 (3GPP TS 24.229 version 10.7.0 Release 10)".

- [3] IETF RFC 3261 (2002): "SIP: Session Initiation Protocol".
- [4] ISO/IEC 9646-1: "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 1: General concepts".
- [5] ISO/IEC 9646-7: "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 7: Implementation Conformance Statements".
- [6] ETSI ETS 300 406: "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".
- [7] ETSI ES 201 873-1: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 1: TTCN-3 Core Language".
- [8] ETSI ES 201 873-2: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 2: TTCN-3 Tabular presentation Format (TFT)".
- [9] ETSI ES 201 873-5: "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: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 6: TTCN-3 Control Interface (TCI)".
- [11] 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".
- [12] ETSI TS 102 351 (V2.1.1): "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT); IPv6 Testing: Methodology and Framework".

## 2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI EG 202 568: "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT); Testing: Methodology and Framework".
- [i.2] IETF RFC 3265: "Session Initiation Protocol (SIP)-Specific Event Notification".
- [i.3] IETF RFC 3311: "The Session Initiation Protocol (SIP) UPDATE Method".
- [i.4] IETF RFC 3313: "Private Session Initiation Protocol (SIP) Extensions for Media Authorization".
- [i.5] IETF RFC 3262: "Reliability of Provisional Responses in the Session Initiation Protocol (SIP)".
- [i.6] IETF RFC 3327: "Session Initiation Protocol (SIP) Extension Header Field for Registering Non-Adjacent Contacts".
- [i.7] IETF RFC 3329: "Security Mechanism Agreement for the Session Initiation Protocol (SIP)".
- [i.8] IETF RFC 3428: "Session Initiation Protocol (SIP) Extension for Instant Messaging".
- [i.9] IETF RFC 3455: "Private Header (P-Header) Extensions to the Session Initiation Protocol (SIP) for the 3rd-Generation Partnership Project (3GPP)".
- [i.10] IETF RFC 3608: "Private Header (P-Header) Extensions to the Session Initiation Protocol (SIP) for the 3rd-Generation Partnership Project (3GPP)".
- [i.11] IETF RFC 4028: "Session Timers in the Session Initiation Protocol (SIP)".
- [i.12] IETF RFC 2617: "HTTP Authentication: Basic and Digest Access Authentication".
- [i.13] Draft-drage-sipping-service-identification-01: "A Session Initiation Protocol (SIP) Extension for the Identification of Services".

## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in ISO/IEC 9646-7 [5] and the following apply:

**abstract test case:** Refer to ISO/IEC 9646-1 [4].

**Abstract Test Method (ATM):** Refer to ISO/IEC 9646-1 [4].

**Abstract Test Suite (ATS):** Refer to ISO/IEC 9646-1 [4].

**Implementation Under Test (IUT):** Refer to ISO/IEC 9646-1 [4].

**Lower Tester (LT):** Refer to ISO/IEC 9646-1 [4].

**Test Purpose (TP):** Refer to ISO/IEC 9646-1 [4].

### 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ISO/IEC 9646-1 [4], ISO/IEC 9646-7 [5] and the following apply:

AS	Application Server
ATS	Abstract Test Suite
CSCF	Call Session Control Function
E-CSCF	Emergency CSCF
IBCF	Interconnection Border Control Function
I-CSCF	Interrogating CSCF
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IUT	Implementation Under Test
P-CSCF	Proxy CSCF
PICS	Protocol Implementation Conformance Statement
PIXIT	Partial Protocol Implementation Extra Information for Testing
PTC	Parallel Test Component
S-CSCF	Serving CSCF
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SUT	System under Test
TC	Test Case
TP	Test Purpose
TS	Test System
TSS	Test Suite Structure
TTCN-3	Testing and Test Control Notation version 3
UE	User Equipment

## 4 Abstract Test Method (ATM)

This clause describes the ATM used to test TS 124 229 [2].

### 4.1 Network architecture

IMS interface under test:

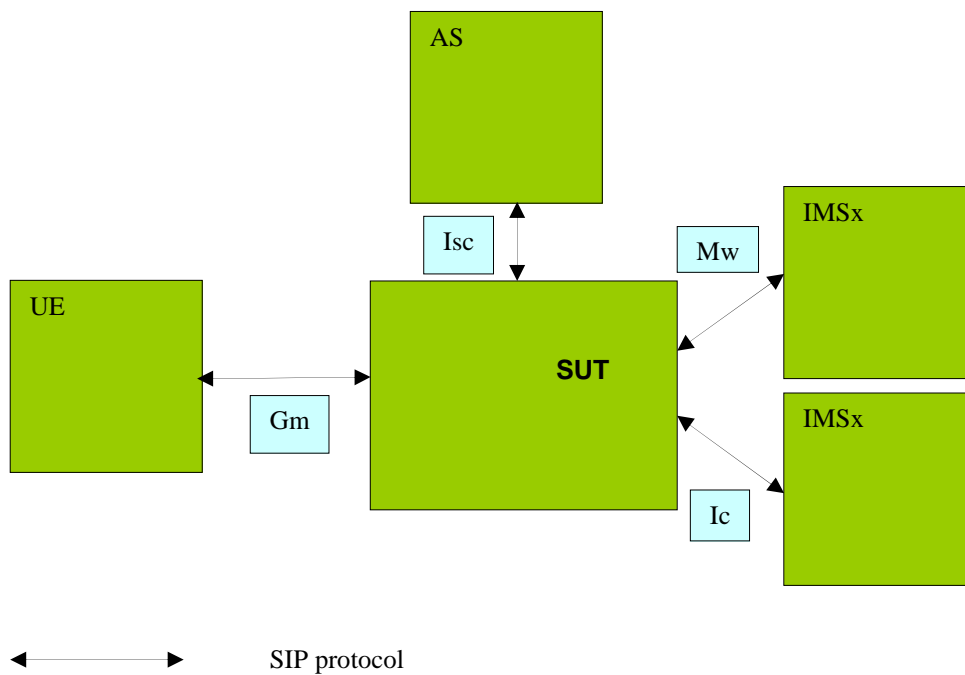
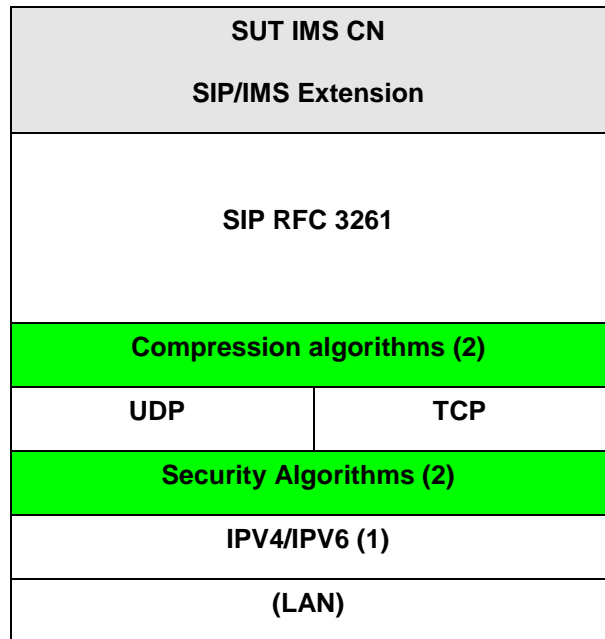


Figure 1

### 4.2 Protocol architecture

The Implementation Under Test (IUT) for which this test case specification applies consists of the SIP protocol (see figure 1a).





- (1) Both IPV4 and IPV6 addressing should be supported.  
 (2) Optional security and compression algorithms should be supported.

**Figure 1a: SIP protocol architecture**

## 4.3 Test architecture

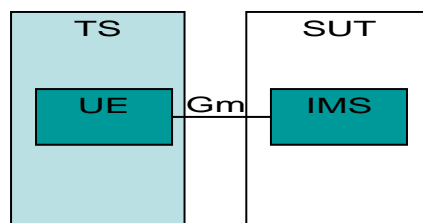
### 4.3.1 Test configuration

The target SUT to be covered by the test purposes of TS 124 229 [2] document address the IMS functional entities that are accessible via the following interfaces: Gm, Mw, Ic, and ISC.

This clause introduces the test configurations that have been used for the test purpose definitions. Depending on the specific configuration the test system (TS) simulates the behaviour of the UE or another IMS communicating with the SUT. Dashed boxes are introduced to visualize the assumption of any UE, but do not imply the implementation of the related user behaviour scenarios.

#### 4.3.1.1 Configurations using Gm interface only

The Gm interface is located between UE and the SUT.



**Figure 1b: Test configuration CF\_1Gm**

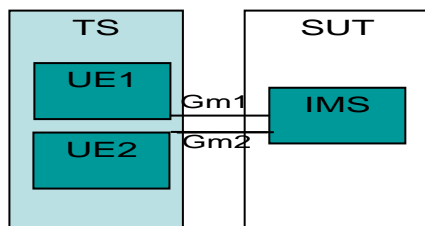


Figure 2: Test configuration CF\_2Gm

#### 4.3.1.2 Configurations using the Mw interface

The Mw interface is located between two different IMS, e.g. due to at least one user visiting a network outside of the home network. This interface is used only if no special functions are required to use the Ic interface, e.g. the topology hiding.

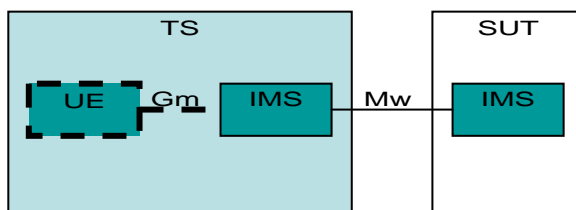


Figure 3: Test configuration CF\_1Mw

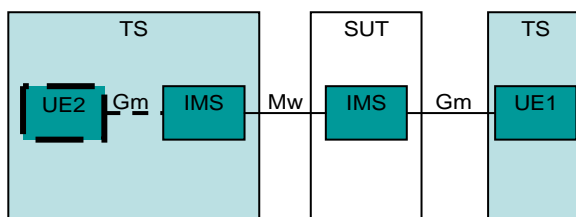


Figure 4: Test configuration CF\_1Mw1Gm

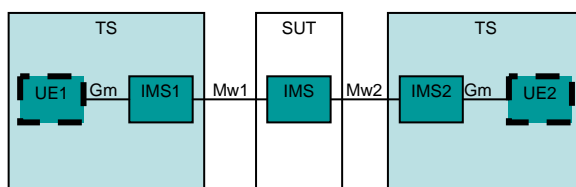


Figure 5: Test configuration CF\_2Mw

#### 4.3.1.3 Configurations using the Ic interface

The Ic interface is located between two different IMS, e.g. due to any user visit outside of the home network. This interface is used only if special functions (e.g. topology hiding) are required to use the Ic interface instead of the Mw.

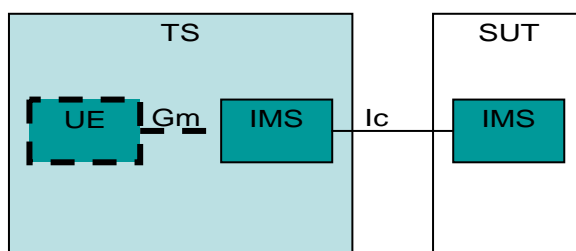


Figure 6: Test configuration CF\_1Ic

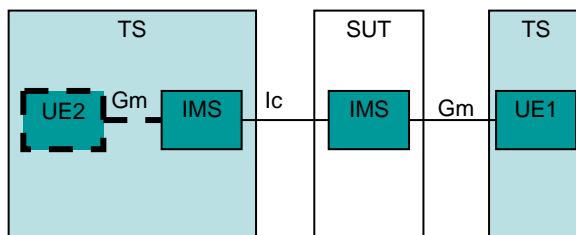


Figure 7: Test configuration CF\_1Ic1Gm

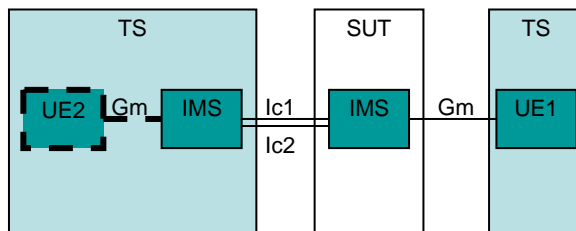


Figure 8: Test configuration CF\_2Ic1Gm

#### 4.3.1.4 Configurations using the ISC interface

The ISC interface provides an access to the AP.

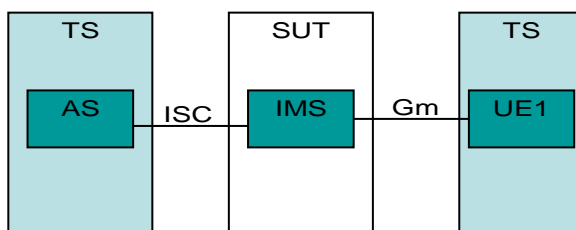


Figure 9: Test configuration CF\_1ISC1Gm

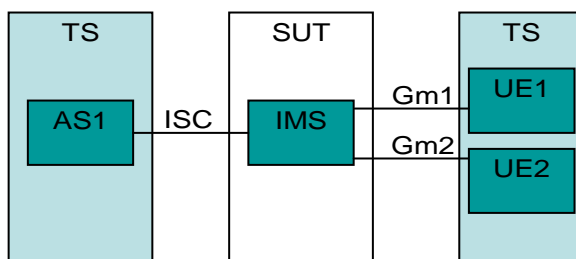


Figure 10: Test configuration CF\_1ISC2Gm

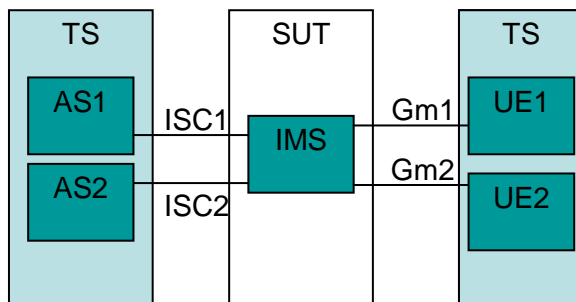
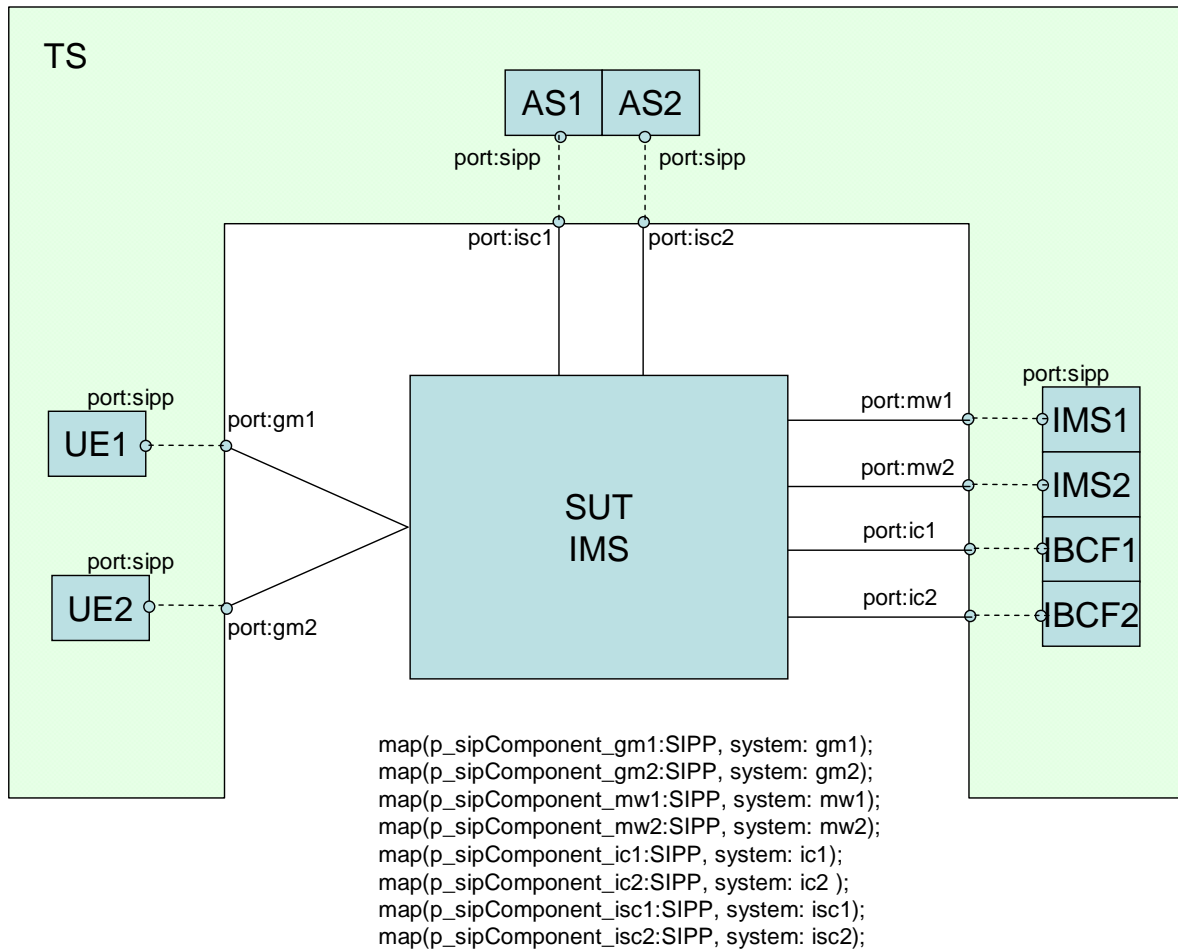


Figure 11: Test configuration CF\_2ISC2Gm

## 4.3.2 Interconnection of TS and SUT

Figure 12 shows the interconnection of TS and SUT in terms of signalling message flows.



**Figure 12**

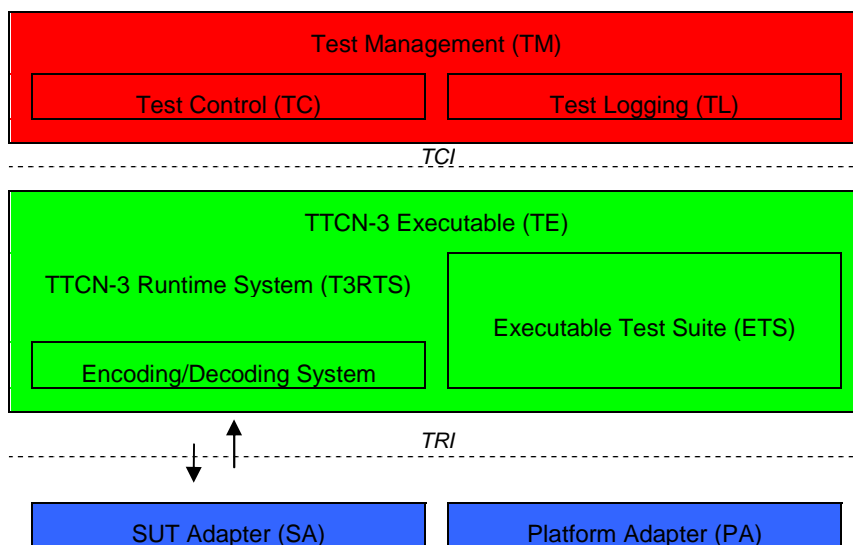
## 4.3.3 Test system architecture

### 4.3.3.1 General

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

### 4.3.3.2 Structure

An abstract architecture for a test system (TS) implementing a TTCN-3 ATS is displayed in figure 13 and also stated in ES 201 873-5 [9].



**Figure 13: 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 [11].

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

#### 4.3.3.3.1 Sending and receiving SIP/IMS messages

Before starting a test case, the SA shall be prepared to provide the transport of SIP messages by establishing appropriate connections on the lower layers (see figure 13).

#### 4.3.3.3.2 Security & messages compression feature

According to figure 13 description, security transport layer, and signalling compression may be used transparently to the ATS, as far as these mechanism does not affect the SIP protocol itself.

#### 4.3.3.4 Encoding/Decoding requirements

##### 4.3.3.4.1 Encoding/Decoding System requirements for basic SIP messages/headers

SIP is a text-based protocol that allows different syntactical presentations of the same information. In general, an implementation of this ATS should use a EDS to parse received encoded messages into TTCN-3 type structures and values, and encode structured TTCN-3 type structures and values into encoded messages. This EDS is not part of the ATS. Still all encoded messages, i.e. the messages as they are transmitted by the SA to or received by the SA from the SUT, shall be logged.

The following terms shall be used for the conventions defined below:

Syntactic delimiter	syntactic delimiters are characters like "=" or ";" that are used to separate encoded values.
LWS	linear white spaces as defined in RFC 3261 [3].
Parameter name	name of header parameters as defined in RFC 3261 [3].
Parameter value	the value of a parameter as defined in RFC 3261 [3].
Undefined method	an undefined method is a method other than: "INVITE", "ACK", "OPTIONS", "BYE", "CANCEL" and "REGISTER".
Undefined header	an undefined header is a header other than general-header, entity-header, request-header and response header as defined in RFC 3261 [3].
Unexpected header	an unexpected header is a header, which shall not be present in a specific request message. This definition complies to the definition of NOT APPLICABLE in RFC 3261 [3], section 20 for request messages.

##### 4.3.3.4.1.1 Encoding requirements

TTCN-3 fields should not contain syntactic delimiters like white space, semicolon, equal characters etc. in fully decoded fields. Instead the information provided by a parser shall be used to build the decoded message in TTCN-3. Decoded messages shall use the TTCN-3 enumeration types where ever appropriate, e.g. for the method and the header field name.

For **charstring** fields the following decoding rules shall be applied by the EDS:

- 1) Subsequent LWS shall compress to a single space character " ".
- 2) Decoded parameter names shall use only lower case letters.
- 3) Parameter values containing an integer value shall be decoded to a TTCN-3 integer value where a TTCN-3 **integer** type is used for a SIP parameter value.

The following decoding rules shall be applied by the EDS to each received message in the following order:

- 1) In case a request message indicating an undefined method is received by the test system, the message shall not be passed in the TE to the ETS. However the message is subject to logging as defined in clause 4.3.3 ("Logging conventions").
- 2) In case an undefined header has been received the header field shall be decoded as **UndefinedHeader** field.

RFC 3261 [3] allows for multiple header field values of the same kind to either arrive in one or multiple occurrences of the corresponding header field. The SIP ATS has been written assuming only the first format. Therefore, should the EDS receive multiple header fields of the same kind in a SIP message, e.g. of a Via header field, it shall convert them into the equivalent single header field with multiple values. This can be achieved by adding the value of, e.g. the second received Via header field as the last value to the value(s) of the first Via header field.

##### 4.3.3.4.1.2 Decoding requirements

Encoders shall follow all encoding rules that are defined in RFC 3261 [3] when encoding structured values received from templates. This applies in particular to but it is not restricted to section 7.3.1 of RFC 3261 [3].

Values of type **Raw** shall be send to the SUT without any modification.

#### 4.3.3.4.2 Encoding/Decoding System requirements for basic SIP and SIP/IMS specific messages and headers

For SIP/IMS testing purpose, new SIP messages and specific header should be supported by the encoding/decoding system.

The rules edicted above should apply.

Hereafter the complete set of message and header being supported, including the corresponding RFC.

**Table 1: IMS Basic and Specific messages**

Msg-Name	RFC	Gm tx	Gm rx	lc tx	lc rx	lsc tx	lsc rx	Mw tx	Mw rx
<b>Requests</b>									
ACK	3261 [3]	x	x	x	x	x	x	x	x
BYE	3261 [3]	x	x	x	x	-	-	x	x
INVITE	3261 [3]	x	x	x	x	-	-	x	x
CANCEL	3261 [3]	x	x	x	x	-	-	x	x
MESSAGE	3428 [i.8]	x	x	x	x	x	-	x	x
NOTIFY	3265 [i.2]	-	-	-	-	-	-	x	-
SUBSCRIBE	3265 [i.2]	-	x	-	-	-	-	x	-
PUBLISH		x	x	-	-	-	-	x	x
UPDATE	3311 [i.3]	x	x	-	-	-	-	x	x
PRACK	3262 [i.5]	x	x	-	-	-	-	x	x
REGISTER (unprotected)	3261 [3]	-	x	x (see note 1)	-	x (see note 1)	-	x (see note 1)	x (see note 1)
REGISTER (protected)	3261 [3]	-	x	x (see note 1)	-	x (see note 1)	-	x (see note 1)	x (see note 1)
<b>Responses</b>									
100	3261 [3]	x	? (see note 2)	x	? (see note 2)	-	-	x	? (see note 2)
180	3261 [3]	x	x	x	x	x	-	x	x
200	3261 [3]	x	x	x	x	x	-	x	x
3xx	3261 [3]	-	-	-	x	-	-	-	x
380	3261 [3]	x	-	-	-	-	-	-	-
4xx	3261 [3]	x	x	-	-	-	-	x	-
400	3261 [3]	x	-	-	-	-	-	x	-
401	3261 [3]	x	-	-	-	-	-	x	x
403	3261 [3]	x	-	x	-	-	-	x	-
404	3261 [3]	-	-	-	-	-	-	x	-
408	3261 [3]	x	-	x	-	-	x	-	-
422	3261 [3]	x	-	-	-	-	-	-	-
423	3261 [3]	-	-	-	-	-	-	x	-
480	3261 [3]	-	-	-	x	-	-	-	-
481	3261 [3]	x	-	-	-	-	-	-	-
488	3261 [3]	-	-	-	-	-	-	x	-
5xx	3261 [3]	-	-	-	-	-	x	-	-
504	3261 [3]	x	-	x	-	-	-	-	-
NOTE 1: Not clear, if protected or unprotected REGISTER is used here.									
NOTE 2: 100 not mentioned in any TP, may still be needed in the ATS to acknowledge outstanding INVITE requests.									

Table 2: IMS specific headers

Header-Name	RFC	Gm	Ic	Isc	Mw
Min-SE	4028 [i.11]	x	-	-	-
Path	3327 [i.6]	-	x	-	x
P-Access-Network-Info	3455 [i.9]	x	-	x	x
P-Asserted-Service	draft-dragage-sipping-service-identification-01 [i.13]	-	-	x	-
P-Charging-Function-Addresses	3455 [i.9]	x	x	x	x
P-Charging-Vector	3455 [i.9]	x	x	x	x
P-Media-Authorization	3313 [i.4]	x	-	-	x
P-Visited-Network-ID	3455 [i.9]	-	-	x	x
Security-Client	3329 [i.7]	x	-	-	x
Security-Server	3329 [i.7]	x	-	-	-
Security-Verify	3329 [i.7]	x	-	-	x
Service-Route	3608 [i.10]	x	-	-	-
Session-Expires	4028 [i.11]	x	-	-	-
NOTE: P-Called-Party-ID header (RFC 3455 [i.9]) may be also necessary.					

---

## 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 102 790-2 [1]. The requirements applicable to this TP are given by a reference to RFC 3261 [3] (SIP) or TS 124 229 [2]. There are no explicit formulations of requirements.

### 5.2 ATS structure

#### 5.2.1 Test case grouping

The ATS structure defined in table 3 is based on the structuring of Test Purposes in clause 5 of TS 102 790-2 [1]. The group names in columns 1 to 2 of table 3 are those assigned in the ATS; they are based on the names provided in clause 5 of TS 102 790-2 [1], but use the naming conventions defined for the ATS (see clause 5.3.2.2 of the present document).



Table 3: ATS structure

Group	Sub-group	TC-Identifier
<b>Gm Interface</b>	General	GM_GEN
	Registration procedures	GM_REG
	Initial dialog request procedures	GM_INI
	Standalone requests procedures	GM_STA
	Subsequent requests on a dialog procedures	GM_SUB
	Target refresh request procedures	GM_TAR
	Emergency	GM_EME
	Exceptional procedures	GM_EXC
	SDP	GM_SDP
	NAT Traversal	GM_NAT
<b>Mw Interface</b>	General	MW_GEN
	Registration procedures	MW_REG
	Initial dialog request procedures	MW_INI
	Standalone requests procedures	MW_STA
	Subsequent requests on a dialog procedures	MW_SUB
	Target refresh request procedures	MW_TAR
	Emergency	MW_EME
	SDP	MW_SDP
<b>Ic Interface</b>	General	IC_GEN
	Registration procedures	IC_REG
	Initial dialog request procedures	IC_INI
	Standalone requests procedures	IC_STA
	Subsequent requests on a dialog procedures	IC_SUB
	Target refresh request procedures	IC_TAR
<b>ISC Interface</b>	Registration procedures	ISC_REG
	Initial dialog request procedures	ISC_INI
	Standalone requests procedures	ISC_STA
	Subsequent requests on a dialog procedures	ISC_SUB
	Target refresh request procedures	ISC_TAR

## 5.2.2 Test case identifiers

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

**Table 3a: TC identifier naming convention scheme**

Identifier: <b>TC_&lt;ts&gt;_&lt;int&gt;&lt;subgroup&gt;_&lt;nn&gt;</b>			
<ts>	=	Test suite name:	i.e. "IMST2" IMS version 2
<int>	=	type of Interface:	i.e. "MW" Mw interface
<subgroup>	=		subgroup 3 first letter of the subgroup according to TSS subdivision (i.e. GEN for general)
<nn>	=	sequential number	(01 to 99)

EXAMPLE : TC\_IMST2\_GM\_GEN\_01 stands for 1<sup>st</sup> test case in the Gm interface only group, and in the general subgroup.

NOTE: This naming scheme provides a 1-1 correspondence of TP identifiers as defined in TS 102 790-2 [1], and test case names.

The TP identifier of TC\_IMST2\_GM\_GEN\_01 is TP\_IMST2\_GM\_GEN\_01.

## 5.3 ATS specification framework

### 5.3.1 ATS Library

For this ATS the TTCN-3 library modules are basically organized as:

- 1) SIP/IMS modules;
- 2) SIP Common modules (RFC 3261 [3]);
- 4) LibCommon modules (taken from TS 102 351 [12]).

Table 4 shows the organization of the ATS as library of modules.

**Table 4: 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.
Liblms	Liblms_PIXITS	IMS specific common Module Parameter (e.g. addresses related to SUT components and TS) declarations associated with PIXIT.
	Liblms_Interface	IMS component (see note).
	Liblms_SIPTypesAndValues	IMS specific user and interface specific profile data (see note).
	Liblms_Templates	Modified templates with IMS specific header fields.
	Liblms_Steps	functions using IMS specific types.
LibSip	LibSip_PIXITS	SIP general common Module Parameter (e.g. SDP/SIP procedure options) declarations associated with PIXIT.
	LibSip_Interface	SIP component.
	LibSip_SIPTypesAndValues	SIP message types and constants, simple user profiles (see note).
	LibSip_SDPTypes	SDP types and constants.
	LibSip_Templates	Basic and modified templates with SIP specific header fields.
	LibSip_Steps	SIP specific behaviour function library.
	LibSip_XMLTypes	XML type system for SIP tests.
	XSDAUX	ASN.1 base type definitions.
SIP/IMS Ats	Atslms_PICS	Module Parameter declarations associated with PICS.
	Atslms_PIXITS	Module Parameter declarations associated with PIXIT.
	Atslms_Testcases	Test case definitions for the complete module.
	Atslms_TestConfiguration	Functions for mapping of test components to help setup and tear down different test configurations and configuration of the SUT adapter.
	Atslms_TestExecution	Module control: execute test cases depending on selection conditions.
	Atslms_TestSystem	TSI components, test system internal ports.
	Atslms_Testcases	Test case definitions for the complete module.
	Atslms_Gm_TCFFunctions	TC functions used by the test component for test on the Gm configurations.
	Atslms_Gm_Testcases	Test case definitions for the Gm configurations.
	Atslms_Mw_TCFFunctions	TC functions used by the test component for test on the Mw configurations.
	Atslms_Mw_Testcases	Test case definitions for the Mw configurations.
	Atslms_Ic_TCFFunctions	TC functions used by the test component for test on the Ic configuration.
	Atslms_Ic_Testcases	Test case definitions for the Ic configuration.
	Atslms_Isc_TCFFunctions	TC functions used by the test component for test on the ISC configuration.
	Atslms_Isc_Testcases	Test case definitions for the ISC configuration.
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 [7] 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/IMS ATS are based on the following underlying principles:

- when constructing meaningful identifiers, the general guidelines specified for naming in clause 9 of [8] 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 5 specifies the naming guidelines for each element of the TTCN-3 language indicating the recommended prefix and capitalization.

Table 5: 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	
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	
Message template	Use lower-case initial letter	m_	m_setupInit m_setupBasic	Note 1
Message template with wildcard or matching expression	Use lower-case initial letters	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_IMST2_xxxxx	
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	
<p>NOTE 1: This prefix shall 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.</p> <p>NOTE 2: This prefix shall 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.</p> <p>NOTE 3: In this case it is acceptable to use underscore as a word delimiter.</p> <p>NOTE 4: This convention has been used in TS 102 027-3 [11] (SIP ATS).</p>				

### 5.3.2.3 Test Suite documentation

In order to allow browsing of the SIP/IMS ATS without the use of a specific TTCN-3 test development environment, the TTCN ATS is made available in HTML format with hyperlinks between entities in the ATS. The documentation in the ATS makes use of special comment tags used by the tool that converts the ATS to the HTML format. These tags are defined in clause 9 of [i.1] and the tags shown in table 6.

**Table 6: TTCN-3 comment tags**

<b>Tag</b>	<b>Description</b>
@author	Specifies the names of the authors or an authoring organization which either has created or is maintaining a particular piece of TTCN-3 code.
@desc	Describes the purpose of a particular piece of TTCN-3 code. The description should be concise yet informative and describe the function and use of the construct.
@remark	Adds extra information, such as the highlighting of a particular feature or aspect not covered in the description.
@img	Associates images with a particular piece of TTCN-3 code.
@see	Refers to other TTCN-3 definitions in the same or another module.
@url	Associates references to external files or web pages with a particular piece of TTCN-3 code, e.g. a protocol specification or standard.
@return	Provides additional information on the value returned by a given function.
@param	Documents the parameters of parameterized TTCN-3 definitions.
@version	States the version of a particular piece of TTCN-3 code.

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## Annex A (normative): Partial PIXIT proforma

Notwithstanding the provisions of the copyright clause related to the text of the present document, grants that users of the present document may freely reproduce the PIXIT proforma in this annex so that it can be used for its intended purposes and may further publish the completed PIXIT proforma.
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### 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.

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### 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/IMS-related PIXIT

Each PIXIT item corresponds to a Module Parameter of the ATS.

**Table A.1: SIP library related PIXIT items**

Index	Identifier	Type/Description
1	<a href="#">PX_SIP_SDP_dyn</a>	charstring for SDP dynamic port
2	<a href="#">PX_SIP_SDP_b_modifier</a>	charstring for SDP bandwidth modifier
3	<a href="#">PX_SIP_SDP_b_bandwidth</a>	integer for SDP bandwidth value
4	<a href="#">PX_SIP_SDP_encoding</a>	charstring for SDP media attribute encoding supported by the IUT
5	<a href="#">PX_SIP_SDP_encoding_unavail</a>	charstring for SDP media attribute encoding unavailable by the IUT
6	<a href="#">PX_SIP_SDP_encoding_unsup</a>	charstring for SDP media attribute encoding unsupported by the IUT
7	<a href="#">PX_SIP_SDP_transport</a>	charstring for SDP media T
8	<a href="#">PX_SIP_ISUP_LANGUAGE</a>	charstring for Used CPC language
9	<a href="#">PX_SIP_ISUP_CPC_VALUE</a>	charstring for Used CPC language
10	<a href="#">PX_SIP_100rel</a>	Boolean for True if 100rel mechanism is supported in SIP
11	<a href="#">PX_SIP_precondition</a>	Boolean for True if precondition mechanism is supported in SIP
12	<a href="#">PX_SIP_UDP</a>	Boolean for True if UDP Transport is used by the IUT to run campaign
13	<a href="#">PX_SIP_TRANSPORT</a>	charstring for Used Transport in upper case "UDP"/"TCP"
14	<a href="#">PX_SIP_SUT_PORT</a>	integer for SUT port number to exchange SIP messages
15	<a href="#">PX_SIP_SUT_IPADDR</a>	charstring for SUT IP address to exchange SIP messages
16	<a href="#">PX_SIP_SUT_HOME_DOMAIN</a>	charstring for SUT domain
17	<a href="#">PX_SIP_SUT_HOME_DOMAIN_UNKNOWN</a>	charstring for unknown SUT domain
18	<a href="#">PX_SIP_TS1_PORT</a>	integer for port number used by the TS1 to exchange SIP messages
19	<a href="#">PX_SIP_TS1_IPADDR</a>	charstring for IP address used by the TS1 to exchange SIP messages
20	<a href="#">PX_SIP_TS1_LOCAL_DOMAIN</a>	charstring for identity of the tester local domain
21	<a href="#">PX_SIP_TS1_LOCAL_USER</a>	charstring for identity of the tester local user
22	<a href="#">PX_SIP_TS1_LOCAL_USER_DIV</a>	charstring for identity of the user with active call diversion service
23	<a href="#">PX_SIP_TS1_LOCAL_USER_FULL</a>	charstring for identity of the tester local user (format "+cc+ndc+sn)
24	<a href="#">PX_SIP_TS1_BEARER_PORT</a>	integer for port number used by the TS to exchange media streams
25	<a href="#">PX_SIP_TS1_BEARER_PORT2</a>	charstring for port number used by the TS to exchange media streams
26	<a href="#">PX_SIP_TS1_BEARER_IPADDR</a>	charstring for IP address used by the TS to exchange media streams
27	<a href="#">PX_SIP_TS2_PORT</a>	integer for port number used by the TS2 to exchange SIP messages
28	<a href="#">PX_SIP_TS2_IPADDR</a>	charstring for IP address used by the TS2 to exchange SIP messages
29	<a href="#">PX_SIP_TS2_LOCAL_DOMAIN</a>	charstring for identity of the tester local domain
30	<a href="#">PX_SIP_TS2_LOCAL_USER</a>	charstring for identity of the tester local user
31	<a href="#">PX_SIP_TS2_LOCAL_USER_DIV</a>	charstring for identity of the user with active call diversion service
32	<a href="#">PX_SIP_TS2_LOCAL_USER_FULL</a>	charstring for identity of the tester local user (format "+cc+ndc+sn)
33	<a href="#">PX_SIP_TS2_BEARER_PORT</a>	integer for port number used by the TS to exchange media streams
34	<a href="#">PX_SIP_TS2_BEARER_PORT2</a>	integer for port number used by the TS to exchange media streams



Index	Identifier	Type/Description
35	<a href="#">PX_SIP_TS2_BEARER_IPADDR</a>	charstring for IP address used by the TS to exchange media streams
36	<a href="#">PX_SIP_TS3_PORT</a>	integer for Port number used by the TS3 to exchange SIP messages
37	<a href="#">PX_SIP_TS3_IPADDR</a>	charstring for IP address used by the TS3 to exchange SIP messages
38	<a href="#">PX_SIP_TS3_LOCAL_DOMAIN</a>	charstring for identity of the tester local domain
39	<a href="#">PX_SIP_TS3_LOCAL_USER</a>	charstring for identity of the tester local user
40	<a href="#">PX_SIP_REGISTRATION</a>	Boolean for the SIP user if it have to register itself before executing a test case
41	<a href="#">PX_SIP_REGISTRATION_exp_min</a>	integer for the minimum SIP user registration expires-value
42	<a href="#">PX_SIP_SUT_REGISTRAR_DOMAIN</a>	charstring for REGISTRAR domain
43	<a href="#">PX_SIP_BYE_CAUSE</a>	integer for Release cause to be used in BYE and in Failure messages
44	<a href="#">PX_SIP_CheckConversation</a>	Boolean for True, if conversation check is implemented.
45	<a href="#">PX_SIP_CheckDTMF</a>	Boolean for True, if DTMF check is implemented.
46	<a href="#">PX_SIP_SendAnnouncement</a>	Boolean for True, if Announcement sending is implemented.
47	<a href="#">PX_SIP_CheckRinging</a>	Boolean for True, if ringing check is implemented.
48	<a href="#">PX_SIP_REGISTER_AUTHENTICATION_ENABLED</a>	Boolean for option controlling if authentication is enabled/disabled for REGISTER messages
49	<a href="#">PX_SIP_INVITE_AUTHENTICATION_ENABLED</a>	Boolean for option controlling if authentication is enabled/disabled for INVITE messages
50	<a href="#">PX_SIP_SUT_UE1_QOP</a>	charstring for RFC 2617 [i.12], clause 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
51	<a href="#">PX_SIP_SUT_UE1_USERNAME</a>	charstring for RFC 2617 [i.12], clause 3.2.2 username: The name of user in the specified realm
52	<a href="#">PX_SIP_SUT_UE1_PASSWD</a>	charstring for RFC 2617 [i.12], clause 3.2.2.2 passwd: A known shared secret, the password of user of the specified username
53	<a href="#">PX_SIP_SUT_UE2_QOP</a>	charstring for RFC 2617 [i.12], clause 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
54	<a href="#">PX_SIP_SUT_UE2_USERNAME</a>	charstring for RFC 2617 [i.12], clause 3.2.2 username: The name of user in the specified realm
55	<a href="#">PX_SIP_SUT_UE2_PASSWD</a>	charstring for RFC 2617 [i.12], clause 3.2.2.2 passwd: A known shared secret, the password of user of the specified username
56	<a href="#">PX_SIP_T1</a>	float for T1 RTT estimate (500 ms)
57	<a href="#">PX_T2</a>	float for T2 Maximum retransmit interval for non-INVITE requests and INVITE response (4 000 ms)
58	<a href="#">PX_T4</a>	float for T4 Maximum duration a message will remain in the network
59	<a href="#">PX_SIP_TF</a>	float for TDELAY default value for timeout on outgoing SIP request (i.e. 64*T1)
60	<a href="#">PX_SIP_TWAIT</a>	float for TWait default value for waiting an operator action
61	<a href="#">PX_SIP_TACK</a>	float for Tack default value for waiting an acknowledgement
62	<a href="#">PX_SIP_TRESP</a>	float for TResp default value for waiting for a response from the IUT
63	<a href="#">PX_SIP_TNOACT</a>	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))

Index	Identifier	Type/Description
64	<a href="#">PX_SIP_TSYNC</a>	float for TSYNC default value to synchronize ptc
65	<a href="#">PX_SIP_TGUARD</a>	float for TGUARD default value for an extra long timer to limit test execution
66	<a href="#">PX_TRespRetention</a>	float for TRespRetention minimum time that a Proxy will wait before sending a final response

Table A.2: IMS library related PIXIT items

Index	Index/Identifier	Type/Description
1	<a href="#">PX_IMS_SUT_UE_IPADDR</a>	charstring for <a href="#">SUT</a> - UE IP address to exchange SIP messages - connection point for PCSCF
2	<a href="#">PX_IMS_SUT_UE_PORT</a>	integer for <a href="#">SUT</a> - UE port number to exchange SIP messages - connection point for PCSCF
3	<a href="#">PX_IMS_SUT_PCSCF1_IPADDR</a>	charstring for <a href="#">SUT</a> - PCSCF1 IP address to exchange SIP messages - connection point for UE1
4	<a href="#">PX_IMS_SUT_PCSCF1_PORT</a>	integer for <a href="#">SUT</a> - PCSCF1 port number to exchange SIP messages - connection point for UE1
5	<a href="#">PX_IMS_SUT_PCSCF1_HOME_DOMAIN</a>	charstring for <a href="#">SUT</a> /PCSCF1 domain - connection point for UE1
6	<a href="#">PX_IMS_SUT_UE1_BEARER_IPADDR</a>	charstring for IP address used by the <a href="#">TS</a> to exchange media streams for UE1
7	<a href="#">PX_IMS_SUT_UE1_HOME_DOMAIN</a>	charstring for identity of the tester UE1 local domain
8	<a href="#">PX_IMS_SUT_UE1_PUBLIC_USER</a>	charstring for identity of the tester UE1 local user
9	<a href="#">PX_IMS_SUT_UE1_PRIVAT_USERNAME</a>	charstring for RFC 2617 [i.12], clause 3.2.2 username of UE1 The name of user in the specified realm
10	<a href="#">PX_IMS_SUT_UE1_PRIVAT_PASSWD</a>	charstring for RFC 2617 [i.12], clause 3.2.2.2 passwd of UE1: A known shared secret, the password of user of the specified username
11	<a href="#">PX_IMS_SUT_UE1_QOP</a>	charstring for RFC 2617 [i.12], clause 3.2.1 qop options of UE1: 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
12	<a href="#">PX_IMS_SUT_UE1_REGISTRAR</a>	charstring for home( <a href="#">SUT</a> ) REGISTRAR domain of UE1
13	<a href="#">PX_IMS_SUT_UE1_DISPLAY</a>	charstring for UE1 display name
14	<a href="#">PX_IMS_SUT_PCSCF2_IPADDR</a>	charstring for <a href="#">SUT</a> - PCSCF2 IP address to exchange SIP messages - connection point for UE2
15	<a href="#">PX_IMS_SUT_PCSCF2_PORT</a>	integer for <a href="#">SUT</a> - PCSCF2 port number to exchange SIP messages - connection point for UE2
16	<a href="#">PX_IMS_SUT_PCSCF2_HOME_DOMAIN</a>	charstring for <a href="#">SUT</a> /PCSCF2 domain - connection point for UE2
17	<a href="#">PX_IMS_SUT_UE2_BEARER_IPADDR</a>	charstring for IP address used by the <a href="#">TS</a> to exchange media streams for UE2
18	<a href="#">PX_IMS_SUT_UE2_HOME_DOMAIN</a>	charstring for identity of the tester UE2 local domain
19	<a href="#">PX_IMS_SUT_UE2_PUBLIC_USER</a>	charstring for identity of the tester UE2 local user
20	<a href="#">PX_IMS_SUT_UE2_PRIVAT_USERNAME</a>	charstring for RFC 2617 [i.12], clause 3
21	<a href="#">PX_IMS_SUT_UE2_PRIVAT_PASSWD</a>	charstring for RFC 2617 [i.12], clause 3.2.2.2 passwd: A known shared secret, the password of user of the specified username of UE2
22	<a href="#">PX_IMS_SUT_UE2_QOP</a>	charstring for RFC 2617 [i.12], clause 3.2.1 qop options UE2: 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
23	<a href="#">PX_IMS_SUT_UE2_REGISTRAR</a>	charstring for home( <a href="#">SUT</a> ) REGISTRAR domain of UE2

Index	Index/Identifier	Type/Description
24	<a href="#">PX IMS SUT PCSCF3 IPADDR</a>	charstring for <a href="#">SUT</a> - PCSCF3 IP address to exchange SIP messages - connection point for UE3
25	<a href="#">PX IMS SUT PCSCF3 PORT</a>	integer for <a href="#">SUT</a> - PCSCF3 port number to exchange SIP messages - connection point for UE3
26	<a href="#">PX IMS SUT PCSCF3 HOME DOMAIN</a>	charstring for SUT/PCSCF3 domain - connection point for UE3
27	<a href="#">PX IMS SUT UE3 BEARER IPADDR</a>	charstring for IP address used by the <a href="#">TS</a> to exchange media streams for UE3
28	<a href="#">PX IMS SUT UE3 HOME DOMAIN</a>	charstring for identity of the tester UE2 local domain
29	<a href="#">PX IMS SUT UE3 PUBLIC USER</a>	charstring for identity of the tester UE3 local user
30	<a href="#">PX IMS SUT UE3 PRIVAT USERNAME</a>	charstring for RFC 2617 [i.12], clause 3
31	<a href="#">PX IMS SUT UE3 PRIVAT PASSWD</a>	charstring for RFC 2617 [i.12], clause 3.2.2.2 passwd: A known shared secret, the password of user of the specified username of UE2
32	<a href="#">PX IMS SUT UE3 QOP</a>	charstring for RFC 2617 [i.12], clause 3.2.1 qop options UE3: 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
33	<a href="#">PX IMS SUT UE3 REGISTRAR</a>	charstring for home( <a href="#">SUT</a> ) REGISTRAR domain of UE3
34	<a href="#">PX IMS SUT PCSCF4 IPADDR</a>	charstring for <a href="#">SUT</a> - PCSCF4 IP address to exchange SIP messages - connection point for UE4
35	<a href="#">PX IMS SUT PCSCF4 PORT</a>	integer for <a href="#">SUT</a> - PCSCF4 port number to exchange SIP messages - connection point for UE4
36	<a href="#">PX IMS SUT PCSCF4 HOME DOMAIN</a>	charstring for SUT/PCSCF4 domain - connection point for UE4
37	<a href="#">PX IMS SUT UE4 BEARER IPADDR</a>	charstring for IP address used by the <a href="#">TS</a> to exchange media streams for UE4
38	<a href="#">PX IMS SUT UE4 HOME DOMAIN</a>	charstring for identity of the tester UE2 local domain
39	<a href="#">PX IMS SUT UE4 PUBLIC USER</a>	charstring for identity of the tester UE4 local user
40	<a href="#">PX IMS SUT UE4 PRIVAT USERNAME</a>	charstring for RFC 2617 [i.12], clause 3
41	<a href="#">PX IMS SUT UE4 PRIVAT PASSWD</a>	charstring for RFC 2617 [i.12], clause 3.2.2.2 passwd: A known shared secret, the password of user of the specified username of UE2
42	<a href="#">PX IMS SUT UE4 QOP</a>	charstring for RFC 2617 [i.12], clause 3.2.1 qop options UE4: 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
43	<a href="#">PX IMS SUT UE4 REGISTRAR</a>	charstring for home( <a href="#">SUT</a> ) REGISTRAR domain of UE4
44	<a href="#">PX IMS SUT unknownUE PUBLIC USER</a>	
45	<a href="#">PX IMS SUT EMERGENCY HOME DOMAIN</a>	charstring for identity of emergency service local domain
46	<a href="#">PX IMS SUT EMERGENCY SERVICE</a>	charstring for identity of the emergency service
47	<a href="#">PX IMS SUT EMERGENCY SERVICE INVALID</a>	charstring for identity of the invalid emergency service
48	<a href="#">PX IMS SUT IBCF1 IPADDR</a>	charstring for SUT/IBCF1 IP address to exchange SIP messages
49	<a href="#">PX IMS SUT IBCF1 PORT</a>	integer for SUT/IBCF1 port number to exchange SIP messages
50	<a href="#">PX IMS SUT IBCF1 HOME DOMAIN</a>	charstring for SUT/IBCF1 domain
51	<a href="#">PX IMS SUT IBCF2 IPADDR</a>	charstring for SUT/IBCF2 IP address to exchange SIP messages
52	<a href="#">PX IMS SUT IBCF2 PORT</a>	integer for SUT/IBCF2 port number to exchange SIP messages
53	<a href="#">PX IMS SUT IBCF2 HOME DOMAIN</a>	charstring for SUT/IBCF2 domain
54	<a href="#">PX IMS SUT PCSCF IPADDR</a>	charstring for SUT/P-CSCF IP address to exchange SIP messages
55	<a href="#">PX IMS SUT PCSCF PORT</a>	integer for SUT/P-CSCF port number to exchange SIP messages
56	<a href="#">PX IMS SUT PCSCF HOME DOMAIN</a>	charstring for SUT/P-CSCF domain

Index	Index/Identifier	Type/Description
57	<a href="#">PX IMS SUT PCSCF VisitedNetworkID</a>	charstring for SUT/P-CSCF P_VisitedNetwork ID header (see RFC 3455 [i.9])
58	<a href="#">PX IMS SUT PCSCF MinSE</a>	charstring for SUT/P-CSCF Min-SE header lower bound for the session refresh interval (see RFC 4028 [i.11])
59	<a href="#">PX IMS SUT SCSCF IPADDR</a>	charstring for SUT/S-CSCF IP address to exchange SIP messages
60	<a href="#">PX IMS SUT SCSCF PORT</a>	integer for SUT/S-CSCF port number to exchange SIP messages
61	<a href="#">PX IMS SUT SCSCF HOME DOMAIN</a>	charstring for SUT/S-CSCF domain
62	<a href="#">PX IMS SUT SCSCF REALM</a>	charstring for SUT/S-CSCF globally used realm name of IUT S-CSCF
63	<a href="#">PX IMS SUT ICSCF IPADDR</a>	charstring for SUT/I-CSCF IP address to exchange SIP messages
64	<a href="#">PX IMS SUT ICSCF PORT</a>	integer for SUT/I-CSCF port number to exchange SIP messages
65	<a href="#">PX IMS SUT ICSCF HOME DOMAIN</a>	charstring for SUT/I-CSCF domain
66	<a href="#">PX IMS SUT AS IPADDR</a>	charstring for <a href="#">SUT</a> - AS IP address to exchange SIP messages - connection point for SCSCF
67	<a href="#">PX IMS SUT AS PORT</a>	integer for <a href="#">SUT</a> - AS port number to exchange SIP messages - connection point for SCSCF
68	<a href="#">PX IMS SUT AS HOME DOMAIN</a>	charstring for SUT/AS domain
69	<a href="#">PX IMS SUT IMGCF IPADDR</a>	charstring for SUT/I-MGCF IP address to exchange SIP messages
70	<a href="#">PX IMS SUT IMGCF PORT</a>	integer for SUT/I-MGCF port number to exchange SIP messages
71	<a href="#">PX IMS SUT IMGCF HOME DOMAIN</a>	charstring for SUT/I-MGCF domain
72	<a href="#">PX IMS SUT CONF IPADDR</a>	charstring for SUT/conference IP address to exchange SIP messages
73	<a href="#">PX IMS SUT CONF PORT</a>	integer for SUT/conference port number to exchange SIP messages
74	<a href="#">PX IMS SUT CONF HOME DOMAIN</a>	charstring for SUT/conference domain
75	<a href="#">PX IMS SUT CONF FACTORY NAME</a>	charstring for conference factory URI name
76	<a href="#">PX IMS TS UE1 IPADDR</a>	charstring for IP address used by the UE1 to exchange SIP messages
77	<a href="#">PX IMS TS UE1 PORT</a>	integer for port number used by the UE1 to exchange SIP messages
78	<a href="#">PX IMS TS UE1 REGISTRAR</a>	charstring for visited( <a href="#">TS</a> ) REGISTRAR domain
79	<a href="#">PX IMS TS UE2 IPADDR</a>	charstring for IP address used by the UE2 to exchange SIP messages
80	<a href="#">PX IMS TS UE2 PORT</a>	integer for port number used by the UE2 to exchange SIP messages
81	<a href="#">PX IMS TS UE2 REGISTRAR</a>	charstring for visited( <a href="#">TS</a> ) REGISTRAR domain
82	<a href="#">PX IMS TS UE3 IPADDR</a>	charstring for IP address used by the UE3 to exchange SIP messages
83	<a href="#">PX IMS TS UE3 PORT</a>	integer for port number used by the UE3 to exchange SIP messages
84	<a href="#">PX IMS TS UE3 REGISTRAR</a>	charstring for visited( <a href="#">TS</a> ) REGISTRAR domain
85	<a href="#">PX IMS TS UE4 IPADDR</a>	charstring for IP address used by the UE3 to exchange SIP messages
86	<a href="#">PX IMS TS UE4 PORT</a>	integer for port number used by the UE3 to exchange SIP messages
87	<a href="#">PX IMS TS UE4 REGISTRAR</a>	charstring for visited( <a href="#">TS</a> ) REGISTRAR domain
88	<a href="#">PX IMS TS IBCF IPADDR</a>	charstring for TS/IBCF IP address to exchange SIP messages
89	<a href="#">PX IMS TS IBCF PORT</a>	integer for TS/IBCF port number to exchange SIP messages
90	<a href="#">PX IMS TS IBCF HOME DOMAIN</a>	charstring for TS/IBCF domain
91	<a href="#">PX IMS TS ICSCF IPADDR</a>	charstring for TS/I-CSCF IP address to exchange SIP messages

Index	Index/Identifier	Type/Description
92	<a href="#">PX IMS TS ICSCF PORT</a>	integer for IUT/I-CSCF port number to exchange SIP messages
93	<a href="#">PX IMS TS ICSCF HOME DOMAIN</a>	charstring for TS/I-CSCF domain
94	<a href="#">PX IMS TS PCSCF IPADDR</a>	charstring for TS/P-CSCF IP address to exchange SIP messages
95	<a href="#">PX IMS TS PCSCF PORT</a>	integer for IUT/P-CSCF port number to exchange SIP messages
96	<a href="#">PX IMS TS PCSCF HOME DOMAIN</a>	charstring for TS/P-CSCF domain
97	<a href="#">PX IMS TS SCSCF IPADDR</a>	charstring for TS/S-CSCF IP address to exchange SIP messages
98	<a href="#">PX IMS TS SCSCF PORT</a>	integer for TS/S-CSCF port number to exchange SIP messages
99	<a href="#">PX IMS TS SCSCF HOME DOMAIN</a>	charstring for TS/S-CSCF domain
100	<a href="#">PX IMS SUT BARRED PUBLIC USER</a>	charstring public user identity for Request-URI to be rejected by IUT S-CSCF as it is barred for incoming calls
101	<a href="#">PX IMS SUT INVALID GRUU</a>	charstring invalid GRUU for Request-URI to be rejected by IUT S-CSCF
102	<a href="#">PX IMS SUT UNSUBSCRIBED SERVICE</a>	charstring Service value in P-Asserted-Service header to be rejected by IUT S-CSCF, as service is not subscribed-to
103	<a href="#">PX IMS SUT UNSUBSCRIBED SDP SERVICE</a>	charstring Service value in SDP message body to be rejected by IUT S-CSCF, as service is not subscribed-to; intentionally kept as charstring to allow maximum flexibility to construct unsubscribed service
104	<a href="#">PX IMS TS ECSCF IPADDR</a>	charstring for TS/E-CSCF IP address to exchange SIP messages
105	<a href="#">PX IMS TS ECSCF PORT</a>	integer for TS/E-CSCF port number to exchange SIP messages
106	<a href="#">PX IMS TS ECSCF HOME DOMAIN</a>	charstring for TS/E-CSCF domain
107	<a href="#">PX IMS TS IMS1UE PUBLIC USER</a>	charstring for public userinfo/displayname addressing IMS1UE (simulated by the <a href="#">TS</a> )
108	<a href="#">PX IMS TS IMS1UE HOME DOMAIN</a>	charstring for TS/domain
109	<a href="#">PX IMS TS ISUP PUBLIC USER</a>	charstring for public userinfo addressing ISUPUE (simulated by the <a href="#">TS</a> )
110	<a href="#">PX IMS TS ISUP HOME DOMAIN</a>	charstring for ISUP TS/domain or IP address
111	<a href="#">PX IMS TS AS1 IPADDR</a>	charstring for TS/AS1 IP address to exchange SIP messages
112	<a href="#">PX IMS TS AS1 PORT</a>	integer for TS/AS1 port number to exchange SIP messages
113	<a href="#">PX IMS TS AS1 HOME DOMAIN</a>	charstring for TS/AS1 domain
114	<a href="#">PX IMS TS AS2 IPADDR</a>	charstring for TS/AS2 IP address to exchange SIP messages
115	<a href="#">PX IMS TS AS2 PORT</a>	integer for TS/AS2 port number to exchange SIP messages
116	<a href="#">PX IMS TS AS2 HOME DOMAIN</a>	charstring for TS/AS2 domain
117	<a href="#">PX SCSCF reject unsubscribed service</a>	Boolean (This is an operator option, not a protocol option), True, if SUT/S-CSCF rejects INVITE requests indicating services that are not subscribed to by the called subscriber, service may be requested in SDP or in a P-Asserted-Service header Ref: TS 124 229 [2], 5-4-3-3

Table A.3: SIP related PIXIT items

Index	Identifier	Type / Description
1	PX_IMSR10_SCSCF_reject_unsubscribed_service	Boolean True, if SUT/S-CSCF rejects INVITE requests indicating services that are not subscribed to by the called subscriber, service may be requested in SDP or in a P-Asserted-Service header Ref: TS 124 229 [2], 5-4-3-3
2	PX_IMSR10_SecTls	SecurityMechanism TLS
3	PX_IMSR10_SecAka	SecurityMechanism AKA
4	PX_IMSR10_SecNass	SecurityMechanism NASS
5	PX_IMSR10_Via	Via

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## 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\_10279003v020101p0.zip which accompanies the present document.

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## History

<b>Document history</b>		
V1.1.1	March 2010	Publication
V2.1.1	February 2013	Publication