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**Harmonizacija telekomunikacij in internetnega protokola prek omrežij (TIPHON) -
Specifikacija tehnološke ustreznosti - Osnutek IETF SIP RFC 3261 - 2. del:
Abstraktni preskušalni niz (ATS) in delna dodatna informacija za preskušanje
izvedbe protokola (PIXIT) - Proforma specifikacija**

Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON);
Technology Compliance Specification; Draft IETF SIP RFC 3261; Part 2: Abstract Test
Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT)
proforma specification

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Technical Specification

**Telecommunications and Internet Protocol
Harmonization Over Networks (TIPHON)
Technology Compliance Specification;
Draft IETF SIP RFC 3261;
Part 2: Abstract Test Suite (ATS) and partial Protocol
Implementation eXtra Information for Testing (PIXIT)
proforma specification**

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Foreword

This Technical Specification (TS) has been produced by ETSI Project Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON).

The present document is part 2 of a multi-part deliverable covering Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Conformance Testing for TIPHON Release 3; TIPHON profile for Session Initiation Protocol (SIP), as described below:

Part 1: "Test Suite Structure and Test Purposes (TSS&TP) specification";

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

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1 Scope

The present document specifies the Abstract Test Suite (ATS) for the Session Initiation Protocol SIP as defined in RFC 3261 [1].

The objective of the present document is to provide a basis for conformance tests for SIP equipment giving a high probability of inter-operability between different manufacturer's SIP equipments.

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

Annex B provides the Partial Protocol Implementation Extra Information for Testing (PIXIT) Proforma of the ATS.

Annex C provides the Protocol Conformance Test Report (PCTR) Proforma of the ATS.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

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

- [1] IETF RFC 3261: "SIP: Session Initiation Protocol".
<https://standards.ietf.org/catalog/standards/sist/87da8d8b-0866-49dc-bbcc-3a00674007/sip-3261-01-2004>
- [2] ETSI ES 201 873-1 (V2.2.0): "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 1: TTCN-3 Core Language".
- [3] ETSI ES 201 873-5 (V1.1.1): "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 5: TTCN-3 Runtime Interface (TRI)".
- [4] ISO/IEC 9646-1 (1991): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".
- [5] ISO/IEC 9646-2 (1991): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract test suite specification".
- [6] ISO/IEC 9646-4 (1991): "Information Technology - Open Systems Interconnection - Conformance Testing Methodology and Framework, Part 4: Test realisation".
- [7] ISO/IEC 9646-5 (1991): "Information Technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 5: Requirements on test laboratories".
- [8] ISO/IEC 9646-6 (1991): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 6: Protocol profile test specification".
- [9] ISO/IEC 9646-7 (1991): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation conformance statement".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

- Terms defined in RFC 3261 [1];
- Terms defined in ES 201 873-1 [2];
- Terms defined in ES 201 873-5 [3].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ES 201 873-1 [2], ES 201 873-5 [3], and RFC 3261 [1] apply. In particular, the following abbreviations apply:

ABNF	Augmented Backus Naur Form
ATM	Abstract Test Method
ATS	Abstract Test Suite
EDS	Encoding/Decoding System
ETS	Executable Test Suite
IUT	Implementation Under Test
PA	Platform Adapter
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PTC	Parallel Test Component
SA	SUT Adapter
SUT	System Under Test
TC	Test Cases
TCI	TTCN-3 Control Interface
TE	TTCN-3 Executable
TM	Test Management
TP	Test Purpose
TRI	TTCN-3 Runtime Interface
TS	Test System
TSS	Test Suite Structure
TTCN	Testing and Test Control Notation version 3

4 Abstract Test Method (ATM)

This clause describes the ATM used to test IETF SIP RFC as defined in [1].

4.1 Network architecture

The basic SIP network architecture is defined in figure 1. The ATS defines test cases for the IUT being in the role of each displayed entity.

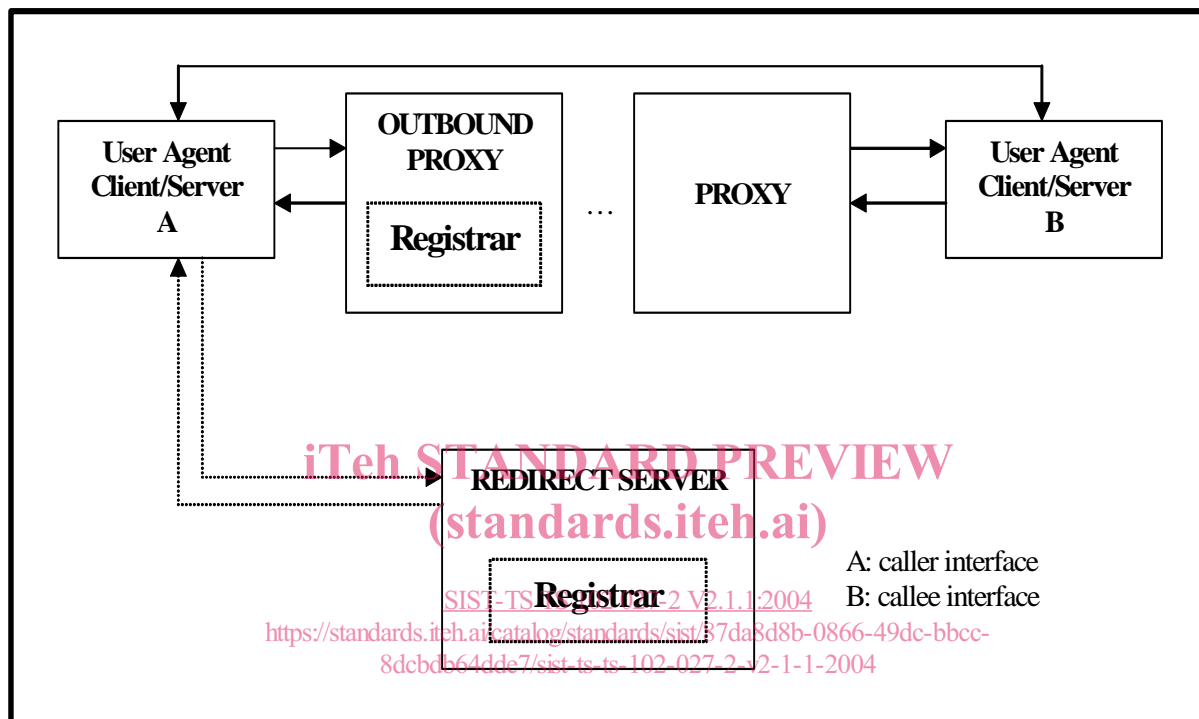


Figure 1: SIP network architecture

4.2 Protocol architecture

The Implementation Under Test (IUT) for which this test case specification applies consists of the SIP protocol (see figure 2).

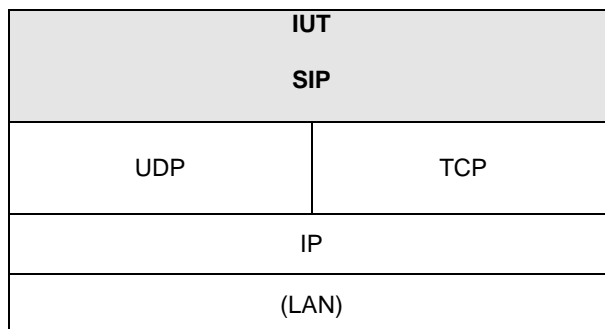


Figure 2: SIP protocol architecture

SIP messages are considered in TTCN-3 description as PDU and analysed independently of the transport layer that has been used. The ATS does not care if the several SIP messages have been received in a same frame or in several frames and expect SIP messages one by one. It is up to the TRI to manage those considerations. The choice of the transport protocol used is taken into account by the ATS while the port are initialized at the beginning of each test component by calling a dedicated init function (initUDPport(), initUDPMTCport(), etc.).

4.3 Test system architecture

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

4.3.1 Structure

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

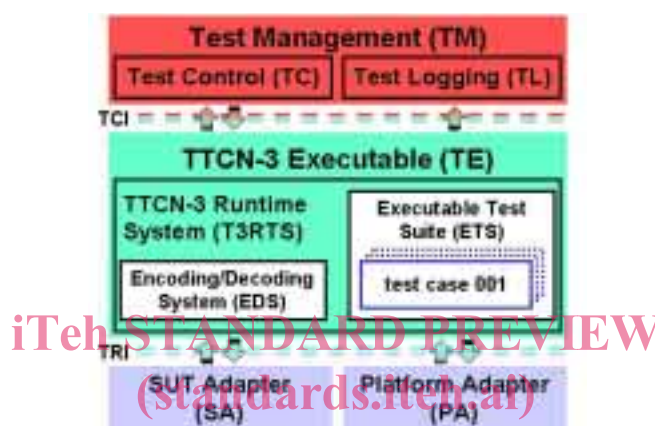


Figure 3: Abstract Test System Architecture

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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 [3], whereas the specification and implementation of the TCI is currently considered to be proprietary.

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 SA for a SIP TS shall implement the TRI adaptation as well as the SIP transport protocol architecture described in clause 4.2. The Encoding/Decoding System (EDS) entity with the TE and Test Logging (TL) entity within the TM shall comply with the conventions defined in following clauses.

4.3.2 Encoding/Decoding System requirements

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 SIP [1]
Parameter name	name of header parameters as defined in SIP [1].
Parameter value	the value of a parameter as defined in SIP
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 SIP [1].
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 SIP [1]/10 for request messages.

4.3.2.1 Decoding 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:

- Subsequent LWS shall compress to a single space character " ".
- Decoded parameter names shall use only lower case letters.
- 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.
- 2) In case an undefined header has been received the header field shall be decoded as **UndefinedHeader** field.
- 3) The SIP standard [1] 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.

4.3.2.2 Encoding requirements

Encoders shall follow all encoding rules that are defined in SIP ABNF [2] when encoding structured values received from templates. This applies in particular to but it is not restricted to clause [1]/3 "SIP Message Overview" and [1]/10.5 "Header Field Format".

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

4.3.3 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 Untestable Test Purposes (TP)

This clause gives a list of TP, which are not implemented in the ATS due to the chosen ATM or other restrictions :
None

6 ATS conventions

The ATS conventions are intended to give a better understanding of the ATS, but they also describe the conventions made for the development of the ATS. These conventions shall be considered during any later maintenance or further development of the ATS.

The ATS conventions contain two clauses, the naming conventions and the implementation conventions. The naming conventions describe the structure of the naming of all ATS elements. The implementation conventions describe the functional structure of the ATS.

6.1 Naming conventions

6.1.1 Type definitions

This clause describes the naming conventions used for structured and unstructured types as well as for the field names of structured types.

6.1.1.1 General iTeh STANDARD PREVIEW

Type identifiers use mixed cased with the first letter of each internal word capitalized.

EXAMPLE: RequestLine

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Field identifiers use mixed cased with a lowercase first letter. Internal words start with a capital letter.

EXAMPLE: requestLine

Names of type as well as field identifiers attempt to follow the naming chosen of ABNF elements (if a counterpart exists) as closely as possible.

EXAMPLES: NameAddr
hostName

In case type and identifier names should give a hint on their structure the term describing the structure should be separated with an underscore ("_") at the end of the name.

EXAMPLES: CommaParam_List
ContactBody_Union

6.1.1.2 PDU Type Definition

Names of types used as PDUs follow the general conventions as defined in clause 6.1.1.1.

EXAMPLE: Request

6.1.2 Template definition

Template identifiers consist of the type name, an identifier denoting whether the template is for sending or receiving and a sequential number.

EXAMPLE: Request_r_1 denotes a template from type Request that is intended for reception.
CommaParam_List_s_25 denotes a template from type CommaParam_List that is intended for sending.

The sequential number is used only to distinguish between templates for the same type and direction and includes no other information.

6.1.3 Constant declarations

Identifiers for either internal or external constants, use only uppercase letters. Internal words are separated by an underscore ("_").

EXAMPLE: SIP_VERSION

6.1.4 Enumeration declarations

While identifiers for the enumeration type follow the conventions as defined in clause 6.1.1.1, enumerations elements use only uppercase letters, which are suffixed by "_E" to distinguish them from constants. Internal words are separated by an underscore character ("_").

EXAMPLE: Enumeration type
 FieldName

 Enumeration value
 FROM_E

6.1.5 Module parameter declarations

Identifiers for module parameters follow the general rules as defined in clause 6.1.3. Numbers are separated from words using the underscore character "_".

EXAMPLE: CAP_1

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6.1.6 Variable declarations

Identifiers for variables follow the general rules for field names as defined in clause 6.1.1.1.

6.1.7 Function declarations

Identifiers for either internal or external functions use mixed case with a lowercase first letter. Internal words start with a capital letter, and "To " is abbreviated with "2".

EXAMPLE: char2str ()

6.1.8 Test Case declarations

6.1.8.1 General

All test cases are listed in the order in which they appear in the Test Suite Structure (TSS) and TP document. Grouping is used to reflect the TSS.

6.1.8.2 Test Case (TC) identifier

The identifier of the test case is constructed in the same way as the test purpose described in TS 102 027-1, clause 5.1.1. The identifier of a TC is built according to table 1.

Table 1: TP identifier naming convention scheme

Identifier: <protocol>_<main functionality>_<role>_<functionality>_<type>_<nn>	
<protocol>	SIP
<main functionality>	Registration (RG), Call Control (CC), Messaging (MG).
<role>	Registrant (RT), Registrar (RR) Originating Endpoint (OE), Terminating Endpoint (TE), Proxy (PR), Redirect (RD).
<functionality> (optional) (MP),	Call Establishment (CE), Call Release(CR), Session modification (SM), Message processing Transaction (TR).
<sub-functionality> (optional)	Request (RQ), Response(RS), Client(CL), Server(SE)
<type>	Valid Behaviour (V), Invalid Behaviour (I), Inopportune Behaviour (O) , Timers (TI).
<nnn>	sequential number (001-999).

6.1.9 Timer declarations

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Two types of timers can be identified:

1) Standardized:

- Those defined in SIP [1], e.g. T1. They use exactly the same name as in the standard.

As there is a tolerance margin accepted for these timers, three values are needed:

- The maximum value allowed, which will use the suffix "_max";
- The minimum value allowed, which will use the suffix "_min";
- The value actually implemented, with no suffix;

EXAMPLE: T1_max, T1_min, and T1.

2) Not standardized:

- Those not defined in the protocol standard, i.e. for execution use, e.g. a timer waiting for a response. These timers begin with the prefix "T_", followed by a string in lowercase letters.

EXAMPLE: T_resp represents a timer for controlling the response time of the IUT.

6.1.10 Group names

Group names follow the same general conventions as defined in clause 6.1.1.1.

EXAMPLE: SubtypesTemplateDeclarations

Where appropriate group names reflect the hierarchic group structure.