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ETSI TS 102 027-1 V2.1.1 (2003-10)

Technical Specification

**Telecommunications and Internet Protocol
Harmonization Over Networks (TIPHON)
Technology Compliance Specification;
Draft IETF SIP RFC3261;
Part 1: Test Suite Structure and
Test Purposes (TSS&TP) specification**

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Reference

RTS/TIPHON-06021-1[2]

Keywords

IP, SIP, telephony, testing, TSS&TP, VoIP

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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 1 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 identified 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 proposes a Test Suite Structure and Test Purposes (TSS&TP) for the SIP protocol as described in RFC 3261, "Session Initiation Protocol" issued in June 2002.

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".
- [2] IETF RFC 2327: "SDP: Session Description Protocol".
- [3] ISO/IEC 9646-1: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".
- [4] ISO/IEC 9646-2: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract Test Suite specification".
- [5] ISO/IEC 9646-3: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 3: The Tree and Tabular Combined Notation".
- [6] ETSI ETS 300 406: "Methods for Testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

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 ISO/IEC 9646-1, -2 and -3 ([3], [4] and [5]).

callee: SIP entity that is requested to participate to a session by receiving an INVITE message

caller: SIP entity that initiates a session by sending an INVITE message

dialog: identifier defined as the combination of the remote address, local address, and Call-ID

inopportune: test group that handles invalid signalling exchanges of messages, which are properly structured and correctly encoded

Invalid (I): test group that handles valid signalling exchanges of messages, which are either not properly structured or incorrectly encoded

Test Purpose (TP): non-formal high-level description of a test, mainly using text

NOTE: This test description can be used as the basis for a formal test specification (e.g. Abstract Test Suite in TTCN). See ISO/IEC 9646.

Valid (V): test group that handles valid signalling exchanges of messages, which are properly structured and correctly encoded

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ATS	Abstract Test Suite
CE	Call Establishment
CR	Call Release
I	Invalid
IUT	Implementation Under Test
MG	Messaging
O	Inopportune
OE	Originating Endpoint
PIXIT	Protocol Implementation eXtra Information for Testing
PR	Proxy
RD	ReDirect Server
RG	Registration
RR	RegistraR
RT	RegistranT
SM	Session Modification
TE	Terminating Endpoint
TP	Test Purpose
TSS	Test Suite Structure
UA	User Agent
UAC	User Agent Client
UAS	User Agent Server
V	Valid

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4 Test Suite Structure (TSS)

4.1 Introduction

4.1.1 SIP Entities

Test Purposes have been written for SIP entities according to the RFC 3261 [1].

Three kinds of entities are considered successively as IUT:

- User Agent behaving as client or Server.
- Proxy (outbound and simple proxy).
- Redirect Server.

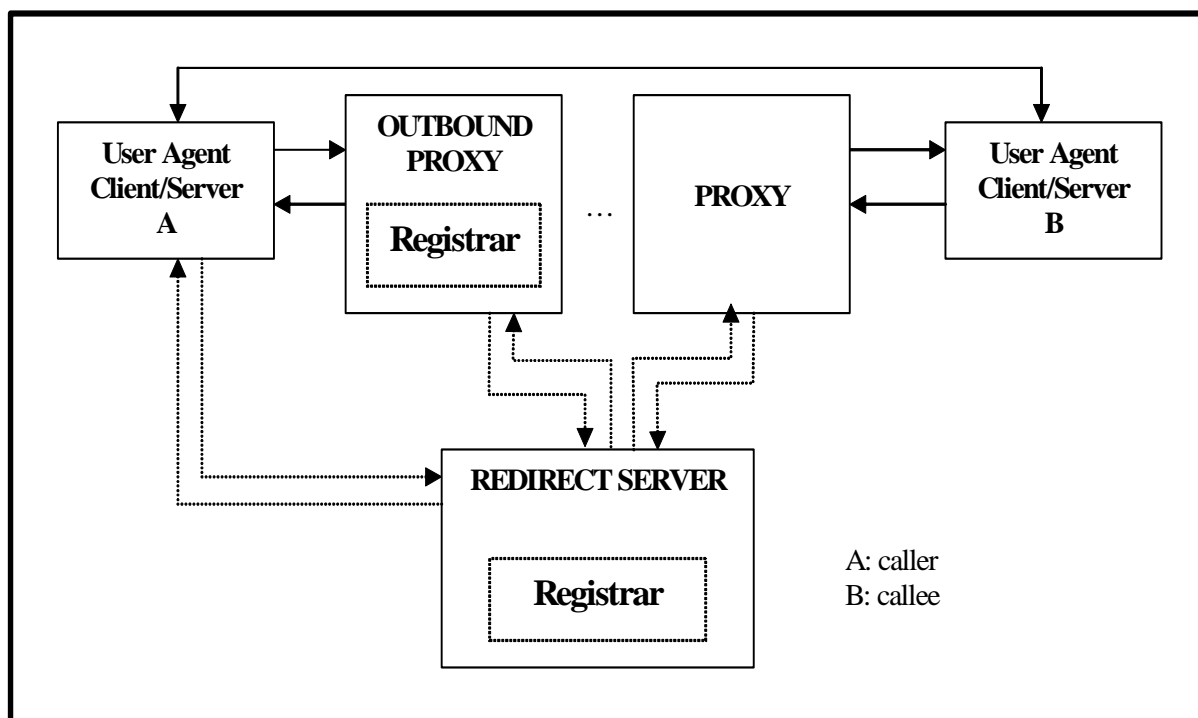


Figure 1: SIP protocol entities

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4.1.2 General assumptions

Test Purposes have been written for behaviours requested with "MUST" and conditional "SHOULD" as recommended test.

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Several proxy servers may forward the requests, but the test purposes are written from the point of view of one SIP entity only. The client can be either a user agent client or the client portion of a proxy server.

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SDP has been considered as the method used to describe the session, but no test purposes have been written to check the SDP content itself as it is out of the scope of the present document.

Proxy, redirect server and registrar shall support both UDP and TCP as transport layer while UA shall support at least UDP.

SIP entities are considered in the present document to be addressed with SIP-URIs, except for test purposes that validate the IUT's behaviour upon reception of non SIP-URIs. The features listed below are not covered by the present document. Reasons are described along with their description:

- ICMP Handling:
 - RFC 3261 [1] states that host, network, port, parameter or protocol errors SHOULD be treated as a 4xx response (Client-Server), which SHOULD therefore cause the server to cease retransmitting the response. Others (source quench ICMP messages and TTL exceeds) SHOULD be ignored.
- Timers T1, T2 (14.3.1 [1]):
 - RFC 3261 [1] states that retransmission of requests other than INVITE and ACK SHOULD be implemented when a SIP client is using an unreliable protocol (UDP).
- OPTION (8 [1]):
 - RFC 3261 [1] states that the OPTION method MUST be supported, but MAY be answered. Therefore, there is no guarantee that the IUT will respond to an option message. A Test Purpose is then not applicable.

- 380 (Alternative Service) message:
 - RFC 3261 [1] states that this message indicates, for an unsuccessful call, that Alternative services are possible. But, the alternative services are described in the message body content, which is not considered.
- TLS:
 - Encrypted transport TLS cannot run over UDP that is the default transport used in the following test. Additionally TLS is optional for UA.
- SIPS URI:
 - As TLS is not covered, the SIPS URIs are not covered too.

The verb "ignore" in test purpose means that the IUT does not react with an error message and does not take into account the element to be ignored. When this element is an undefined Header field, according to 10 [1], proxy shall not remove or modify it.

The adjective "unknown" means in the test purpose not defined in the standard [1] while "non-understood" means unknown from the point of view of the IUT.

The mandatory headers like Call-ID, CSeq, From, To, Via are supposed to be present in all messages as Max-Forwards in Request message without stressing those requirements in each test purpose (see clauses 8.1.1 and 8.2.6 of RFC 3261 [1]).

4.1.3 System under test

In SIP, a client can either send its request directly to the Request-URI or to its outbound proxy. It can also ask for SIP-URI to a redirect server before sending its request. Test purpose will apply depending of the current tested configuration.

Three kinds of session have been considered in the present document:

- Call using a proxy. [SIST-TS TS 102 027-1 V2.1.1:2004](https://standards.iteh.ai/catalog/standards/sist/bc603aba-c720-434e-998e-e0cda399c724/sist-ts-ts-102-027-1-v2-1-1-2004)
- Direct call with no proxy. <https://standards.iteh.ai/catalog/standards/sist/bc603aba-c720-434e-998e-e0cda399c724/sist-ts-ts-102-027-1-v2-1-1-2004>
- Call using a redirect server.

4.2 Overview of the Test Suite Structure (TSS)

The Test Suite Structure is based on SIP entities and assumptions as described in clause 4.1.2.

Figure 2 shows the Test Suite Structure (TSS).

Last Sub groups may be subdivided in three subgroups: Valid behaviour (V), Invalid behaviour (I), Inopportune behaviour (O).

Test Suite	Main Functionalities	Role	Functionalities subgroups	Test group		
SIP	Registration	Registrant		V		
		Registrar		V-I-O		
	Call Control	Originating Endpoint		Call establishment	V-Timers	
				Call release	V-I-Timers	
				Session Modification	V	
		Terminating Endpoint		Call establishment	V-I-Timers	
				Call release	V-I-Timers	
				Session Modification	V-I	
		Proxy	Message processing	Request		V-I
				Response		V
			Transaction	Client		V-Timers
				Server		V-Timers
	Redirect server		Call establishment		V	
			Call release		V	
	Messaging	Registrant			V-I	
		Registrar			V-I	
		Originating Endpoint			V-I	
Terminating Endpoint				V-I		
Proxy				V-I		
Redirect Server				V-I		

Figure 2: TSS for SIP

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5 Test Purposes (TP)

5.1 Introduction

5.1.1 TP naming convention

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).

5.1.2 State Definitions during a call

For more clarity and consistency, states defined in figures 5 and 7 in [1], have been reused in the wording of test purposes.

5.1.3 TP structure

Each test purpose is decomposed in seven keyword.

- "TPId" gives a unique identifier to each test purpose.
- "Status" specifies whether the test purpose or the group is mandatory or optional according to in RFC 3261 [1]. The group status applies to all test purposes belonging to this group.
- "Ref." outlines the references in RFC 3261 [1] used to create the test purpose.
- "Purpose" describes the objective of the test.

5.2 Test Purposes for Registration

5.2.1 Registrant

Group selection: Registration being listed as an option, the test purpose is applicable if the SUT is declared as supporting periodic registration and can behave as User Agent.

Status: Optional

5.2.1.1 Valid Behaviour

TPId: SIP_RG_RT_V_001

Status: Mandatory

Ref: 10.2 [1]

Purpose: Ensure that the IUT, in order to be registered, sends a REGISTER request to its registrar, without user name in the Request-URI and with a SIP-URI as request-URI.

TPId: SIP_RG_RT_V_002

Status: Mandatory

Ref: 10.3 [1]

Purpose: Ensure that the IUT having sent a REGISTER request is able to receive a Success (200 OK) response containing its current registration list in the Contact header and an expires parameter in the header.

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TPId: SIP_RG_RT_V_003

Status: Optional

Ref: 10.2.6 [1]

Purpose: Ensure that the IUT, in order to be registered, sends a REGISTER request to the its pre-configured registrar address and without username.

TPId: SIP_RG_RT_V_004

Status: Optional

Ref: 10.2.6 [1]

Purpose: Ensure that the IUT, in order to be registered, sends a REGISTER request to host part of address of record as the Request-URI and without username.

TPId: SIP_RG_RT_V_005

Status: Optional

Ref: 10.2.6 1

Purpose: Ensure that the IUT, in order to be registered, sends a REGISTER request to the well-known "all SIP servers" multicast address "sip.mcast.net" (224.0.1.75) and without username.

TPId: SIP_RG_RT_V_006
Status: Mandatory
Ref: 10.2.4 [1]
Purpose: Ensure that the IUT, already registered, sends at least one REGISTER request, during the shortest lifetime indicated in the Contact parameters of the Success (200 OK) response it has received.

TPId: SIP_RG_RT_V_007
Status: Recommended
Ref: 8.1.3.5 [1], 22.2 [1]
Purpose: Ensure that the IUT having sent a REGISTER message, on receipt of an Unauthorized (401 Unauthorized) response including a WWW-Authenticate header, repeats its REGISTER request with an Authorization header and with an incremented Cseq value.

TPId: SIP_RG_RT_V_008
Status: Mandatory
Ref: 10.2 [1]
Purpose: Ensure that the IUT, in order to be registered, sends a REGISTER request to its registrar, with a address-of record in the To header of type SIP URI.

TPId: SIP_RG_RT_V_009
Status: Mandatory
Ref: 10.2 [1]
Purpose: Ensure that the IUT, in order to be registered, sends a REGISTER request to its registrar, with the same URI in the From and the To header.

TPId: SIP_RG_RT_V_010
Status: Mandatory
Ref: 10.2 [1]
Purpose: Ensure that the IUT having sent a REGISTER request, does not send a new registration before the REGISTER request has timed out in case of no final response is received.

TPId: SIP_RG_RT_V_011
Status: Mandatory
Ref: 10.2 [1]
Purpose: Ensure that the IUT having sent a REGISTER request, will increment the CSeq value by one in the next new REGISTER request with the same Call-ID.