ETSI TS 101 586 V1.1.1 (2012-04)

Technical Specification

IMS Network Testing (INT);

User Documentation and IMS Codec and Adapter layer software for IPv6 and 3GPP Release 9

Reference

DTS/INT-00060

Keywords

IMS, testing

ETSI

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Foreword

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

1 Scope

The purpose of the present document is to present and describe issues and design choices made to support IPv6 into the generic test adapter and codec suited for TTCN-3 interoperability testing within STF370, STF407 and STF435.

NOTE: Both client and server were concerned by supporting of IPv6.

For further information, the reader is referred to EG 202 810 [i.2] for global view of methodology and framework for automated interoperability testing and TR 102 788 [i.3] for an overall view of the IMS interoperability test architecture which has served as the main source for design requirements.

The present document has been written with the assumption that the reader is well versed in C++ and TTCN-3 (ES 201 873-1 [i.1]) programming. Also good knowledge of the operation of ES 201 873-5 [i.7] and ES 201 873-6 [i.8] standards is assumed.

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 referenced document (including any amendments) applies.

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NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

2.1 Normative references

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

[1] IETF RFC 4291: "IP Version 6 Addressing Architecture".

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 ES 201 873-1 (V3.4.1): "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 1: TTCN-3 Core Language".

[i.2] ETSI EG 202 810: "Methods for Testing and Specification (MTS); Automated Interoperability Testing; Methodology and Framework".

[i.3] ETSI TR 102 788: "Methods for Testing and Specification (MTS); Automated Interoperability Testing; Specific Architectures".

[i.4] ETSI TR 101 561 (V1.1.1): "IMS Network Testing (INT); Enhancement of Automated Interoperability Testing Framework in IMS core networks: Test adapter And codec design suited for TTCN-3 interoperability testing".

[i.5] ETSI EG 202 568: "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT); Testing: Methodology and Framework".

[i.6] ETSI TS 186 011-3: "IMS Network Testing (INT); IMS NNI Interoperability Test Specifications; Part 3: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT)".

[i.7]   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)".

[i.8]   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)".

[i.9]   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)".

3   Abbreviations

For the purposes of the present document, the abbreviations given in [1], [i.1], [i.2], [i.3], [i.4], [i.5], [i.6], [i.7], [i.8], [i.9] and the following apply:

ATM	Abstract Test Method
IPv6	Internet Protocol version 6
MSRP	Message Session Relay Protocol
PCAP	Packet CAPture
SIP	Session Internet Protocol
SDP	Session Description Protocol
TTCN-3	Testing and Test Control Notation 3

4   Abstract Test Method (ATM)

This clause describes the impact supporting IPv6 into the generic test adapter and codec.

4.1   Introduction

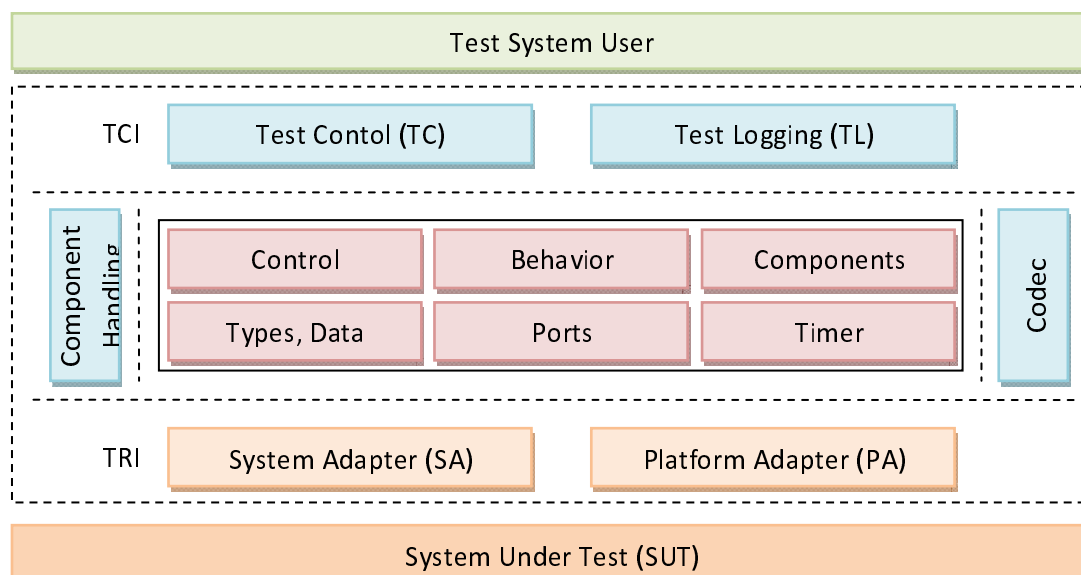The test adapter software architecture is described figure 1.

Figure 1: Abstract Test System Architecture

The main components are:

- A Lower Test Adapter which provides traffic capture processing functionality which includes handling both IPv4 and IPv6 and TCP fragmentation, isolation of protocol messages, etc.

- A PCAP capture process which interacts with the Lower Test Adapter.

- An Upper Test Adapter which converts TTCN-3 equipment operation messages into EUT operator instructions and can process their feedback based on a terminal window.

- TRI implementation.

- Codecs for decoding of configuration message request and encoding responses in the adapter.

NOTE: Refer to TR 101 561 [i.4] for more details.

4.2   Impact on the Test Adapter

The adapter conceptually splits into three parts:

a)   an upper test adapter which provides an implementation of vendor specific operation of different EUTs involved in an interoperability test;

b)   a lower test adapter which captures traffic and isolates requested payloads based on filter criteria specified by an interoperability test suite and forwards them as raw data to the test suite; and

c)   a TTCN-3 platform adapter implementing timers.

Only the lower tester is impacted by supporting IPv6.

NOTE: As the PCAP library already support IPv6 protocol, the PCAP Traffic Capture process (refer to TR 101 561 [i.4], clause 6.1) is not concerned by supporting IPv6.

4.3   Impact on the Codec

SIP, SDP and MSRP stacks are concerned by changes involved supporting IPv6.

5   Supporting IPv6 on the lower tester part

The lower test adapter provides traffic capture processing functionality which includes handling of IPv4/IPv6 and TCP fragmentation, isolation of protocol messages, etc., ([i.4], clause 6.2.2).

6   Supporting IPv6 on the codec

Only addressing and versioning parts of SIP/SDP/MSRP stacks are concerned by supporting IPv6.

As described in TR 101 561 [i.4], clause 6.1, the codec is based on regular expression. In consequence, the impact of supporting IPv6 is reduced. The regular expression assertions were enhanced to include IPv6 formalism [1].

```
// IPv6
#define SIPREG_HEX4      "[" SIPCHARS_HEXA "]{1,4}"
#define SIPREG_HEXSEQ       SIPREG_HEX4 "([:]" SIPREG_HEX4 ")*"
#define SIPREG_HEXPART  "(((" SIPREG_HEXSEQ ")?[:]{2}(" SIPREG_HEXSEQ ")?)|(" SIPREG_HEXSEQ  "))"
#define SIPREG_IP6       "[[]" SIPREG_HEXPART "([:]" SIPREG_IP4 ")?[]]"

// host
#define SIPREG_HOST      "((" SIPREG_HOSTNAME ")|(" SIPREG_IP4 ")|(" SIPREG_IP6 "))"
#define SIPREG_ABSOLUTE_URI "([" SIPCHARS_UNRESERVED "/;?:@&=+$,]|" SIPREG_ESCAPED ")+"
```

7   Untestable Test Purposes

Not applicable.

8   ATS conventions

TTCN-3 can be considered a programming language. Therefore, the usage of naming conventions supports or increases code readability, consistency, and maintainability of the code. It also helps to achieve earlier detection of semantic errors and the distribution of test suite development work across several developers.

The naming convention used by this test suite is based on the ETSI generic naming conventions and follows the underlying principles:

- when constructing meaningful identifiers, the general guidelines specified for naming in clause 8 of EG 202 568 [i.5] 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 1 (as described by EG 202 568 [i.5], clause 8) 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 1 specifies the naming guidelines for each construct of the TTCN-3 language indicating the recommended prefix and capitalization.

Table 1: Naming Conventions

Language element	Naming convention	Prefix	Example	Notes
Module	Upper-case initial letter	none	LibSip_TypesAndValues	
Group	Lower-case initial letter	none	messageGroup	
Data type	Upper-case initial letter	none	SetupContents	
Message template	Lower-case initial letter	m_	m_response	Note 1
Message template with wildcard or matching expression	Lower-case initial letter	mw_	mw_response	Note 2
Modifying message template	Lower-case initial letter	md_	md_response	Note 1
Modifying message template with wildcard or matching expression	Lower-case initial letter	mdw_	mdw_reponse	Note 2
Port instance	Lower-case initial letter	none	configPort	
Test component reference	Lower-case initial letter	none	userTerminal	
Constant	Lower-case initial letter	c_	c_maxRetransmission	
Constant (defined within component type)	Lower-case initial letter	cc_	cc_maxRetransmission	
External constant	Lower-case initial letter	cx_	cx_macId	
Function	Lower-case initial letter	f_	f_authentication()	
External function	Lower-case initial letter	fx_	fx_calculateLength()	
Altstep (incl. Default)	Lower-case initial letter	a_	a_receiveSetup()	
Test case	All upper-case letters	TC_	TC_IMS_MESS_0001	
Variable (defined locally)	Lower-case initial letter	v_	v_macId	Note 3
Variable (defined within component type)	Lower-case initial letter	vc_	vc_systemName	

Language element	Naming convention	Prefix	Example	Notes
Timer (defined locally)	Lower-case initial letter	t_	t_wait	
Timer (defined within component type)	Lower-case initial letter	tc_	tc_authMin	
Module parameter	All upper-case letters	none	PX_MAC_ID	
Parameterization	Lower-case initial letter	p_	p_macId	
Enumerated Value	Lower-case initial letter	e_	e_syncOk	
NOTE 1: This prefix should be used for all template definitions which do *not* assign or refer to templates with wildcards or matching expressions, e.g. templates specifying a constant value, parameterized templates without matching expressions, etc. NOTE 2: This prefix should be used in identifiers for templates which either assign a wildcard or matching expression (e.g. ?, *, value list, ifpresent, pattern, etc.) or reference another template which assigns a wildcard or matching expression. NOTE 3: In this case it is acceptable to use underscore within an identifier.				

NOTE: Naming conventions have been enforced only in the TTCN-3 code written within this project for this ATS. There may be some minor deviations from these conventions in code that has been reused from other ETSI projects.

In addition to the above naming conventions, TTCN-3 functions which specify behaviour that is to execute on the main test component should use a "f_mtc_" prefix to distinguish it from functions which can run on PTCs which have no prefix extension. For further information on function design the reader is referred to [i.6].

9   Abstract Test Suite (ATS)

This ATS has been produced using the Testing and Test Control Notation (TTCN) according to ES 201 873-2 [i.9].

History

Document history		
V1.1.1	April 2012	Publication