ETSI TS 104 153-3 V1.1.1 (2026-02)

TECHNICAL SPECIFICATION

Core Network and Interoperability Testing (INT); Conformance Testing for IP/ICMP Translation Algorithm; (IETF RFC 7915); Part 3: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) pro forma specification

Reference
DTS/INT-00208-3

Keywords
ATS, conformance, IPv6, PIXIT

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Foreword

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

The present document is part 3 of a multi-part deliverable. Full details of the entire series can be found in part 1 [2].

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document specifies the Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) pro forma for the test specification for the IP/ICMP Translation Algorithm as specified in IETF RFC 7915 [1] in compliance with the relevant requirements and in accordance with the relevant guidance given in ISO/IEC 9646-7 [i.2] and ETSI ETS 300 406 [5].

The test notation used in the ATS is TTCN-3 (see ETSI ES 201 873-1 [i.3]).

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;
- TTCN styles and conventions;
- the partial PIXIT pro forma;
- the modules containing the TTCN-3 ATS.

Annex A provides the Partial Implementation Extra Information for Testing (PIXIT) pro forma.

2 References

2.1 Normative 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.

Referenced documents which are not found to be publicly available in the expected location might be found in the ETSI docbox.

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

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

[1] IETF RFC 7915: "IP/ICMP Translation Algorithm".

[2] ETSI TS 104 153-1: "Core Network and Interoperability Testing (INT); Conformance Testing for IP/ICMP Translation Algorithm; (IETF RFC 7915); Part 1: Protocol Implementation Conformance Statement (PICS)".

[3] ETSI TS 104 153-2: "Core Network and Interoperability Testing (INT); Conformance Testing for IP/ICMP Translation Algorithm; (IETF RFC 7915); Part 2: Test Suite Structure (TSS) and Test Purposes (TP)".

[4] ISO/IEC 9646-6: "Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 6: Protocol profile test specification".

[5] ETSI ETS 300 406: "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

2.2 Informative 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.

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

The following referenced documents may be useful in implementing an ETSI deliverable or add to the reader's understanding, but are not required for conformance to the present document.

[i.1] ISO/IEC 9646-1: "Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 1: General concepts".

[i.2] ISO/IEC 9646-7: "Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 7: Implementation Conformance Statements".

[i.3] 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".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ISO/IEC 9646-7 [i.2] and IETF RFC 7915 [1] apply.

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ISO/IEC 9646-1 [i.1], ISO/IEC 9646-6 [4], ISO/IEC 9646-7 [i.2], IETF RFC 7915 [1] and the following apply:

ATM	Abstract Test Method
ATS	Abstract Test Suite
CF	Configuration
GE	Generation of ICMPv4/ICMPv6 Error messages
ICMP	Internet Control Message Protocol
ICMPE	translating ICMPv4/ICMPv6 Error messages
ICMPH	translating ICMPv4/ICMPv6 Headers
ICMPv4	Internet Control Message Protocol version 4
ICMPv6	Internet Control Message Protocol version 6
IP	Internet Protocol
IPHDR	translating IPv4/IPv6 Headers
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
IUT	Implementation Under Test
SIIT	Stateless IP/ICMP Translation
SUT	System Under Test
TLH	Transport-Layer Header translation
TS	Test System
WTT	knowing When To Translate
XLAT	Translator

4 Abstract Test Method (ATM)

4.1 Introduction

This clause describes the ATM used to test the IP/ICMP Translation Algorithm at the translator.

4.2 Test architecture

4.2.1 Test method

Void.

4.2.2 Test machine configuration

Following configurations are simplified to highlight tested interface and involved entities.

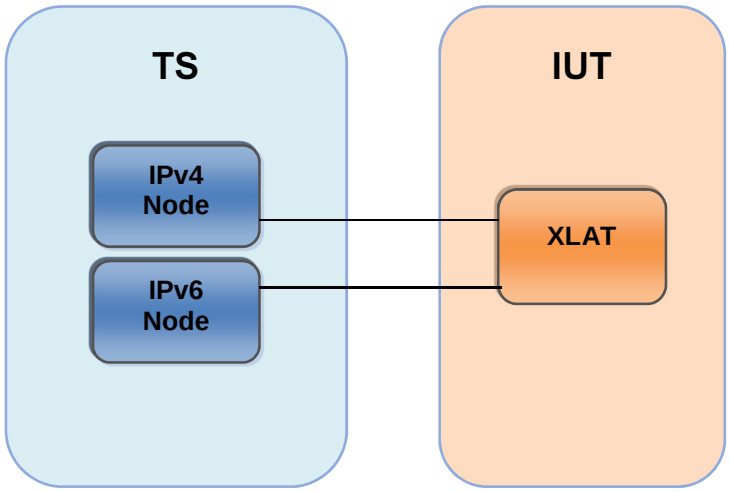

Figure 1: Test configuration CF_XLAT_SIIT

5 ATS conventions

5.1 Introduction

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 testing conventions and the naming conventions. The naming conventions describe the structure of the naming of all ATS elements.

To define the ATS, the guidelines of ETSI ETS 300 406 [5] were considered.

5.2 Testing conventions

5.2.1 Test cases Preamble and Postamble

As described in the ETSI TS 104 153-2 [3], the test tool is required to emulate both an IPv4 node and an IPv6 node. It must handle traffic conversion in two directions: IPv4-to-IPv6 (T46) and IPv6-to-IPv4 (T64). For that reason, the test case preambles and postambles are named as follows:

IUT is an XLAT (example TC_XLAT_T46_IPHDR_01)

```
f_cf_XLAT_T46_IPHDR_Up

f_cf_XLAT_T46_IPHDR_Down
```

IUT is an XLAT (example TC_XLAT_T64_IPHDR_01)

```
f_cf_XLAT_T64_IPHDR_Up

f_cf_XLAT_T64_IPHDR_Down
```

5.3 Naming conventions

5.3.1 General guidelines

The naming conventions are based on the following underlying principles:

- In most cases, identifiers should be prefixed with a short alphabetic string (specified in table 1) indicating the type of TTCN-3 element it represents.
- Suffixes should not be used except in those specific cases identified in table 1.
- Prefixes and suffixes should be separated from the body of the identifier with an underscore ("_").

EXAMPLE 1: `c_sixteen, t_wait_max`.

- Only 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.
- The start of second and subsequent words in an identifier should be indicated by capitalizing the first character. Underscores should not be used for this purpose.

EXAMPLE 2: `f_send_Location_Reporting_Control`.

Table 1 specifies the naming guidelines for each element of the TTCN-3 language indicating the recommended prefix, suffixes (if any) and capitalization.

Table 1: TTCN-3 naming convention

Language element	Naming convention	Prefix	Suffix	Example	Notes
Module	Use upper-case initial letter	LibNGAP_	*none*	LibNGAP_Interface	
TSS grouping	Use all upper-case letters	*none*	*none*	NGAP_gNB_PDU	
Message template	Use lower-case initial letter	m_	none	m_E_PDUSetupRequest	
Message template with wildcard or matching expression	Use lower-case initial letters	mw_	none	mw_cause	
Port instance	Use upper-case initial letter	*none*	*none*	NGAPPort	
Constant	Use lower-case initial letter	c_	*none*	c_maxRetransmission	
Function	Use lower-case initial letter	f_	*none*	f_recv_NGAP_PDU()	
Altstep	Use lower-case initial letter	a_	*none*	a_receive()	
Variable	Use lower-case initial letter	v_	*none*	v_basicId	
PICS values	Use all upper case letters	*PICS_*	*none*	PICS_NGAP_AMF_IUT	See note
PIXIT values	Use all upper case letters	*PX_*	*none*	PX_NGAP_AMF_ETS_PORT	See note
Parameterization	Use lower-case initial letter	p_	*none*	p_servedPLMNs	
Enumerated Value	Use lower-case initial letter	e_	*none*	e_preamble	
NOTE: In this case it is acceptable to use underscore as a word delimiter.					

5.3.2 Test case grouping

The ATS structure is based on the Test Purposes for the IP/ICMP Translation Algorithm as defined in ETSI TS 104 153-2 [3].

5.3.3 Test case identifiers

The test cases have been divided according to the functionalities into several groups.

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

Table 2: TC identifier naming convention scheme

Identifier: **<TC>_<scope>_<nn>**		
<tc>	= Test Case:	fixed to "TC"
<interface or protocol>		Interface or protocol: stateless IP/ICMP translation (SIIT) algorithm
<direction>		from IPv4 to IPv6 (T46) or from IPv6 to IPv4 (T64)
<scope>	= group	IPHDR Translating IPv4/IPv6 Headers
		ICMPH Translating ICMPv4/ICMPv6 Headers
		ICMPE Translating ICMPv4/ICMPv6 Error Messages
		GE Generation of ICMPv4/ICMPv6 Error Message
		TLH Transport-Layer Header Translation
		WTT Knowing When to Translate
<nn>	= sequential number	(01 to 99)

NOTE: This naming scheme results into a one-to-one correspondence between the test purpose identifiers as defined in ETSI TS 104 153-2 [3] and the test case identifiers.
The TP identifier of the test case TC_xxx_01 is TP_xxx_01.

Annex A (normative): SIIT partial PIXIT pro forma

A.1 The right to copy

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

The PIXIT Pro forma is based on ISO/IEC 9646-6. Any additional information which may be needed can be found in this international standard document.

A.2 Identification summary

Table A.1

PIXIT Number:	
Test Laboratory Name:	
Date of Issue:	
Issued to:	

A.3 ATS summary

Table A.2

Protocol Specification:	IETF RFC 7915
Protocol to be tested:	SIIT
ATS Specification:	ETSI TS 104 153-2
Abstract Test Method:	ETSI TS 104 153-3, clause 4

A.4 Test laboratory

Table A.3

Test Laboratory Identification:	
Test Laboratory Manager:	
Means of Testing:	
SAP Address:	

A.5 Client identification

Table A.4

Client Identification:	
Client Test manager:	
Test Facilities required:	

A.6 SUT

Table A.5

Name:	
Version:	
SCS Number:	
Machine configuration:	
Operating System Identification:	
IUT Identification:	
PICS Reference for IUT:	
Limitations of the SUT:	
Environmental Conditions:	

A.7 Protocol layer information

A.7.1 Protocol identification

Table A.6

Name:	IETF RFC 7915: "IP/ICMP Translation Algorithm"
Version:	
PICS References:	ETSI TS 104 153-1

A.8 PIXIT items

A.8.1 Introduction

Tables in this clause need to be filled by the IUT Manufacturer to specify how the IUT needs to be configured with IUT specific values or describe IUT specific procedures required for complete testing of the IUT.

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

A.8.2 Port and Address items

Table A.7: Test system ports and addresses

Item	Identifier	Type	Description
1	PX_XLAT_T46_IPADDR	Charstring	IP address of the XLAT test system connected to IPv4 node
2	PX_XLAT_T46_PORT	Integer	Port number of the XLAT test system connected to IPv4 node
3	PX_XLAT_T64_IPADDR	Charstring	IP address of XLAT test system connected to IPv6 node
4	PX_XLAT_T64_PORT	Integer	Port number of XLAT test system connected to IPv6 node

Table A.8: SUT ports and addresses

Item	Identifier	Type	Description
1	PX_XLAT_SUT_T46_IPADDR	Charstring	IP address of the XLAT system under test connected to IPv4 node
2	PX_XLAT_SUT_T46_PORT	Integer	Port number of the XLAT system under test connected to IPv4 node
3	PX_XLAT_SUT_T64_IPADDR	Charstring	IP address of the XLAT system under test connected to IPv6 node
4	PX_XLAT_SUT_T64_PORT	Integer	Port number of the XLAT system under test connected to IPv6 node

History

Version	Date	Status
V1.1.1	February 2026	Publication