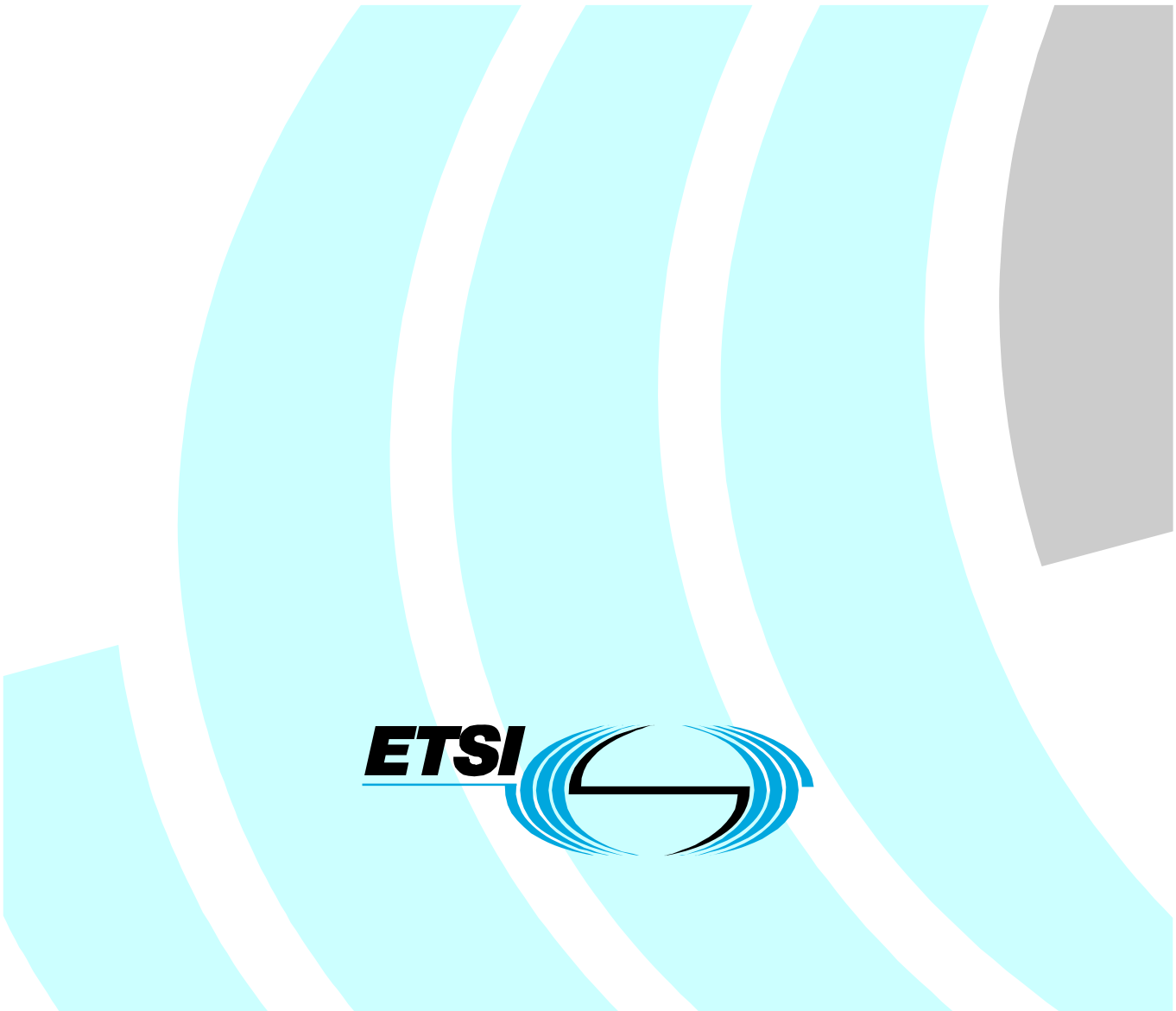
ETSI TS 102 751 V1.1.1 (2008-03)

Technical Specification

Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT): IPv4 to IPv6 Transitioning; Conformance Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma



Reference
DTS/MTS-IPT-021-IPv6-TrsATS

Keywords
IP, IPv6, testing, TTCN

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Contents

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Methods for Testing and Specification (MTS).

1 Scope

The present document specifies the Abstract Test Suite (ATS) for the IPv4 to IPv6 transitioning functions of the Internet Protocol, as defined in the specifications [11] through to [14]. The ATS is based on the requirements defined in the IPv6 requirements catalogue (TS 102 599 [2]) and theIPv6 test purposes (TS 102 518 [3]) and written according to the guidelines of TS 102 514 [1], ISO/IEC 9646-2 [5] and ETS 300 406 [9].

The objective of the present document is to provide a basis for conformance tests for IPv6 equipment giving a high probability of inter-operability between different manufacturer's IPv6 equipments.

Annex A provides the Tree and Tabular Combined 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.

NOTE: Annex B provides only the PIXIT items relevant for the IPv4 to IPv6 transitioning functions. It is therefore necessary to also fill the core PIIXT item in TS 102 516 [15] to gain all PIXIT values needed to run the mobility test campaign.

2 References

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.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
  - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
  - for informative references.

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For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

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 indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] ETSI TS 102 351: "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT); IPv6 Testing: Methodology and Framework".

[2] ETSI TS 102 599: "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT): IPv4 to IPV6 Transitioning; Requirements Catalogue".

[3] ETSI TS 102 518: "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT); IPv4 to IPv6 Transitioning; Conformance Test Suite Structure and Test Purposes (TSS&TP)".

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

[5] ISO/IEC 9646-2: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract Test Suite specification".

[6] ISO/IEC 9646-4: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 4: Test realization".

[7] ISO/IEC 9646-5: "Information technology - Open Systems Interconnection - Conformance testing methodology and Framework - Part 5: Requirements on test laboratories and clients for the conformance assessment process".

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

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

[10] 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".

[11] IETF RFC 2529: "Transmission of IPv6 over IPv4 Domains without Explicit Tunnels".

[12] IETF RFC 2765: "Stateless IP/ICMP Translation Algorithm (SIIT)".

[13] IETF RFC 3056: "Connection of IPv6 Domains via IPv4 Clouds".

[14] IETF RFC 4213: "Basic Transition Mechanisms for IPv6 Hosts and Routers".

[15] ETSI TS 102 516: "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT): IPv6 Core Protocol; Conformance Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma".

2.2 Informative references

Not applicable.

3 Definitions and abbreviations

3.1 Definitions

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

ATM	Abstract Test Method
ATS	Abstract Test Suite
ETS	Executable Test Suite
IETF	Internet Engineering Task Force
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
IUT	Implementation Under Test
MOT	Means Of Testing
PCTR	Protocol Conformance Test Report
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PTC	Parallel Test Component
SUT	System Under Test
TC	Test Case
TP	Test Purpose
TSS	Test Suite Structure

4 Abstract Test Method (ATM)

This clause describes the ATM used to test the IPv4 to IPv6 transitioning functions as defined in the RFC specifications [11] through to [14]. The three following configurations have been developed to test the different types of IUT, 6to4-Nodes, 6to4-Routers, IP6/IP4_Nodes and IPtranslators.

4.1 CF_TRANS_01

Used to test 6to4Router only.

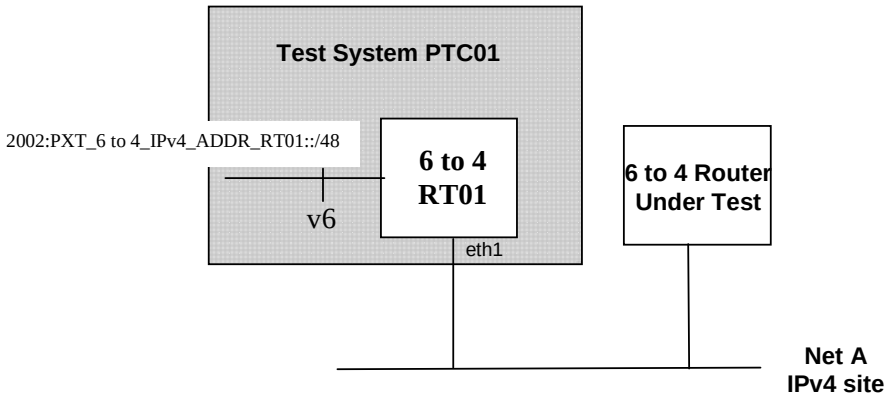

Figure 1: CF_TRANS_01

4.2 CF_TRANS_02

Used to test 6to4Router only.

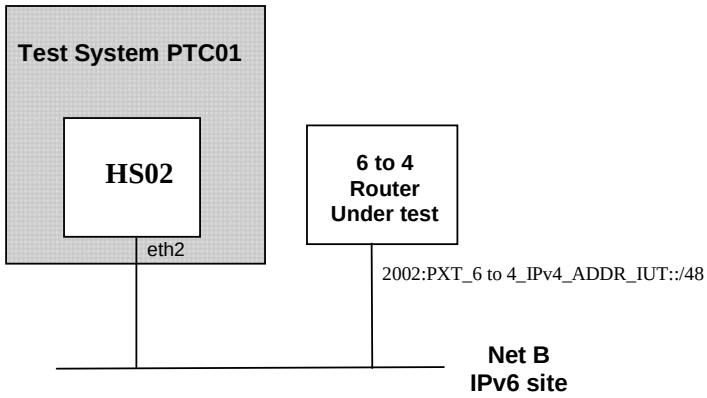

Figure 2: CF_TRANS_02

4.3 CF_TRANS_03

Used to test 6to4Router only.

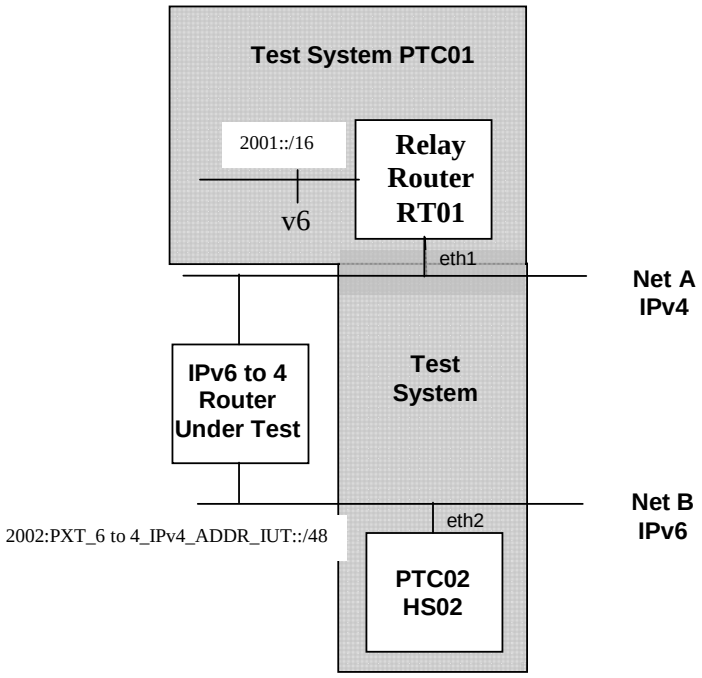

Figure 3: CF_TRANS_03

4.4 CF_TRANS_04

Used to test SIIT translator only.

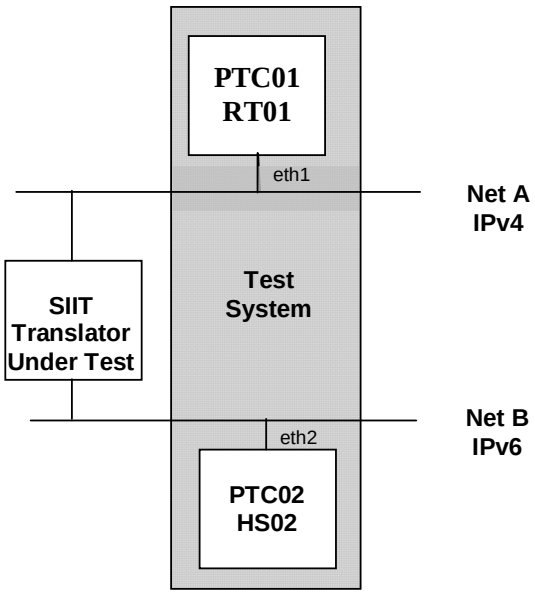

Figure 4

4.5 CF_TRANS_05

Used to test 6over4Nodes.

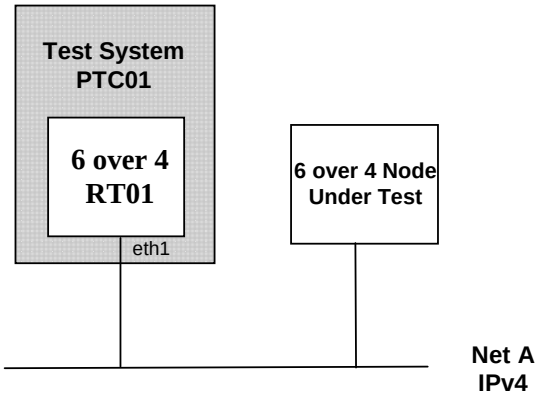

Figure 5: CF_TRANS_05

The same configuration is used to test the IPv4 interface of RFC 4213 [14] implementations.

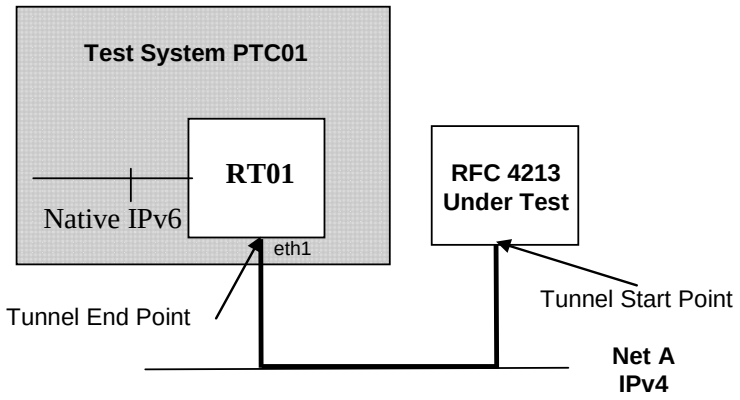

Figure 6: CF_TRANS_05

4.6 CF_TRANS_06

Used to test the IPv6 interface of RFC 4213 [14] implementations. The HS02 part of configuration CF_CORE_02 is used.

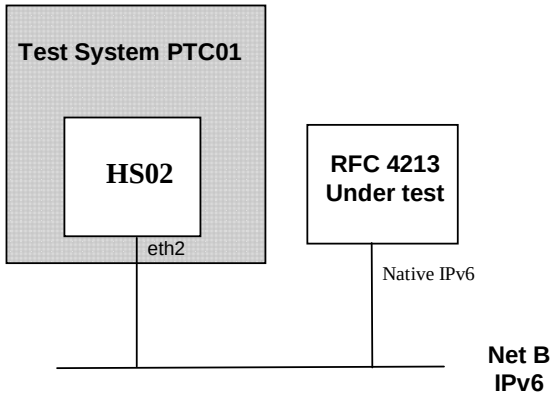

Figure 7: CF_TRANS_06

4.7 CF_TRANS_07

Used to test the IPv6 and IPv4 interface of RFC 4213 [14] implementations. It is the addition of the CF_TRANS_05 and CF_TRANS_06.

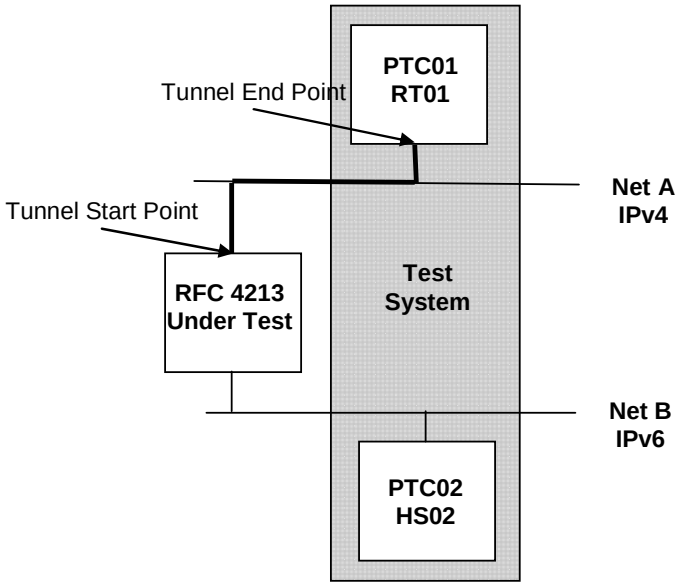

Figure 8: CF_CORE_07

5 Untestable and not implemented Test Purposes (TP)

The ATS is comprised of 106 TC. Those were derived from a total of 113 TP.

5.1 Untestable TP

This clause gives a list of 7 TP, which are not implemented in the ATS due to the chosen ATM or other restrictions:

TP_TRA_4065_01, TP_TRA_4047_01, TP_TRA_4075_02, TP_TRA_4078_01, TP_TRA_4078_02, TP_TRA_4078_03, TP_TRA_4078_04

6 ATS conventions

The following clause describes the cleanup procedures used in this ATS.

Descriptions of the ATS conventions are found in TS 102 351 [1]. The ATS implementation details for the IPv6 core test suite, including mapping procedures and ATS value conventions are found in TS 102 516 [15].

7 PCTR conformance

A test laboratory, when requested by a client to produce a PCTR, is required, as specified in ISO/IEC 9646-5 [7], to produce a PCTR conformant with the PCTR template given in annex B of ISO/IEC 9646-5 [7].

Furthermore, a test laboratory, offering testing for the ATS specification contained in annex C, when requested by a client to produce a PCTR, is required to produce a PCTR conformant with the PCTR proforma contained in annex A.

A PCTR which conforms to this PCTR proforma specification shall preserve the content and ordering of the clauses contained in annex A. Clause A.6 of the PCTR may contain additional columns. If included, these shall be placed to the right of the existing columns. Text in italics may be retained by the test laboratory.

8 PIXIT conformance

A test realizer, producing an executable test suite for the Abstract Test Suite (ATS) specification contained in annex C, is required, as specified in ISO/IEC 9646-4 [6], to produce an augmented partial PIXIT proforma conformant with this partial PIXIT proforma specification.

An augmented partial PIXIT proforma which conforms to this partial PIXIT proforma specification shall, as a minimum, have contents which are technically equivalent to annex B. The augmented partial PIXIT proforma may contain additional questions that need to be answered in order to prepare the Means Of Testing (MOT) for a particular Implementation Under Test (IUT).

A test laboratory, offering testing for the ATS specification contained in annex C, is required, as specified in ISO/IEC 9646-5 [7], to further augment the augmented partial PIXIT proforma to produce a PIXIT proforma conformant with this partial PIXIT proforma specification.

A PIXIT proforma which conforms to this partial PIXIT proforma specification shall, as a minimum, have contents which are technically equivalent to annex B. The PIXIT proforma may contain additional questions that need to be answered in order to prepare the test laboratory for a particular IUT.

9 ATS Conformance

The test realizer, producing a Means Of Testing (MOT) and Executable Test Suite (ETS) for the present document, shall comply with the requirements of ISO/IEC 9646-4 [6]. In particular, these concern the realization of an Executable Test Suite (ETS) based on each ATS. The test realizer shall provide a statement of conformance of the MOT to the present document.

An ETS which conforms to the present document shall contain test groups and test cases which are technically equivalent to those contained in the ATS in annex C. All sequences of test events comprising an abstract test case shall be capable of being realized in the executable test case. Any further checking which the test system might be capable of performing is outside the scope of the present document and shall not contribute to the verdict assignment for each test case.

Test laboratories running conformance test services using this ATS shall comply with ISO/IEC 9646-5 [7].

A test laboratory which claims to conform to this ATS specification shall use an MOT which conforms to this ATS.

Annex A (normative): Abstract Test Suite (ATS)

A.1 The ATS in TTCN-3 core (text) format

This ATS has been produced using the Testing and Test Control Notation (TTCN-3) according to ES 201 873-1 [10].

The TTCN-3 core (text) representation corresponding to this ATS is contained in several ASCII files contained in archive ts_102751v010101p0.zip which accompanies the present document.

Annex B (normative): Partial PIXIT proforma

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 PIXIT proforma in this annex so that it can be used for its intended purposes and may further publish the completed PIXIT.

The PIXIT Proforma is based on ISO/IEC 9646-6 [8]. Any needed additional information can be found in there.

B.1 Identification summary

Table B.1

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

B.2 ATS summary

Table B.2

Protocol Specification:	
Protocol to be tested:	
ATS Specification:	
Abstract Test Method:	

B.3 Test laboratory

Table B.3

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

B.4 Client identification

Table B.4

Client Identification:	
Client Test manager:	
Test Facilities required:	

B.5 SUT

Table B.5

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

B.6 Protocol layer information

NOTE: The tables below provide only the PIXIT items relevant for the IPv4 to IPv6 transitioning functions of IPv6. It is therefore necessary to also fill the core PIXIT item in TS 102 516 [15] to gain all PIXIT values needed to run the transitioning test campaign.

B.6.1 Protocol identification

Table B.6

Name:	
Version:	
PICS References:	

B.6.2 Addresses

Table B.7: Addresses

Name	Type	Comments	Value
PX_IPv4_NOT_CONFIGURED_ENCAPSULATOR_ADDR_RT01	Ipv4 Address	Source Address of TN for TC_TRA_4048_01. This address is not know to the tunnel configuration.	
PX_IPv4_ADDR_RT01	Ipv4 Address	IPv4 Adress of router 1 (see clause 4).	
PX_IPv4_ADDR_IUT	Ipv4 Address	IPv4 Adress of IUT (see clause 4).	
PX_6to4_IF_ID_IUT	Octetstring [8]	Interface Id of 6 to4 IUTs primary interface.	
PX_6to4_SUBNET_ID_IUT	Octetstring [2]	Subnet Id of 6 to4 IUTs primary interface.	

Annex C (normative): PCTR proforma

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 PCTR proforma in this annex so that it can be used for its intended purposes and may further publish the completed PCTR.

The PCTR proforma is based on ISO/IEC 9646-6 [8]. Any needed additional information can be found in there.

C.1 Identification summary

C.1.1 Protocol conformance test report

Table C.1

PCTR Number:	
PCTR Date:	
Corresponding SCTR Number:	
Corresponding SCTR Date:	
Test Laboratory Identification:	
Test Laboratory Manager:	
Signature:	

C.1.2 IUT identification

Table C.2

Name:	
Version:	
Protocol specification:	
PICS:	
Previous PCTR if any:	

C.1.3 Testing environment

Table C.3

PIXIT Number:	
ATS Specification:	
Abstract Test Method:	
Means of Testing identification:	
Date of testing:	
Conformance Log reference(s):	
Retention Date for Log reference(s):	

C.1.4 Limits and reservation

Additional information relevant to the technical contents or further use of the test report, or the rights and obligations of the test laboratory and the client, may be given here. Such information may include restriction on the publication of the test report.

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C.1.5 Comments

Additional comments may be given by either the client or the test laboratory on any of the contents of the PCTR, for example, to note disagreement between the two parties.

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C.2 IUT Conformance status

This IUT has or has not been shown by conformance assessment to be non conforming to the specified protocol specification.

Strike the appropriate words in this sentence. If the PICS for this IUT is consistent with the static conformance requirements (as specified in clause C.3) and there are no "FAIL" verdicts to be recorded (in clause C.6) strike the words "has or", otherwise strike the words "or has not".

C.3 Static conformance summary

The PICS for this IUT is or is not consistent with the static conformance requirements in the specified protocol.

Strike the appropriate words in this sentence.

C.4 Dynamic conformance summary

The test campaign did or did not reveal errors in the IUT.

Strike the appropriate words in this sentence. If there are no "FAIL" verdicts to be recorded (in clause C.6) strike the words "did or" otherwise strike the words "or did not".

Summary of the results of groups of test:

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C.5 Static conformance review report

If clause C.3 indicates non-conformance, this clause itemizes the mismatches between the PICS and the static conformance requirements of the specified protocol specification.

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C.6 Test campaign report

Table C.4

ATS Reference	Selected?	Run?	Verdict	Observations
Group 1 IPv6 Transitioning - RFC 2529 [11]				
Group 1.1 Node Tests				
Group 1.1.1 Encapsulating IPv4 Header frame format validation				
TC_TRA_1003_01				
TC_TRA_1004_01				
TC_TRA_1007_01				
Group 1.1.2 Stateless Auto-configuration and Link-local addresses on 6over4				
TC_TRA_1009_01				
Group 1.1.3 Source and Target Link layer address options				
TC_TRA_1013_01				
TC_TRA_1013_02				
TC_TRA_1013_03				
TC_TRA_1013_04				
Group 1.1.4 IPv6 Multicast address mapping to IPv4 multicast address to support Neighbor Discovery				
TC_TRA_1017_01				
TC_TRA_1017_02				
TC_TRA_1017_03				
Group 1.2 Route Tests				
Group 1.2.1 Boundary routers handling multicast IPv4 packets from 6over4 domain				
TC_TRA_1024_02				
Group 2 IPv6 Transitioning - RFC 2765 [12]				
Group 2.1 IPv4-to-IPv6 translation				
TC_TRA_3003_01				
TC_TRA_3004_01				
TC_TRA_3012_01				
TC_TRA_3020_01				
TC_TRA_3021_01				
TC_TRA_3037_01				
TC_TRA_3039_01				
TC_TRA_3041_01				
TC_TRA_3042_01				
TC_TRA_3043_01				
TC_TRA_3044_01				
TC_TRA_3045_01				
TC_TRA_3046_01				
TC_TRA_3047_01				
TC_TRA_3048_01				
TC_TRA_3049_01				
TC_TRA_3051_01				
TC_TRA_3052_01				
TC_TRA_3053_01				
TC_TRA_3054_01				
TC_TRA_3057_01				
TC_TRA_3057_02				
TC_TRA_3058_01				
TC_TRA_3058_02				
TC_TRA_3059_01				
TC_TRA_3061_01				
TC_TRA_3062_01				
TC_TRA_3064_01				
TC_TRA_3065_01				
TC_TRA_3066_01				
TC_TRA_3067_01				
TC_TRA_3068_01				
TC_TRA_3069_01				
TC_TRA_3070_01				
Group 2.2 IPv6-to-IPv4 translation				
TC_TRA_3075_01				
TC_TRA_3087_01				

ATS Reference	Selected?	Run?	Verdict	Observations
TC_TRA_3089_01				
TC_TRA_3090_01				
TC_TRA_3091_01				
TC_TRA_3093_01				
TC_TRA_3095_01				
TC_TRA_3104_01				
TC_TRA_3106_01				
TC_TRA_3108_01				
TC_TRA_3109_01				
TC_TRA_3110_01				
TC_TRA_3111_01				
TC_TRA_3112_01				
TC_TRA_3113_01				
TC_TRA_3114_01				
TC_TRA_3115_01				
TC_TRA_3116_01				
TC_TRA_3118_01				
TC_TRA_3119_01				
TC_TRA_3120_01				
TC_TRA_3121_01				
TC_TRA_3122_01				
TC_TRA_3123_01				
TC_TRA_3125_01				
TC_TRA_3126_01				
TC_TRA_3127_01				
TC_TRA_3129_01				
Group 3 IPv6 Transitioning - RFC 3056 [13]				
Group 3.1 Node Tests				
Group 3.1.1 Test IPv6 Prefix Allocation				
TC_TRA_0001_01				
Group 3.1.2 Encapsulation in IPv4				
Group 3.1.2.1 Encapsulation of an IPv6Packet in an IPv4Packet				
TC_TRA_0009_01				
TC_TRA_0009_02				
TC_TRA_0012_01				
Group 3.1.3 6to4 Site Communication				
Group 3.1.3.1 Unicast scenario				
TC_TRA_0027_01				
TC_TRA_0030_01				
Group 3.1.4. Security Consideration				
Group 3.1.4.1 Security consideration during Encapsulation of IPv6 packet in an IPv4 packet				
TC_TRA_0049_01				
TC_TRA_0049_02				
TC_TRA_0049_03				
TC_TRA_0049_04				
TC_TRA_0049_05				
Group 3.1.4.2 Security consideration during Decapsulation of IPv6 packet from IPv4 packet				
TC_TRA_0050_01				
TC_TRA_0050_02				
TC_TRA_0050_03				
TC_TRA_0050_04				
TC_TRA_0050_05				
Group 4 IPv6 Transitioning - RFC 4213 [14]				
Group 4.1 Node Tests				
Group 4.1.2 Configured tunneling - encapsulation				
Group 4.1.2.1 Encapsulation of an IPv6Packet in an IPv4Packet				
TC_TRA_4008_01				
TC_TRA_4009_01				
TC_TRA_4018_01				
TC_TRA_4020_01				
TC_TRA_4029_01				
TC_TRA_4038_01				
Group 4.1.3 Configured tunneling - decapsulation				
Group 4.1.3.1 Decapsulation of IPv6Packet from IPv4Packet				

ATS Reference	Selected?	Run?	Verdict	Observations
TC_TRA_4061_01				
TC_TRA_4063_01				
Group 4.1.3.2 Handling errorneous packet while decapsulation				
TC_TRA_4048_01				
TC_TRA_4048_02				
TC_TRA_4067_01				
TC_TRA_4067_02				
Group 4.1.3.3 Link-local address on tunnel interface				
TC_TRA_4071_01				
Group 4.1.4 Neighbor Discovery messages on tunnel interface				
Group 4.1.4.1 Processing Probes packets on tunnel interface				
TC_TRA_4075_01				
Group 4.1.4.3 Sending Neighbor Discovery packets on tunnel interface				
TC_TRA_4078_05				
TC_TRA_4078_06				

C.7 Void

C.8 Observations

Additional information relevant to the technical content of the PCTR is given here.

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History

Document history		
V1.1.1	March 2008	Publication