



TECHNICAL SPECIFICATION

**Integrated broadband cable
telecommunication networks (CABLE);
Testing; Conformance test specifications
for MAP-E technology;
Part 3: Abstract Test Suite (ATS) and
Protocol Implementation extra Information for Testing (PIXIT)**

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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Integrated broadband cable telecommunication networks (CABLE).

The present document is part 3 of a multi-part deliverable covering the conformance test specification for MAP-E technology, as identified below:

Part 1: "Protocol Implementation Conformance Statement (PICS) proforma";

Part 2: "Test Suite Structure and Test Purposes (TSS&TP)";

Part 3: "Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT)".

The development of the present document follows the guidance provided in the ETSI EG 202 798 [i.1]. Therefore the present document is also based on the guidance provided in ETSI EG 202 798 [i.1].

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**may not**", "**need**", "**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).

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1 Scope

The present document contains the Abstract Test Suite (ATS) for MAP-E technology as defined in [1] and addressing specific cable industry requirements as defined in ETSI TS 101 569-1 [11] in compliance with the relevant requirements and in accordance with the relevant guidance given in ISO/IEC 9646-7 [5].

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

These ISO standards for the methodology of conformance testing (ISO/IEC 9646-1 [2] and ISO/IEC 9646-2 [3]) as well as the ETSI rules for conformance testing (ETSI ETS 300 406 [6]) are used as a basis for the test methodology.

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 reference document (including any amendments) applies.

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

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] Draft-ietf-softwire-map-12: "Mapping of Address and Port with Encapsulation (MAP)".
- [2] ISO/IEC 9646-1 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 1: General concepts".
- [3] ISO/IEC 9646-2 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 2: Abstract Test Suite specification".
- [4] ISO/IEC 9646-6 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 6: Protocol profile test specification".
- [5] ISO/IEC 9646-7 (1995): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 7: Implementation Conformance Statements".
- [6] ETSI ETS 300 406 (1995): "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".
- [7] 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".
- [8] Void.
- [9] Void.
- [10] ETSI TS 103 239-2: "Integrated broadband cable telecommunication networks (CABLE); Testing; Conformance test specifications for MAP-E technology; Part 2: Test Suite Structure and Test Purposes (TSS&TP)".
- [11] ETSI TS 101 569-1: "Integrated Broadband Cable Telecommunication Networks (CABLE); Cable Network Transition to IPv6 Part 1: IPv6 Transition Requirements".

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 EG 202 798: "Intelligent Transport Systems (ITS); Testing; Framework for conformance and interoperability testing".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI TS 101 569-1 [11], ISO/IEC 9646-1 [2] and ISO/IEC 9646-7 [5] apply.

3.2 Abbreviations

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

| | |
|-------|---|
| 3GPP | Third Generation Partnership Project |
| ASP | Abstract Services Primitives |
| ATM | Abstract Test Method |
| ATS | Abstract Test Suite |
| BR | Border Router |
| CPE | Customer Premises Equipment |
| DHCP | Dynamic Host Configuration Protocol |
| DNS | Domain Name System |
| FTP | File Transfer Protocol |
| GRT | Global Routing Table |
| HTML | HyperText Markup Language |
| HTTP | HyperText Transfer Protocol |
| IP | Internet Protocol |
| IPv4 | IP version 4 |
| IPv6 | IP version 6 |
| IUT | Implementation Under Test |
| MAP-E | Mapping of Address and Port with Encapsulation (MAP) |
| MSS | Maximum Segment Size |
| MTC | Main Test Component |
| MTS | Methods for Testing and Specification |
| OSI | Open System Interconnection |
| PA | Platform Adaptor |
| PDU | Protocol Data Unit |
| PICS | Protocol Implementation Conformance Statement |
| PIXIT | Protocol Implementation Extra Information for Testing |
| PTC | Parallel Test Components |
| SUT | System Under Test |
| TA | Test Adaptor |
| TC | Test Case |
| TP | Test Purpose |
| TSS | Test Suite Structure |
| TTCN | Testing and Test Control Notation |
| VRF | Virtual Routing and Forwarding |

4 Abstract test method

This clause describes the ATM used to test the MAP-E technology.

4.1 Abstract protocol tester

An abstract protocol tester presented in figure 1 is a process providing the test behaviour for testing an IUT. Thus it will emulate an entity which is capable of proving the IUT functionalities. This type of test architecture provides a situation of communication which is equivalent to real operation between real devices. The test system will simulate valid and invalid behaviours, and will analyse the reaction of the IUT. Then the test verdict, e.g. pass or fail, will depend on the result of this analysis. Thus this type of test architecture enables to focus the test objective on the IUT behaviour only.

In order to access an IUT, the corresponding abstract protocol tester needs to use lower layers to establish a proper connection to the system under test (SUT) over a physical link (Lower layers link).

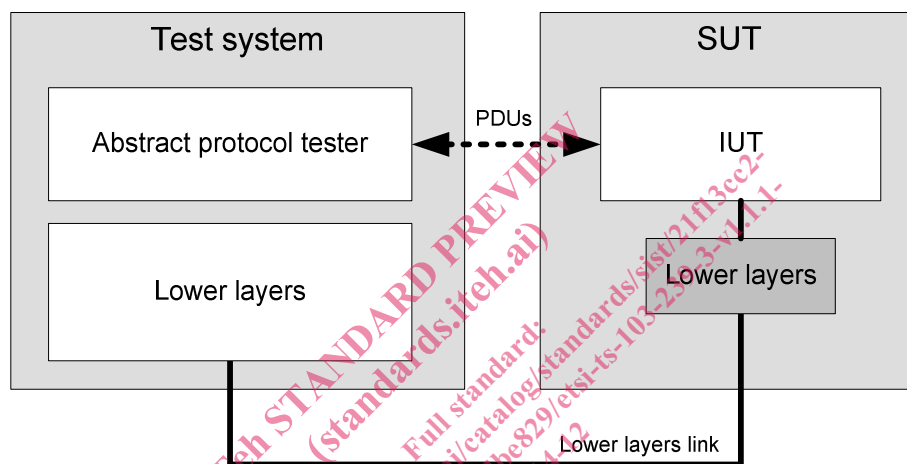


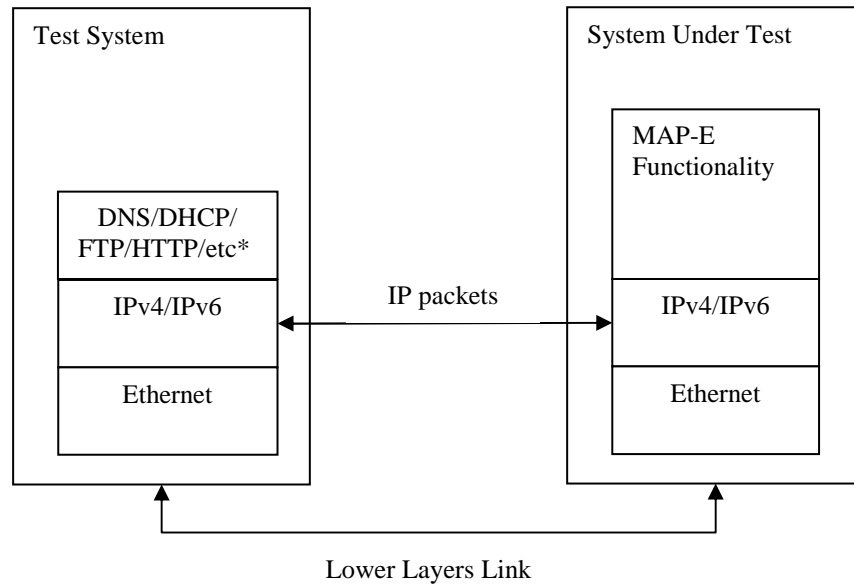
Figure 1: Generic abstract protocol tester

The "Protocol Data Units" (PDUs) are the messages exchanged between the IUT and the abstract protocol tester which permits to trigger the IUT and to analyse its reaction. The result of the analysis allows to assign the test verdict.

Further control actions on the IUT may be necessary from inside the SUT, for instance to simulate a primitive from the upper layer or the management/security entity. Further details on such control actions are provided by means of an upper tester presented in clause 4.3.

The above "Abstract Test Method" (ATM) is well defined in ISO/IEC 9646-1 [2] and supports a wide range of approaches for testing including the TTCN-3 abstract test language [7].

The abstract protocol tester used for MAP-E test suite is described in figure 2. The test system will send and receive IP packets, by using other upper layer protocols such as DHCP, DNS and FTP, in order to analyse MAP-E functionality.



NOTE: * Those protocols are used to prove certain MAP-E functionalities.

Figure 2: Abstract Protocol Tester - MAP-E

4.2 Test configurations

The test suite for MAP-E uses two test configurations in order to cover the different test scenarios. Distinction between the two configurations is given by the two main components in MAP-E, which are BR and CPE.

4.2.1 CF01: BR as IUT

In this configuration, the BR is the IUT and the test system simulates an CPE in one side and a IPv4 host in the other side.

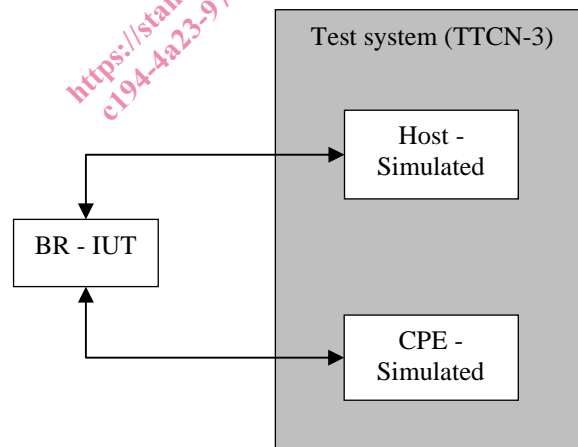


Figure 3: CF01, BR equipment is the IUT

4.2.2 CF02: CPE as IUT

In this configuration, the CPE is the IUT and the test system simulates a BR equipment in one side and an IPv4 host in the other side.

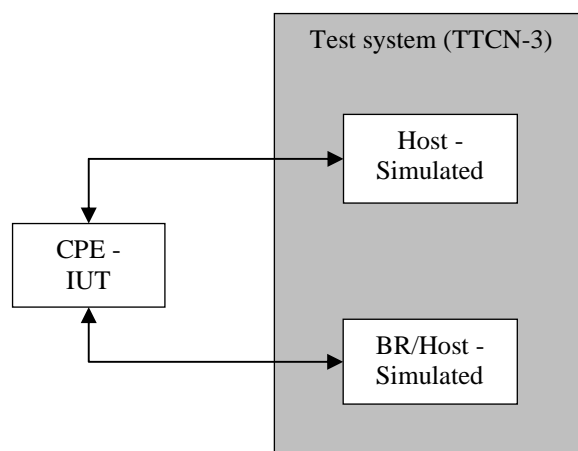


Figure 4: CF02, CPE equipment is the IUT

4.3 TTCN-3 Test architecture

In general, a conformance test system architecture based on TTCN-3 is as figure 5 shows.

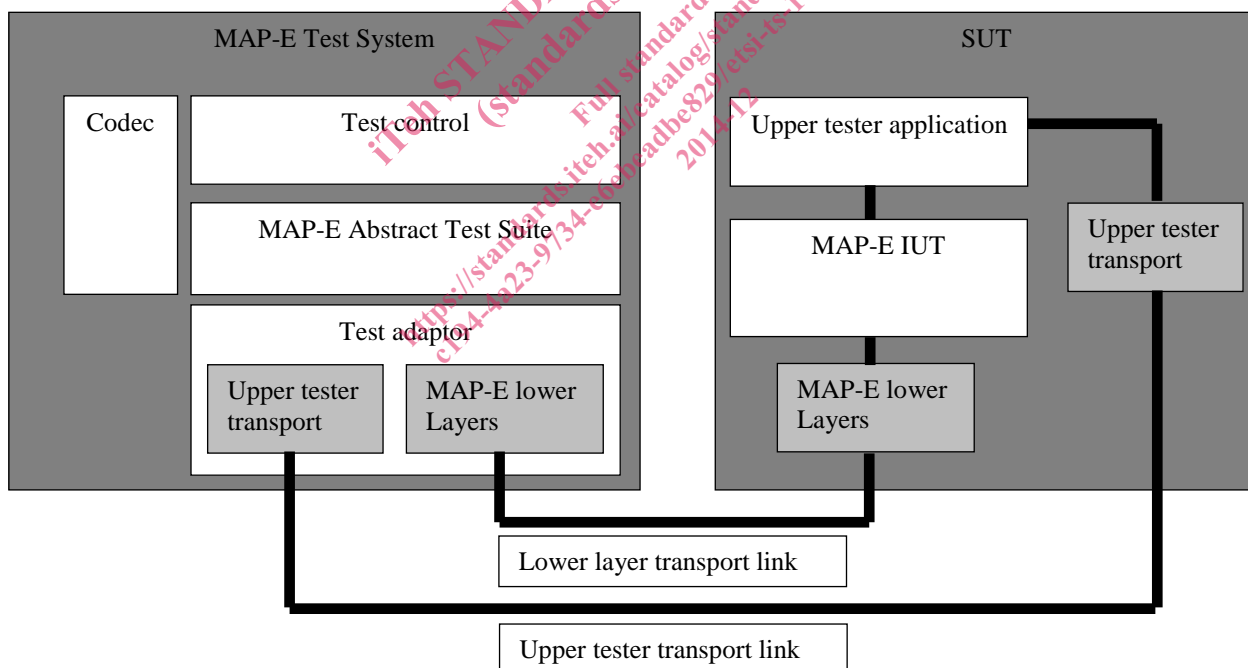


Figure 5: Global test architecture

The "System Under Test" (SUT) contains:

- The "Implementation Under Test" (IUT), i.e. the object of the test.
- The "Upper tester application" enables to trigger or capture some actions (i.e. higher layer service primitives) on the IUT.
- The "MAP-E lower layers" enable to establish a proper connection to the system under test (SUT) over a physical link (Lower layer transport link).