



Technical Specification

**Intelligent Transport Systems (ITS);
Testing;
Conformance test specifications for Transmission of
IP packets over GeoNetworking;
Part 3: Abstract Test Suite (ATS) and Protocol
Implementation eXtra Information for Testing (PIXIT)**

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Intelligent Transport Systems (ITS).

The present document is part 3 of a multi-part deliverable covering Conformance test specifications for Transmission of IP packets over GeoNetworking as identified below:

Part 1: "Test requirements and 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)".

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1 Scope

The present document contains the Abstract Test Suite (ATS) for Transmission of IP packets over GeoNetworking as defined in EN 302 636-6-1 [1] 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 Transmission of IP packets over GeoNetworking equipment giving a high probability of interoperability between different manufacturers' equipment.

The ISO standard 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 (ETS 300 406 [6]) are used as a basis for the test methodology.

Annex A provides the Tree and Tabular Combined Notation (TTCN) 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.

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.

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2.1 Normative references

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

- [1] ETSI EN 302 636-6-1 (V1.2.0): "Intelligent Transport Systems (ITS); Vehicular Communications; GeoNetworking; Part 6: Internet Integration; Sub-part 1: Transmission of IPv6 Packets over GeoNetworking Protocols".
- [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 (V4.5.1): "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 1: TTCN-3 Core Language".
- [8] ETSI TS 102 859-1 (V1.2.1): "Intelligent Transport Systems (ITS); Testing; Conformance test specifications for Transmission of IP packets over GeoNetworking; Part 1: Test requirements and Protocol Implementation Conformance Statement (PICS) proforma".

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 (V1.1.1): "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 EN 302 636-6-1 [1], ISO/IEC 9646-1 [2] and in ISO/IEC 9646-7 [5] apply.

3.2 Abbreviations

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

ATM	Abstract Test Method
ATS	Abstract Test Suite
BI	Invalid behaviour
BV	Valid behaviour
EVI	Expired virtual interfaces
GVL	Geographical Virtual Link
IP	Internet Protocol
IPv6	Internet Protocol version 6
ITS	Intelligent Transportation Systems
IUT	Implementation Under Test
MG	Message Generation
MR	Message Reception
MTC	Main Test Component
NVI	New virtual interfaces
PA	Platform Adaptor
PCTR	Protocol Conformance Test Report
PICS	Protocol Implementation Conformance Statement
PIXIT	Partial Protocol Implementation Extra Information for Testing
PX	PiXit
SA	System Adaptor
SAP	Service Access Point
SCS	System Conformance Statement
SCTR	System Conformance Test Report
SUT	System Under Test
TC	Test Case
TP	Test Purposes
TSS	Test Suite Structure
TTCN	Tree and Tabular Combined Notation
TVL	Topological Virtual Link
VM	Virtual Interface Management

4 Abstract Test Method (ATM)

4.1 Abstract protocol tester

The abstract protocol tester used by the IPv6OverGeoNetworking test suite is described in figure 1. The test system will simulate valid and invalid protocol behaviour, and will analyse the reaction of the IUT.

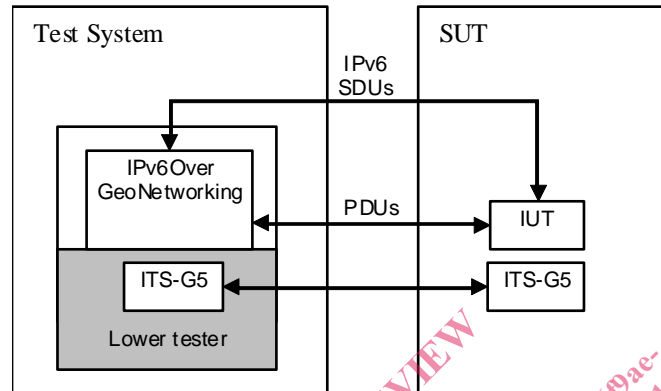


Figure 1: Abstract protocol tester - IPv6OverGeoNetworking

4.2 Test Configuration

The IPv6OverGeoNetworking test suite uses a unique test configuration in order to cover the different test scenarios. In this configuration, the tester simulates one ITS station implementing the IPv6OverGeoNetworking protocol.

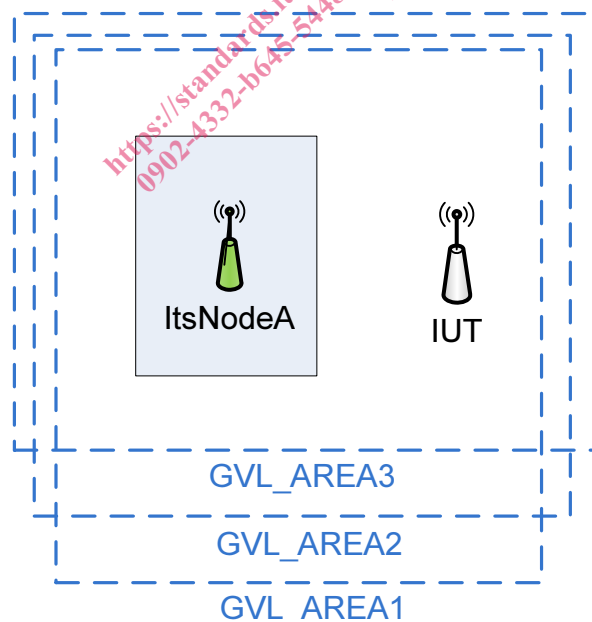


Figure 2: Test configuration CF01

Both IUT and Test system are located in the GeoAreas associated with the three predefined GVLs. Each GVL is associated with an IPv6 prefix which can be parameterized using module parameters.

Table 1: Association between IPv6 prefixes and GVLs

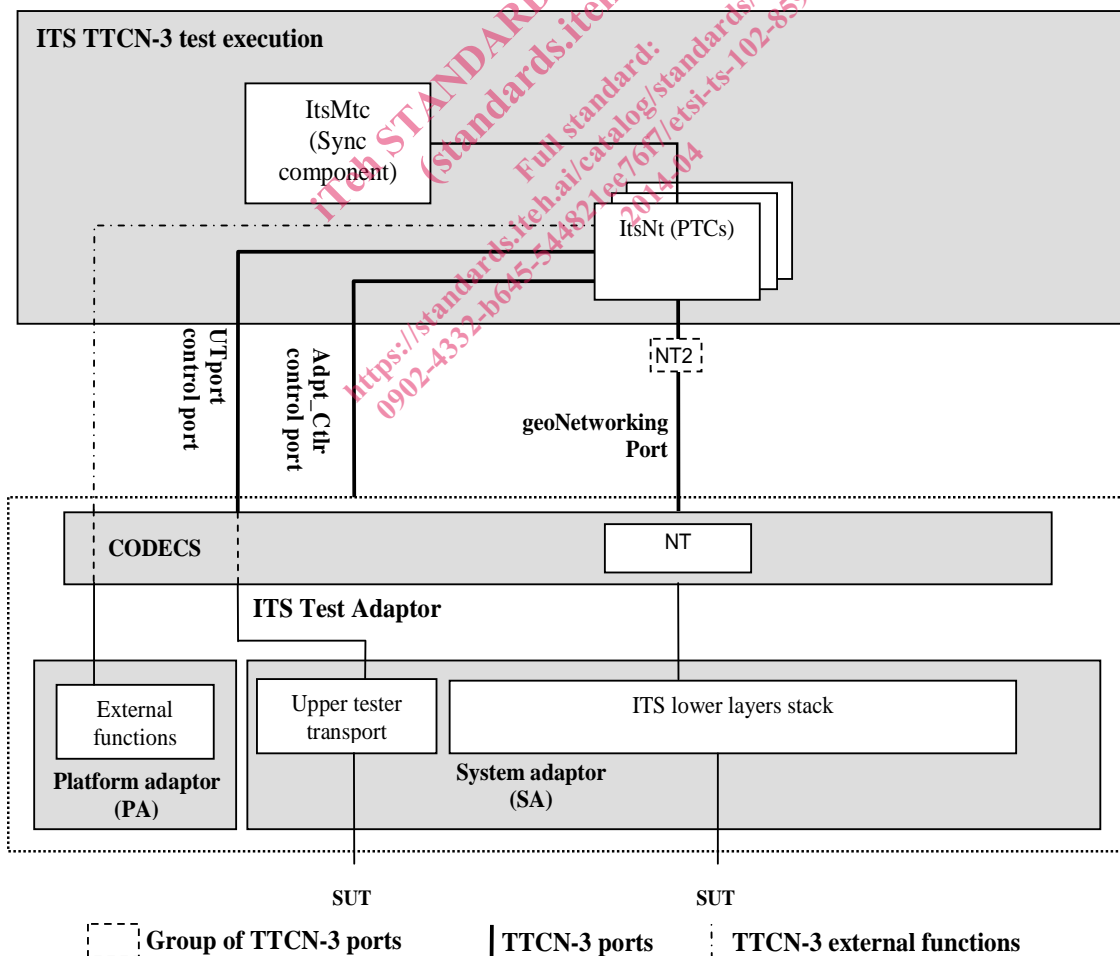
GVL	IPv6 Prefix
GVL_AREA1	PX_GN6_PREFIX_1
GVL_AREA2	PX_GN6_PREFIX_2
GVL_AREA3	PX_GN6_PREFIX_3

4.3 Test Architecture

The present document implements the general TTCN-3 test architecture described in EG 202 798 [i.1], clause 6.3.2.

Figure 3 shows the TTCN-3 test architecture used in for the GeoNetworking ATS. The IPv6OverGeoNetworking test component requires using only the Main Test Component (MTC). The MTC communicates with the IPv6OverGeoNetworking SUT over the ipv6OverGeoNetworkingPort and geoNetworkingPort. The ipv6OverGeoNetworkingPort port is used to exchange IPv6 protocol messages between the test component and the IUT. The geoNetworkingPort port is used to exchange GeoNetworking protocol messages between the test component and the IUT.

The Upper tester entity in the SUT enables triggering IPv6OverGeoNetworking functionalities by simulating primitives from applications. It is required to trigger the IPv6OverGeoNetworking layer in the SUT to send IPv6OverGeoNetworking messages, which are resulting from upper layer primitives. Furthermore, receiving IPv6OverGeoNetworking messages may result for the IPv6OverGeoNetworking layer in sending primitives to the upper layer.

**Figure 3: Test System Architecture**

4.4 Ports and ASPs (Abstract Services Primitives)

Three ports are used by the IPv6OverGeoNetworking ATS:

- The geoNetworkingPort, of type GeoNetworkingPort.
- The ipv6OverGeoNetworkingPort, of type Ipv6OverGeoNetworkingPort.
- The utPort of type UpperTesterPort.

4.4.1 Primitives of the geoNetworkingPort

Two types of primitives are used in the geoNetworkingPort:

- The geoNetworkingInd primitive used to receive messages of type GeoNetworkingPacket.
- The geoNetworkingReq primitive used to send messages of type GeoNetworkingPacket.

4.4.2 Primitives of the ipv6OverGeoNetworkingPort

Two types of primitives are used in the geoNetworkingPort:

- The Ipv6OverGeoNetworkingInd primitive used to receive messages of type IPv6.
- The Ipv6OverGeoNetworkingReq primitive used to send messages of type IPv6.

4.4.3 Primitives of the utPort

This port uses two types of primitives:

- The UtInitialize primitive used to initialise IUT.
- The UtTrigger primitive used trigger upper layer events in IUT.

4.4.4 Primitives of the taPort

This port uses the following primitives to trigger special behaviour in Test Adapter:

- AcGn6InterfaceInfoList used to retrieve the list of IUT's link-layer interfaces with their configured IPv6 addresses.
- AcGetLongPosVector used to retrieve IUT's position (extracted from IUT's beacon messages).

5 Untestable Test Purposes

Table 2 gives a list of TPs, which are not implemented in the ATS due to the chosen ATM or other restrictions.

Table 2: Untestable TP

Test purpose	Reason