



Technical Specification

**Intelligent Transport Systems (ITS);
Testing;
Conformance test specifications for GeoNetworking ITS-G5;
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 specification for GeoNetworking ITS-G5 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)".

The development of ITS test specifications follows the guidance provided in the EG 202 798 [i.1]. Therefore this ATS documentation is also based on the guidance provided in EG 202 798 [i.1].

1 Scope

The present document contains the Abstract Test Suite (ATS) for GeoNetworking ITS-G5 as defined in EN 302 636-4-1 [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 GeoNetworking ITS-G5 equipment giving a high probability of inter-operability 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.

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.

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

2.1 Normative references

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

- [1] ETSI EN 302 636-4-1 (V1.2.0): "Intelligent Transport Systems (ITS); Vehicular Communications; GeoNetworking; Part 4: Geographical addressing and forwarding for point-to-point and point-to-multipoint communications; Sub-part 1: Media-Independent Functionality".
- [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 102 871-1: "Intelligent Transport Systems (ITS); Testing; Conformance test specifications for GeoNetworking ITS-G5; 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 302 636-4-1 [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
BAA	GeoBroadcast Advanced Algorithm
BAH	Basic Header
BCA	GeoBroadcast CBF Algorithm
BEA	Beacon
BI	Invalid Behaviour
CAN	Controller Area Network
CAP	Buffer Capacities
CBF	Contention Based Forwarding
COH	Common Header
FPB	Forwarding Packet Buffer
FSR	Forwarder, Sender and the local GeoAdhoc router positions
GAC	Geographically-Scoped Anycast
GBC	Geographically-Scoped Broadcast
GNA	GeoNetworking Address
GUC	Geographically-Scoped Unicast
HST	Header Sub-Type
ITS	Intelligent Transportation Systems
ITS-G5	5 GHz wireless communication
IUT	Implementation Under Test
LDM	Local Dynamic Map
LOS	Location Service
LPV	Local Position Vector
MTC	Main Test Component
PCTR	Protocol Conformance Test Report
PIXIT	Partial Protocol Implementation Extra Information for Testing
PTC	Parallel Test Component
SAP	Service Access Point
SCS	System Conformance Statement
SCTR	System Conformance Test Report
SHB	Single Hop Broadcast
SQN	Sequence Number
SUT	System Under Test
TC	Test Case
TH	Threshold
TP	Test Purposes
TSB	Topologically-Scoped Broadcast
TTCN	Tree and Tabular Combined Notation
V2I	Vehicle-to-Infrastructure
V2V	Vehicle-to-Vehicle

4 Abstract Test Method (ATM)

4.1 Abstract protocol tester

The abstract protocol tester used by the GeoNetworking 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.

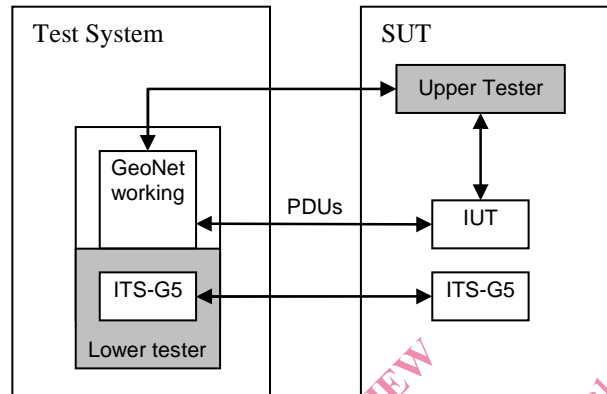





Figure 1: Abstract protocol tester - GeoNetworking

4.2 Test Configuration

4.2.1 Test Configuration Overview

This clause introduces the test configurations that have been used for the definition of test purposes. The test configurations cover the various scenarios of the GeoNetworking tests. The test configurations show:

-  green ItsNode: ItsNode is in the communication range of the IUT.
-  red ItsNode: ItsNode is not in the communication range of the IUT.
-  dashed rectangle: definition of a specific geographical area (see note).

NOTE: A geographical area is defined in the GeoBroadcast or GeoAnycast packet by HST field of Common Header and GeoAreaPos Latitude, GeoAreaPos Longitude, DistanceA, DistanceB and Angle fields of the Extended Header.

Seven test configurations are defined below.

4.2.2 Configuration 1: CF01

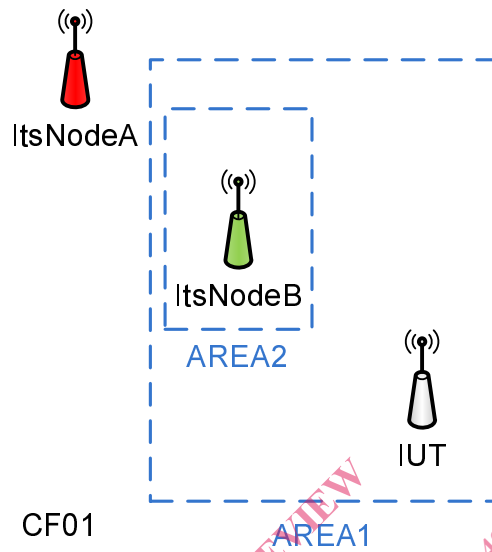


Figure 2

ItsNodeA	is not in IUT's communication range
ItsNodeB	is in IUT's communication range is in direction of ItsNodeA is in AREA1 is in AREA2
IUT	is in AREA1

4.2.3 Configuration 2: CF02

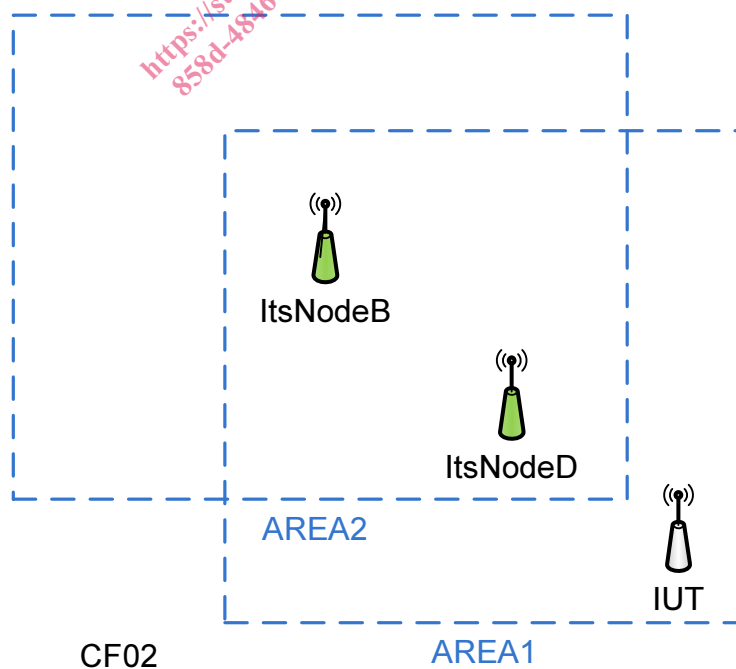


Figure 3

ItsNodeB	is in IUT's communication range is close to the centre of AREA2 is in AREA1 is in AREA2
ItsNodeD	is in IUT's communication range is in direction of ItsNodeB is in AREA1 is in AREA2
IUT	is in AREA1

4.2.4 Configuration 3: CF03

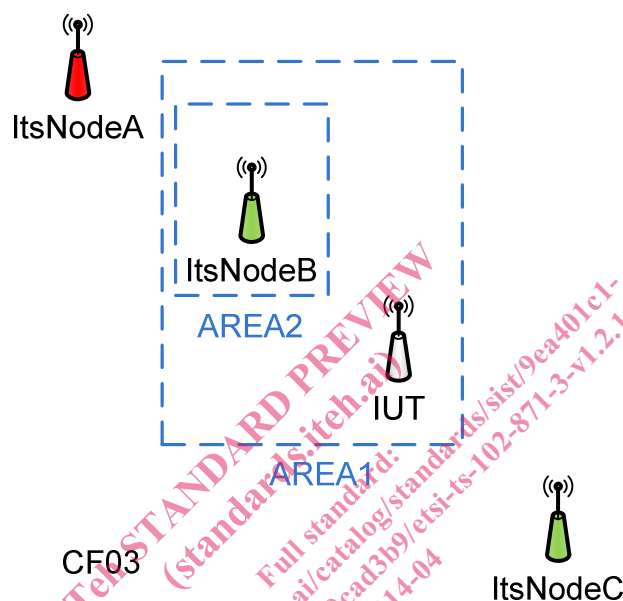


Figure 4

ItsNodeA	is not in IUT's communication range
ItsNodeB	is in IUT's communication range is in direction of ItsNodeA is in AREA1 is in AREA2
ItsNodeC	is in IUT's communication range is not in direction of ItsNodeA
IUT	is in AREA1

4.2.5 Configuration 4: CF04

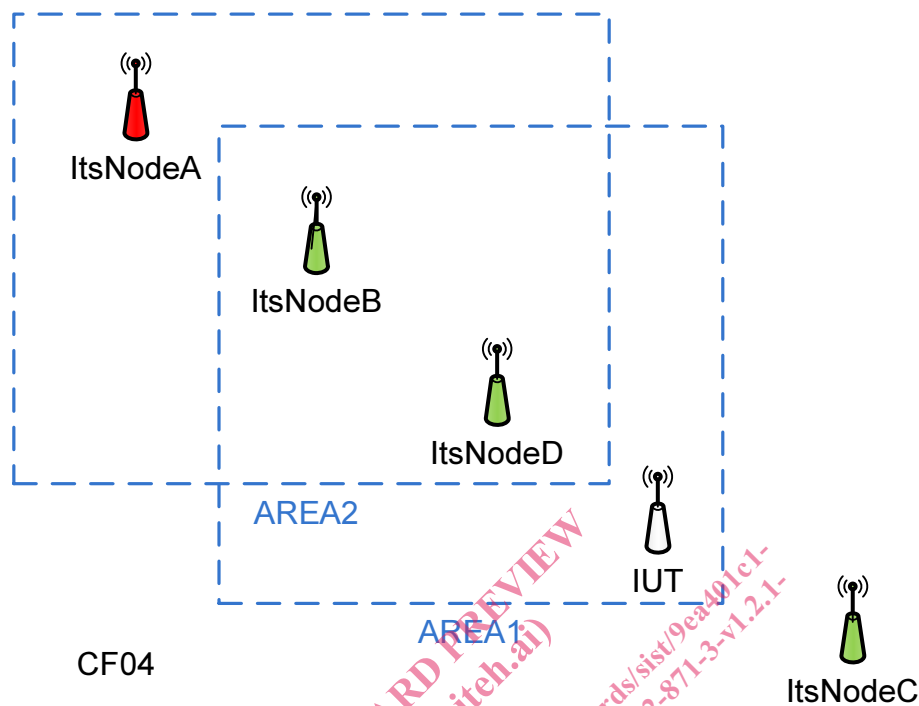


Figure 5

ItsNodeA	is not in IUT's communication range
ItsNodeB	is in IUT's communication range is in direction of ItsNodeA is closer to ItsNodeA than ItsNodeD is in AREA1 is in AREA2. is close to the centre of AREA2
ItsNodeC	is in IUT's communication range is not in direction of ItsNodeA
ItsNodeD	is in IUT's communication range is in direction of ItsNodeA is in AREA1 is in AREA2
IUT	is in AREA1