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Intelligent Transport Systems (ITS);
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Conformance test specifications for GeoNetworking ITS-G5;
Part 2: Test Suite Structure and Test Purposes (TSS & TP)

Reference

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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 2 of a multi-part deliverable covering Conformance test specifications for Geonetworking ITS-G5 as identified below:

Part 1: "Test requirements and Protocol Implementation Conformance Statement (PICS) pro forma";

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

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

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).

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1 Scope

The present document provides the Test Suite Structure and Test Purposes (TSS & TP) for GeoNetworking ITS-G5 as defined in ETSI 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 [i.4].

The ISO standard for the methodology of conformance testing (ISO/IEC 9646-1 [i.2] and ISO/IEC 9646-2 [i.3]) as well as the ETSI rules for conformance testing (ETSI ETS 300 406 [i.5]) are used as a basis for the test methodology.

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 at https://docbox.etsi.org/Reference/.

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

[1] ETSI EN 302 636-4-1 (V1.2.1): "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] ETSI TS 102 871-1 (V1.4.1): "Intelligent Transport Systems (ITS); Testing; Conformance test specifications for GeoNetworking ITS-G5; Part 1: Test requirements and Protocol Implementation Conformance Statement (PICS) pro forma".

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 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".

[i.2] ISO/IEC 9646-1 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework - Part 1: General concepts".

[i.3] ISO/IEC 9646-2 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 2: Abstract Test Suite specification".

[i.4] ISO/IEC 9646-7 (1995): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".

[i.5] ETSI ETS 300 406 (1995): "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI EN 302 636-4-1 [1], ISO/IEC 9646-1 [i.2], ISO/IEC 9646-7 [i.4] and the following apply:

ItsNode: node that implements GeoAdhoc router functionality by ETSI EN 302 636-4-1 [1]

neighbour: ItsNode is in direct (single-hop) communication range

"to be in direction of X": to be a valid candidate for a forwarding algorithm to forward the packet to the destination X

NOTE: This means that the candidate ItsNode is geographically closer to X than the IUT.

to broadcast a packet: to send a packet as a link-layer broadcast frame to all surrounding neighbours

to forward a packet: to send a packet as a link-layer unicast frame to the selected node

to retransmit a packet: to forward or broadcast a received packet

3.2 Abbreviations

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

ATS	Abstract Test Suite
BAA	GeoBroadcast Advanced Algorithm
BAH	Basic Header
BC	BroadCast
BCA	GeoBroadcast CBF Algorithm
BEA	BEAcon
BI	Invalid test events for Behaviour tests
BO	Inopportune test events for Behaviour tests
BV	Valid test events for Behaviour tests
CAP	Buffer Capacities
CBF	Contention Based Forwarding
COH	Common Header
DEPV	Destination Position Vector
EN	European Norm
FDV	Formatting and Data Validity
FPB	Forwarding Packet Buffer
FSR	Forwarder, Sender, local geoadhoc Router
GAC	Geographically-scoped AnyCast
GBC	Geographically-scoped BroadCast
GEONW	GEONetWorking
GNA	GeoNetworking Address
GUC	Geographically-scoped UniCast
HST	Header SubType
HT	Header Type
ISO	International Organization for Standardization
ITS	Intelligent Transportation Systems
ITS-G5	Intelligent Transportation Systems - 5 GHz wireless communication
IUT	Implementation Under Test
LOS	LOcation Service
LOT	LOcation Table
LPV	Local Position Vector
LS	Location Service
LT	LifeTime
MAC	Medium Access Control
MHL	Maximum Hop Limit

MIB	Management Information Base
NH	Next Header
PAI	Position Accuracy Indicator
PICS	Protocol Implementation Conformance Statement
PL	Payload Length
PON	Protocol Operation
PV	Position Vector
RHL	Remaining Hop Limit
SAP	Service Access Point
SCC	Station Country Code
SCF	Store Carry & Forward
SHB	Single Hop Broadcast
SN	Sequence Number
SOPV	Source Position Vector
SQN	Sequence Number
ST	Station Type
TH	Threshold
TI	Timer tests
TIC	Transmission Interval Control
TP	Test Purposes
TS	Test Suite
TSB	Topologically-Scoped Broadcast
TSS	Test Suite Structure
TST	TimeSTamp
UC	UniCast

4 Test Configuration

4.1 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 Configuration 1: CF01

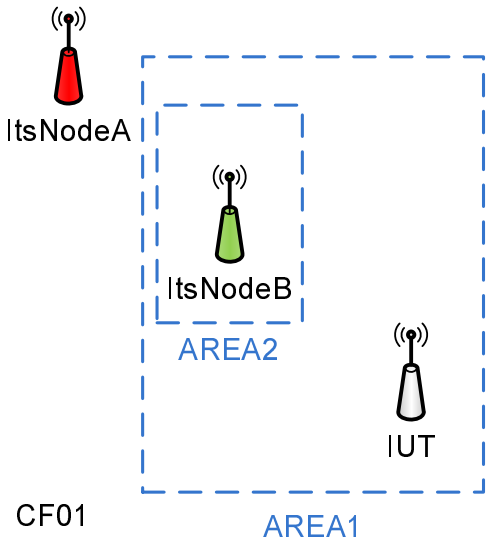

Figure 1

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

4.3 Configuration 2: CF02

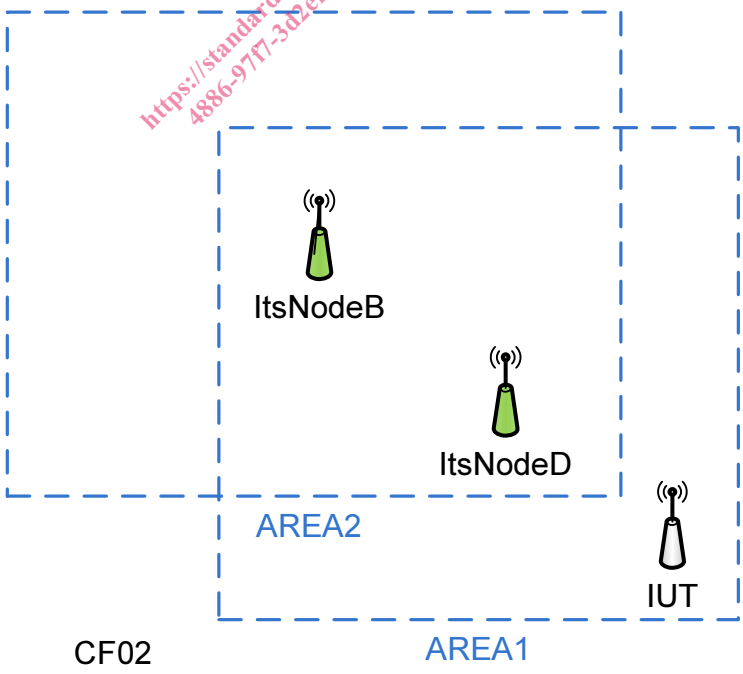

Figure 2

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

4.4 Configuration 3: CF03

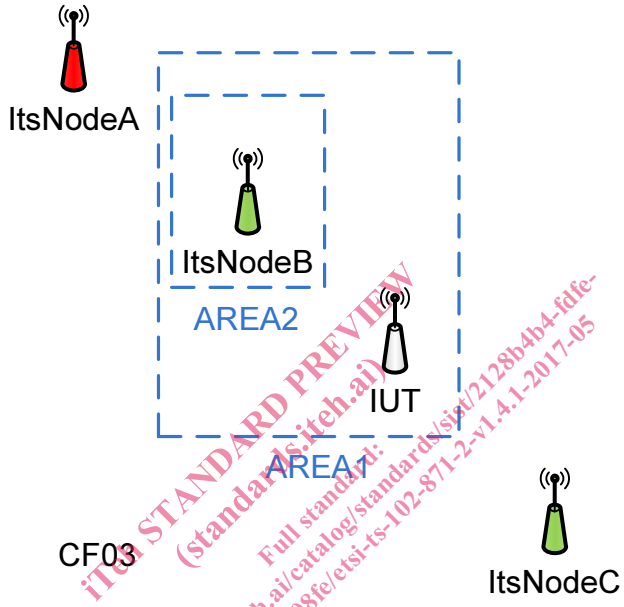

Figure 3

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

4.5 Configuration 4: CF04

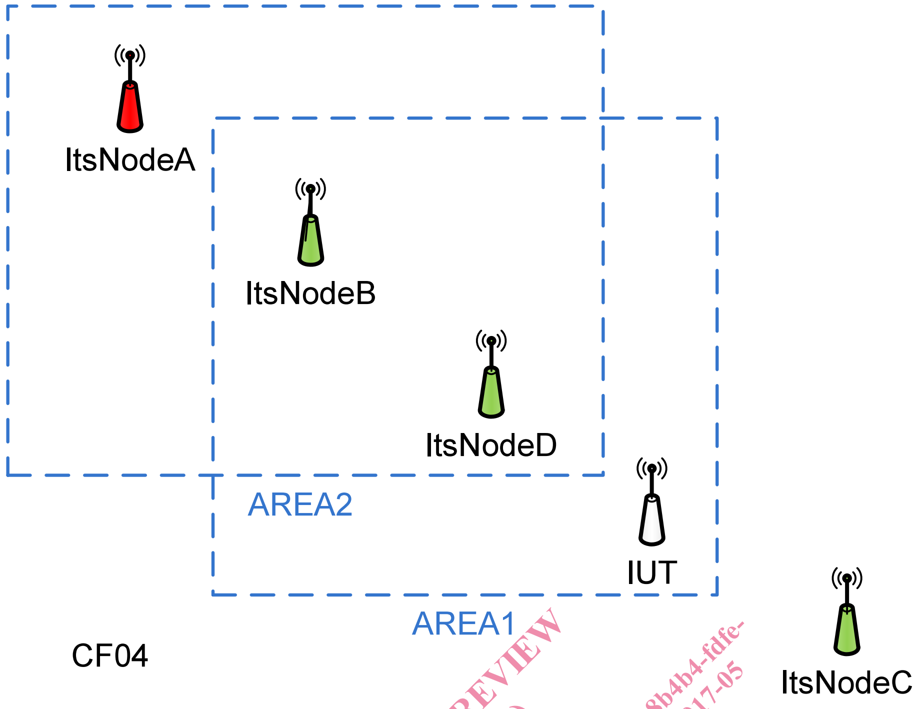

Figure 4

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

4.6 Configuration 5: CF05

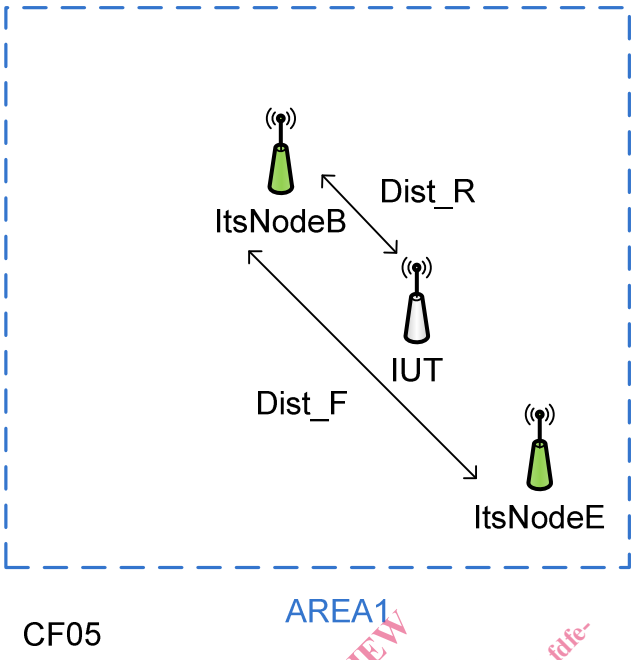

Figure 5

ItsNodeB	is in IUT's communication range is in AREA1 is close to the centre of AREA1
ItsNodeE	is in IUT's communication range is in AREA1
IUT	is in AREA1 is closer to ItsNodeB than ItsNodeE (Dist_R < Dist_F) Angle_FSR formed by ItsNodeE, ItsNodeB and IUT is less than Angle_TH

4.7 Configuration 6: CF06

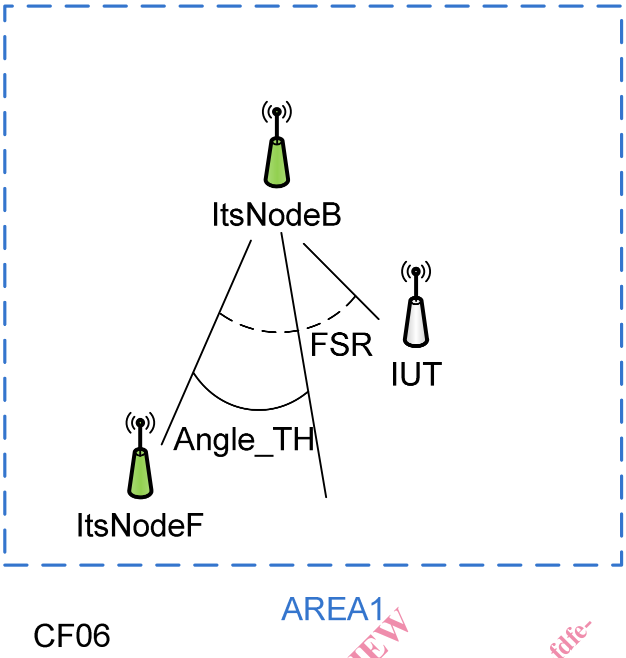

Figure 6

ItsNodeB	is in IUT's communication range is in AREA1 is close to the centre of AREA1
ItsNodeF	is in IUT's communication range is in AREA1
IUT	is in AREA1 is closer to ItsNodeB than ItsNodeE (Dist_R < Dist_F) Angle_FSR formed by ItsNodeF, ItsNodeB and IUT is greater than Angle_TH