



**Intelligent Transport Systems (ITS);
Testing;
Conformance test specifications for
Cooperative Awareness Basic Service (CA);
Part 2: Test Suite Structure and Test Purposes (TSS & TP)**

STANDARDS PREVIEW
https://standards.iso.org/standards/catalog/64783529-
e8a0-4c56-8fae-a692015-102-868-2-v1.3.1-

Reference

RTS/ITS-00153

Keywords

ITS, testing, TSS&TP

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

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2015.

All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	4
Foreword.....	4
Modal verbs terminology.....	4
1 Scope	5
2 References	5
2.1 Normative references	5
2.2 Informative references.....	5
3 Definitions and abbreviations.....	6
3.1 Definitions.....	6
3.2 Abbreviations	6
4 Test Suite Structure (TSS).....	7
4.1 Structure for CA tests	7
4.2 Test groups	7
4.2.1 Introduction.....	7
4.2.2 Root	7
4.2.3 Groups	7
4.2.4 Sub-Groups	7
4.2.5 Categories	7
5 Test Purposes (TP)	8
5.1 Introduction	8
5.1.1 TP definition conventions.....	8
5.1.2 TP Identifier naming conventions.....	8
5.1.3 Rules for the behaviour description.....	8
5.1.4 Sources of TP definitions.....	8
5.1.5 Mnemonics for PICS reference.....	8
5.2 Test purposes for CA.....	9
5.2.1 Message dissemination	9
5.2.1.1 Message format	9
5.2.1.2 Information adaptation.....	12
5.2.1.3 Generation frequency	17
5.2.1.4 Lower-layer parameters	21
5.2.2 Message processing	22
Annex A (informative): Bibliography	24
History	25

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

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 specification for Co-operative Awareness Basic Service (CA) 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).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document provides the Test Suite Structure and Test Purposes (TSS & TP) for Co-operative Awareness Basic Service (CA) as defined in ETSI EN 302 637-2 [1] in compliance with the relevant requirements and in accordance with the relevant guidance given in ISO/IEC 9646-7 [6].

The ISO standard for the methodology of conformance testing (ISO/IEC 9646-1 [4] and ISO/IEC 9646-2 [5]) as well as the ETSI rules for conformance testing (ETSI ETS 300 406 [7]) 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 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.

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

- [1] ETSI EN 302 637-2 (V1.3.2): "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 2: Specification of Cooperative Awareness Basic Service".
- [2] ETSI TS 102 868-1 (V1.3.1): "Intelligent Transport Systems (ITS); Testing; Conformance test specifications for Co-operative Awareness Messages (CAM); Part 1: Test requirements and Protocol Implementation Conformance Statement (PICS) proforma".
- [3] ETSI TS 102 871-1 (V1.3.1): "Intelligent Transport Systems (ITS); Testing; Conformance test specifications for GeoNetworking ITS-G5; Part 1: Test requirements and Protocol Implementation Conformance Statement (PICS) pro forma".
- [4] ISO/IEC 9646-1 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework - Part 1: General concepts".
- [5] ISO/IEC 9646-2 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 2: Abstract Test Suite specification".
- [6] ISO/IEC 9646-7 (1995): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".
- [7] ETSI ETS 300 406 (1995): "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

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 reference 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".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI EN 302 637-2 [1], ISO/IEC 9646-1 [4] and ISO/IEC 9646-7 [6] apply.

3.2 Abbreviations

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

ACC	Adaptive Cruise Control
ATS	Abstract Test Suite
BTP	Basic Transport Protocol
BTP-B	Basic Transport Protocol Type B
BV	valid test events for Behaviour tests
CA	Cooperative Awareness
CAM	Cooperative Awareness Messages
CAN	Controller Area Network
FMT	Message Format
GFQ	Generation Frequency
GN	GeoNetworking
INA	Information Adaptation
ISO	International Organization for Standardization
ITS	Intelligent Transport Systems
ITS-S	ITS station
IUT	Implementation Under Test
LF	Low Frequency
MSD	Message Dissemination
MSP	Message Processing
PAR	Lower-layer parameters
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
RSU	Road Side Unit
SHB	Single Hop Broadcast
SSP	Service Specific Permissions
TI	Timer tests
TP	Test Purposes
TS	Technical Specification
TSS	Test Suite Structure

4 Test Suite Structure (TSS)

4.1 Structure for CA tests

Table 1 shows the CA Test Suite Structure (TSS) including its sub-groups defined for conformance testing.

Table 1: TSS for CA

Root	Group	Sub-Group	Category
CAM	Message Dissemination		
		Message format	Valid
		Information adaptation	Valid
		Generation frequency	Valid and Timer
		lower layer parameters	Valid
	Message processing		Valid

The test suite is structured as a tree with the root defined as CAM. The tree is of rank 3 with the first rank a Group, the second a sub-group, and the third a category. The third rank is the standard ISO conformance test categories.

4.2 Test groups

4.2.1 Introduction

The test suite has a total of four levels. The first level is the root. The second level separates the root into various functional areas. The third level is the sub-functional areas if necessary. The fourth level is the standard ISO conformance test categories.

4.2.2 Root

The root identifies the Co-operative Awareness Basic Service (CA) given in ETSI EN 302 637-2 [1].

4.2.3 Groups

This level contains two functional areas identified as:

- Message Dissemination
- Message Processing

4.2.4 Sub-Groups

This level contains four sub-functional areas identified only for the Message Dissemination group and defined as:

- Message format
- Information adaptation
- Generation frequency
- Lower-layer parameters

4.2.5 Categories

This level contains the standard ISO conformance test categories limited to the behaviour valid event and Timer.

5 Test Purposes (TP)

5.1 Introduction

5.1.1 TP definition conventions

The TP definition is built according to ETSI EG 202 798 [i.1].

5.1.2 TP Identifier naming conventions

The identifier of the TP is built according to table 2.

Table 2: TP naming convention

TP/<root>/<gr>/<sgr>/<x>/<nn> or TP/<root>/<gr>/<x>/<nn> when no <sgr>		
<root> = root	CAM	
<gr> = group	MSD	Message Dissemination
	MSP	Message Processing
<sgr> =sub- group	FMT	Message Format
	INA	Information Adaptation
	GFQ	Generation Frequency
	PAR	Lower-layer parameters
<x> = type of testing	BV	Valid Behaviour tests
	TI	Timer tests
<nn> = sequential number		01 to 99

5.1.3 Rules for the behaviour description

The description of the TP is built according to ETSI EG 202 798 [i.1].

The base standards are not using finite state machine concept. As consequence, the test purposes use a generic "Initial State" that corresponds to a state where the IUT is ready for starting the test execution. Furthermore, the IUT shall be left in this "Initial State", when the test is completed.

Being in the "Initial State" refers to the starting point of the initial device configuration. There are no pending actions, no instantiated buffers or variables, which could disturb the execution of a test.

5.1.4 Sources of TP definitions

All TPs are specified according to ETSI EN 302 637-2 [1].

5.1.5 Mnemonics for PICS reference

To avoid an update of all TPs when the PICS document is changed, table 3 introduces mnemonics name and the correspondence with the real PICS item number.

The PICS item column refers to Table/Item of ETSI TS 102 868-1 [2].

Table 3: Mnemonics for PICS reference

Mnemonic	PICS item
PICS_PUBLICTRANS	A.12/1
PICS_SPECIALTRANS	A.12/2
PICS_DANGEROUSGOODS	A.12/3
PICS_ROADWORKS	A.12/4
PICS_RESCUE	A.12/5
PICS_EMERGENCY	A.12/6
PICS_SAFETYCAR	A.12/7
PICS_SPECIALVEHICLECONTAINER	A.8/4
PICS_RSU	A.1/2
PICS_CAM_RECEPTION	A.3/2
PICS_CAM_GENERATION	A.3/1
PICS_SECURITY	ETSI TS 102 871-1 [3] A.32/12

5.2 Test purposes for CA

5.2.1 Message dissemination

5.2.1.1 Message format

TP Id	TP/CAM/MSD/FMT/BV-01
Test objective	Check that protocolVersion is set to 1 and messageID is set to 2
Reference	ETSI EN 302 637-2 [1], clause B.1
PICS Selection	PICS_CAM_GENERATION
Initial conditions	
with { the IUT being in the "initial state" }	
Expected behaviour	
ensure that { when { a CAM is generated } then { the IUT sends a valid CAM containing ITS PDU header containing protocolVersion indicating value 1 and containing messageID indicating value 2 } }	

TP Id	TP/CAM/MSD/FMT/BV-02
Test objective	Check that LF container is included in first CAM since CA basic service activation
Reference	ETSI EN 302 637-2 [1], clause 6.1.3
PICS Selection	PICS_CAM_GENERATION
Initial conditions	
with { the IUT being in the "initial state" and the IUT has not sent any CAM yet }	
Expected behaviour	
ensure that { when { a CAM is generated } then { the IUT sends a valid CAM containing cam containing camParameters containing lowFrequencyContainer }	

TP Id	TP/CAM/MSD/FMT/BV-03
Test objective	Check that LF container is included if time elapsed since the generation of the last CAM with the low frequency container generation is equal to or greater than 500 ms
Reference	ETSI EN 302 637-2 [1], clause 6.1.3
PICS Selection	PICS_CAM_GENERATION
Initial conditions	
with { the IUT being in the "initial state" and the IUT has sent a CAM containing cam containing camParameters containing lowFrequencyContainer at time TIME_1 and the IUT has not sent CAM containing cam containing camParameters containing lowFrequencyContainer after TIME_1 }	
Expected behaviour	
ensure that { when { a CAM is generated at time TIME_2 >= (TIME_1 + 500 ms) } then { the IUT sends a valid CAM containing cam containing camParameters containing lowFrequencyContainer }	