



**Intelligent Transport Systems (ITS);
Testing;
Conformance test specifications for
Cooperative Awareness Basic Service (CA);
Part 3: Abstract Test Suite (ATS) and
Protocol Implementation eXtra Information for Testing (PIXIT)**

PREVIEW
https://standards.itsrc.com/standards/sist/44455-868-3-v1.5.1-2020-04
460e-9c23-f5f10b5a199c

Reference

RTS/ITS-00190

Keywords

ATS, ITS, PIXIT, testing

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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 Cooperative 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)".**

The development of ITS test specifications follows the guidance provided in ETSI EG 202 798 [i.1]. Therefore this ATS documentation 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**", "**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 Cooperative 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 [i.7].

The objective of the present document is to provide a basis for conformance tests for Cooperative Awareness Basic Service (CA) equipment giving a high probability of interoperability between different manufacturers' equipment.

The ISO standards for the methodology of conformance testing (ISO/IEC 9646-1 [i.4] and ISO/IEC 9646-2 [i.5]) as well as the ETSI rules for conformance testing (ETSI ETS 300 406 [i.8]) 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.

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

- [1] ETSI EN 302 637-2 (V1.4.1): "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 2: Specification of Cooperative Awareness Basic Service".
- [2] ETSI TS 102 868-1 (V1.5.1): "Intelligent Transport Systems (ITS); Testing; Conformance test specifications for Cooperative Awareness Basic Service (CA); Part 1: Test requirements and Protocol Implementation Conformance Statement (PICS) pro forma".
- [3] ETSI TS 102 868-2 (V1.5.1): "Intelligent Transport Systems (ITS); Testing; Conformance test specifications for Cooperative Awareness Basic Service (CA); Part 2: Test Suite Structure and Test Purposes (TSS & TP)".
- [4] ETSI TS 102 894-2 (V1.3.1): "Intelligent Transport Systems (ITS); Users and applications requirements; Part 2: Applications and facilities layer common data dictionary".

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.

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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] ETSI TS 103 096-3 (V1.3.1): "Intelligent Transport Systems (ITS); Testing; Conformance test specifications for ITS Security; Part 3: Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT)".

- [i.3] ETSI TR 103 099 (V1.4.1): "Intelligent Transport Systems (ITS); Architecture of conformance validation framework".
- [i.4] ISO/IEC 9646-1 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 1: General concepts".
- [i.5] ISO/IEC 9646-2 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 2: Abstract Test Suite specification".
- [i.6] ISO/IEC 9646-6 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 6: Protocol profile test specification".
- [i.7] ISO/IEC 9646-7 (1995): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 7: Implementation Conformance Statements".
- [i.8] ETSI ETS 300 406 (1995): "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".
- [i.9] 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".
- [i.10] ETSI ES 201 873-7 (V4.5.1): "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 7: Using ASN.1 with TTCN-3".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

3.2 Symbols

Void.

3.3 Abbreviations

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

ASN	Abstract Syntax Notation
ASN.1	Abstract Syntax Notation One
ATM	Abstract Test Method
ATS	Abstract Test Suite
BV	Valid test events for Behaviour tests
CA	Cooperative Awareness Basic Service
CAM	Cooperative Awareness Messages
CAN	Controller Area Network
CRS	Crash Status
FMT	Message Format
GFQ	Generation Frequency
GNSS	Global Navigation Satellite System
INA	Information Adaptation
ISO	International Organization for Standardization
ITS	Intelligent Transport Systems
IUT	Implementation Under Test
LDM	Local Dynamic Map
MSD	Message Dissemination
MSG	Message Generation

MSP	Message Processing
MTC	Main Test Component
PAR	Parameter
PCTR	Protocol Conformance Testing Report
PICS	Protocol Implementation Conformance Statement
PIXIT	Partial Protocol Implementation eXtra Information for Testing
PX	Pixit
SAP	Service Access Point
SCS	System Conformance Statement
SCTR	Static Conformance Test Report
SSP	Service Specific Permissions
SUT	System Under Test
TC	Test Case
TI	Timer tests
TP	Test Purposes
TS	Test System
TSS	Test Suite Structure
TTCN	Testing and Test Control Notation

4 Abstract Test Method (ATM)

4.1 Abstract protocol tester

The abstract protocol tester used by this 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.

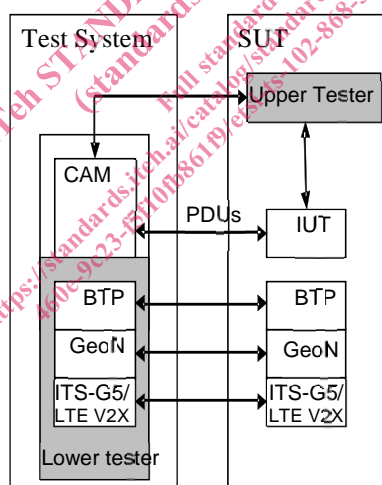


Figure 1: Abstract protocol tester - CA

4.2 Test Configuration

This 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 CAM protocol.

4.3 Test architecture

The present document implements the general TTCN-3 test architecture described in ETSI EG 202 798 [i.1], clauses 6.3.2 and 8.3.1.

Figure 2 shows the test architecture used for the CA ATS. The CA test component requires using only the Main Test Component (MTC). The MTC communicates with the CA SUT over the camPort. The camPort is used to exchange CA protocol messages between the CA test component and the CA IUT.

The Upper tester entity in the SUT enables triggering CA functionalities by simulating primitives from application or LDM entities. It is required to trigger the CA layer in the SUT to send CA messages, which are resulting from upper layer primitives. Furthermore, receiving CA messages may result for the CA layer in sending primitives to the upper layer (sending Data to LDM for instance).

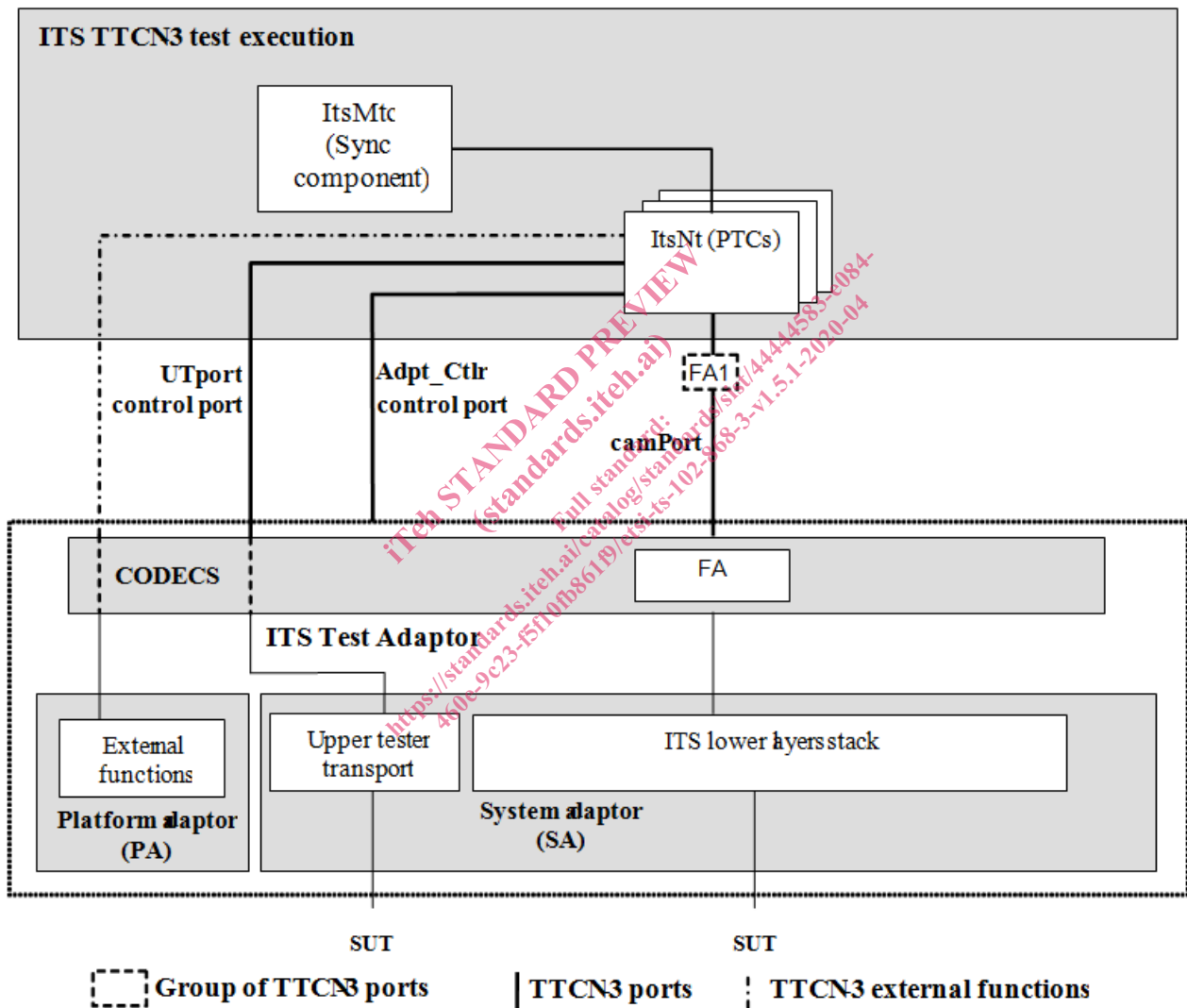


Figure 2: Test system architecture

4.4 Ports and ASPs (Abstract Services Primitives)

4.4.1 Introduction

Two ports are used by the CA ATS:

- The camPort, of type CamPort.
- The utPort, of type UpperTesterPort.

4.4.2 Primitives of the camPort

Two types of primitives are used in the camPort:

- The CamInd primitive used to receive messages of type CamPdu.
- The CamReq primitive used to send messages of type CamPdu.

These two primitives use the CamPdu type, which is declared in the CAM.asn ASN.1 module, following the ASN.1 definition from ETSI EN 302 637-2 [1].

```
CamPdu ::= SEQUENCE {
    header  ItsPduHeader,
    cam     CoopAwareness
}
```

4.4.3 Primitives of the utPort

This port uses two types of primitives:

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

4.5 Executing CA tests in secured mode

All the CA tests, with the exception of the SSP tests, can be executed with security enabled or with security disabled. The choice of running the CA tests in secured or non-secured mode has no impact on the result of the CA tests because the test verdicts assess CA protocol behaviour only.

The SSP tests can only be executed in secured mode.

The choice of running the CA tests in secured or non-secured mode shall be controlled via the test suite parameter PICS_IS_IUT_SECURED, see table A.5/1 of ETSI TS 102 868-1 [2].

Before running the CA tests in secured mode, the following steps need to be executed:

- security certificates need to be generated for the tester as well as for the IUT, see ETSI TS 103 096-3 [i.2], clause 5.3.2.5;
- security certificates need to be installed onto the IUT, see ETSI TS 103 096-3 [i.2], clause 5.3.2.6;
- in case of usage of the ETSI test adapter, the following test adapter parameters need to be configured.