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Intelligent Transport Systems (ITS);
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Part 2: Test Suite Structure and Test Purposes (TSS & TP);
Release 2

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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. Full details of the entire series can be found in part 1 [3].

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 ITS Misbehaviour Reporting service as specified in ETSI TS 103 759 [1] in accordance with the relevant guidance given in ISO/IEC 9646-7 [i.6].

The ISO standard for the methodology of conformance testing (ISO/IEC 9646-1 [i.3] and ISO/IEC 9646-2 [i.4]) as well as the ETSI rules for conformance testing (ETSI ETS 300 406 [i.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 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/.

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 TS 103 759 (V2.1.1): "Intelligent Transport Systems (ITS); Security; Misbehaviour Reporting service; Release 2".

[2] ETSI TS 103 097 (V2.1.1): "Intelligent Transport Systems (ITS); Security; Security header and certificate formats; Release 2".

[3] ETSI TS 103 868-1 (V2.1.1): "Intelligent Transport Systems (ITS); Testing; Conformance test specifications for ITS Misbehaviour Reporting service; Part 1: Protocol Implementation Conformance Statement (PICS); Release 2".

[4] ETSI TS 102 941 (V2.2.1): "Intelligent Transport Systems (ITS); Security; Trust and Privacy Management; Release 2".

[5] 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".

2.2 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] ETSI TS 102 965: "Intelligent Transport Systems (ITS); Application Object Identifier (ITS-AID); Registration".

[i.3] ISO/IEC 9646-1 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 1: General concepts".

[i.4] ISO/IEC 9646-2 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 2: Abstract Test Suite specification".

[i.5] ISO/IEC 9646-6 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 6: Protocol profile test specification".

[i.6] ISO/IEC 9646-7 (1995): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 7: Implementation Conformance Statements".

[i.7] ETSI ETS 300 406 (1995): "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI TS 102 941 [4], ETSI TS 103 097 [2], ETSI TS 103 861-1 [3], ETSI TS 102 965 [i.2], ISO/IEC 9646-6 [i.5] and ISO/IEC 9646-7 [i.6] apply.

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TS 103 759 [1], ETSI TS 103 097 [2], ETSI TS 103 861-1 [3], ETSI TS 102 941 [4] and the following apply:

BO	exceptional BehaviOur
BV	Valid Behaviour
CA	Co-operative Awareness
CERT	CERTificate
GN-MGMT	GeoNetworking ManaGeMenT message
GPC	GNSS Positioning Correction
IUT	Implementation Under Test
IVIM	Infrastructure to Vehicle Information Message
MAPEM	MAP (topology) Extended Message
NIST	National Institute of Standards and Technology
OBU	On-Board Unit
PICS	Protocol Implementation Conformance Statement
PIXIT	Partial Protocol Implementation eXtra Information for Testing
PSID	Provider Service IDentifier
RSU	Road-Side Unit
SPATEM	Signal Phase And Timing Extended Message
SREM	Signal Request Extended Message
SSEM	Signal request Status Extended Message
TP	Test Purposes
TS	Test System
TSS	Test Suite Structure

4 Test Suite Structure (TSS)

4.1 Structure for Security tests

Table 1 shows the Security Test Suite Structure (TSS) defined for conformance testing.

Table 1: TSS for MR service

Root	Group	Sub-Group	Category
mrs	Security		Valid and invalid
	Message	General	Valid
		CAM	Valid
		DENM	Valid
	MULTIPLE	CAM	Valid
		DENM	Valid
	Forwarding		Valid
	Short Range		Valid

4.2 Test entities and states

4.2.1 V-ITS-S states

- State 'idle':
  - ITS-S in 'idle' state is sending CA message or beacons.

4.2.2 R-ITS-S states

- State 'idle':
  - RSU in 'idle' state is sending CA message or beacons.

4.2.3 MA states

- State 'idle':
  - MA in 'idle' state is ready to process MRs.

4.3 Test configurations

4.3.1 Overview

This clause introduces the different IUT's configurations required to execute the TPs described in clause 5.

4.3.2 ITS-S

4.3.2.1 Configuration CFG_ITS_MRS_01

IUT: ITS-S of type V-ITS-S in the state 'idle':

- Following information elements shall be provided by IUT for the MA emulated by the TS:
  - Long range Transport.

TS: MA is emulated by TS.

4.3.2.2 Configuration CFG_ITS_MRS_02

IUT: ITS-S of type V-ITS-S in the state 'idle':

- Following information elements shall be provided by IUT for the MA emulated by the TS:
  - Short range Transport.

4.3.3 R-ITS-S

4.3.3.1 Configuration CFG_ITS_MRS_03

IUT: RSU in the state 'idle':

- Following information elements shall be provided by IUT for the MA emulated by the TS:
  - Short range Transport.
  - Long range Transport.

TS: MA and ITS-S are emulated by TS.

4.3.4 MA

4.3.4.1 Configuration CFG_ITS_MRS_04

IUT: MA in the state 'idle':

- Following information elements shall be provided by IUT for the ITS-S emulated by the TS:
  - Long range Transport.

TS: ITS-S is emulated by TS.

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

Identifier	TP_<root>_<tgt>_<gr>_<sub-gr> <sn>_<x>	Sub-Group	Category
	<root> = root	MRS	
	<tgt> = target	ITSS	IUT is an OBU
		RSU	IUT is an RSU
		MA	General behaviour
	<gr> = group	SEC	Security behaviour
		MESSAGES	Message misbehaviour detection
		FORWARDING	Message forwarding
		SRT	Short Range Transport

Identifier	TP_<root>_<tgt>_<gr>_<sub-gr> <sn>_<x>	Sub-Group	Category
	<sub-gr> = sub-group	CLASS1	MBR class1
		CLASS2	MBR class2
		CLASS3	MBR class3
		CLASS4	MBR class4
		CLASS5	MBR class5
		MULTIPLE	Multiple detectors of same or different classes
	<x> = category	BV	Valid Behaviour tests
		BO	Invalid Behaviour Tests
	<sn> = test purpose 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].

ETSI TS 103 759 [1] does not use the 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 have been specified according to ETSI TS 103 759 [1] which shall be followed as specified in the present document

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' as defined in tables provided in clause A.6 of ETSI TS 103 868-1 [3] shall be used to determine the test applicability.

Table 3: Mnemonics for PICS reference

Mnemonic	PICS item
PICS_IUT_ITS_S	ETSI TS 103 868-1 [3], Table A.2 Item 1
PICS_IUT_RSU	ETSI TS 103 868-1 [3], Table A.2 Item 2
PICS_IUT_MA	ETSI TS 103 868-1 [3], Table A.3 Item 1
PICS_DETECTOR_CAM_BEACON	ETSI TS 103 868-1 [3], Table A.4 Item 1
PICS_DETECTOR_CAM_STATIC	ETSI TS 103 868-1 [3], Table A.4 Item 5
PICS_DETECTOR_CAM_POSITION	ETSI TS 103 868-1 [3], Table A.4 Item 3
PICS_DETECTOR_CAM_SPEED	ETSI TS 103 868-1 [3], Table A.4 Item 2
PICS_DETECTOR_CAM_LONG_ACC	ETSI TS 103 868-1 [3], Table A.4 Item 4
PICS_DETECTOR_CAM_SECURITY	ETSI TS 103 868-1 [3], Table A.4 Item 6
PICS_SHORT_RANGE	ETSI TS 103 868-1 [3], Table A.4 Item 1

5.1.6 Certificates content

5.1.6.1 Root Certificate Authorities certificates

Table 4: Content of the Root CA certificates with MRS ITS-AID permissions

RCA certificate	Content	To be installed on the IUT
CERT_IUT_A_RCA	• self-signed • name "ETSI Test RCA A certificate" • application permissions: - CRL with SSP 0x01 - CTL with SSP 0x0138 • certificate issuing permissions: - CAM with all possible SSP (0x01FFFC / 0xFF0003) - DENM with all possible SSP (0x01FFFFFF / 0xFF000000) - SPATEM with all possible SSP (0x01E0 / 0xFF1F) - MAPEM with all possible SSP (0x01C0 / 0xFF3F) - IVIM with all possible SSP (0x01000000FFF8 / 0xFF0000000007) - SREM with all possible SSP (0x01FFFFE0 / 0xFF00001F) - SSEM with all possible SSP (0x01 / 0xFF) - GPC with all possible SSP (0x01 / 0xFF) - GN-MGMT without SSP - CRT-REQ with SSP (0x01FE / 0xFF01) - MRS with SSP (0x01C0 / 0xFF00) - MDM with SSP (0x01010201240125 / 0xFF000000000000) • validation time for 3 years • no region restriction • assurance level 6 • verification key of type compressed with NIST P256R curve • valid signature of type x-only with NIST P256R curve	Yes
NOTE 1: For MRS SSPs, all PSIDs are authorized. NOTE 2: For MDM SSPs, only CAM and DENM PSIDs are authorized. NOTE 3: MDM SSP are COER encoded.		