



Technical Report

**Intelligent Transport Systems (ITS);
Testing;
Conformance test specification for CALM Fast Services;
FNTP/FSAP/IICP validation report**

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Intelligent Transport Systems (ITS).

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**may not**", "**need**", "**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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Introduction

In response to EC mandate M/453 [i.13], ETSI Technical Committee ITS has standardized test specifications for ITS protocols according to base standards from ISO TC204 WG16. In a next step a prototype TTCN-3 test system was built and validated. The present document describes the validation and design of the prototype TTCN-3 test system.

The action described in the present document supports the implementation of ITS standards by:

- Making available validated and standardized test specifications and thus enabling the application of reliable certification schemes.
- Executing conformance validation framework against real Implementations Under Test (IUTs) from industry and thus providing these companies a conformance assessment of their implementations. During the lifetime of this action, the conformance validation framework was as well demonstrated at a meeting of ISO TC204 in Kobe (Japan), and at an ETSI PlugTest.
- Releasing all software as open source and thus allowing industry to build and run their own conformance validation framework.

1 Scope

The present document is the validation report of the FNTF, FSAP and IICP conformance tests and it provides statistics of executed and validated FNTF, FSAP and IICP conformance tests. The information provided has been produced by validation against two prototype implementations from industry.

Furthermore, identified issues related to the base specifications ISO 29281-1 [i.5], ISO 24102-5 [i.4], ISO 24102-4 [i.3] and test specification TS 102 985-1 [i.6], TS 102 985-2 [i.7], TS 102 985-3 [i.8], TS 102 797-1 [i.9], TS 102 797-2 [i.10], TS 102 797-3 [i.11] are listed in the present document.

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>.

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2.1 Normative references

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

Not applicable.

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 TR 103 099 (V1.2.1): "Intelligent Transport Systems (ITS); Architecture of conformance validation framework".
- [i.2] ETSI EG 201 015 (V1.1.1): "Methods for Testing and Specification (MTS); Specification of protocols and services; Validation methodology for standards using SDL; Handbook".
- [i.3] ISO 24102-4:2013: "Intelligent transport systems -Communications access for land mobiles (CALM) - ITS station management - Part 4: Station-internal management communications".
- [i.4] ISO 24102-5:2013: "Intelligent transport systems -Communications access for land mobiles (CALM) - ITS station management - Part 5: Fast service advertisement protocol (FSAP)".
- [i.5] ISO 29281-1:2013: "Intelligent transport systems -Communications access for land mobiles (CALM) - Non-IP communications - Part 1: Fast networking & transport layer protocol (FNTF)".
- [i.6] ETSI TS 102 985-1 (V1.2.1): "Intelligent Transport Systems (ITS); Communications Access for Land Mobiles (CALM); Test specifications for non-IP networking (ISO 29281); Part 1: Protocol Implementation Conformance Statement (PICS) proforma".
- [i.7] ETSI TS 102 985-2 (V1.2.1): "Intelligent Transport Systems (ITS); Communications Access for Land Mobiles (CALM); Test specifications for non-IP networking (ISO 29281); Part 2: Test Suite Structure and Test Purposes (TSS & TP)".
- [i.8] ETSI TS 102 985-3 (V1.2.1): "Intelligent Transport Systems (ITS); Communications Access for Land Mobiles (CALM); Test specifications for non-IP networking (ISO 29281); Part 3: Abstract Test Suite (ATS) and partial PIXIT proforma".

- [i.9] ETSI TS 102 797-1 (V1.2.1): "Intelligent Transport Systems (ITS); Communications Access for Land Mobiles (CALM); Test specifications for ITS station management (ISO 24102); Part 1: Protocol Implementation Conformance Statement (PICS) specification".
- [i.10] ETSI TS 102 797-2 (V1.2.1): "Intelligent Transport Systems (ITS); Communications Access for Land Mobiles (CALM); Test specifications for ITS station management (ISO 24102); Part 2: Test Suite Structure and Test Purposes (TSS & TP)".
- [i.11] ETSI TS 102 797-3 (V1.2.1): "Intelligent Transport Systems (ITS); Communications Access for Land Mobiles (CALM); Test specifications for ITS station management (ISO 24102); Part 3: Abstract Test Suite (ATS) and partial PIXIT proforma".
- [i.12] ETSI ES 201 873-1: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 1: TTCN-3 Core Language".
- [i.13] EC mandate M/453: "Standardisation Mandate addressed to CEN, CENELEC and ETSI in the field of information and communication technologies to support the interoperability of co-operative systems for intelligent transport in the European community".

3 Abbreviations

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

ASN	Abstract Syntax Notation
ATS	Abstract Test Suite
FNTP	Fast Networking & Transport Protocol
FSAP	Fast Service Advertisement Protocol
IICP	ITS station-Internal management Communications Protocol
ITS	Intelligent Transportation Systems
PICS	Protocol Implementation Conformance Statement
SUT	System Under Test
TC	Test case
TP	Test Purpose
TTCN-3	Testing and Test Control Notation 3

4 Validation report

4.1 Validation level

Level 3 (Rigorous) abstract test suite validation has been performed, according to the validation handbook EG 201 015 [i.2]:

- the test suite has been compiled on more than one TTCN-3 tool;
- the complete suite of tests has been implemented and executed on two test platform;
- the suite of tests for implemented protocol options have been executed against SUTs from a range of different suppliers;
- the operation and output traces of all the tests have been validated.

4.2 Source code evaluation

4.2.1 TTCN-3 version

The FSAP, FNTP and IICP abstract test suites TS 102 985-3 [i.8] and TS 102 797-3 [i.11] are based on TTCN-3 edition 4.2.1 (TTCN3:2010) specified in ES 201 873-1 [i.12].

4.2.2 TTCN-3 tools used for compilation

The test suites TS 102 985-3 [i.8] and TS 102 797-3 [i.11] have been compiled using three different TTCN-3 tools, as detailed in table 1.

Table 1: TTCN-3 tools used for compilation

Supplier	Tool name	Version	Settings	Compilation result
Elvior	TestCast T3	6.7.2.1		No error, no warning
TestingTech	TTworkbench	1.1.17	Support for very large integers ASN.1-Language-Support-v1.1.4	No error, no warning
OpenTTCN	OpenTTCN Tester 2012	4.2.2		No error, no warning

4.3 Validation process

4.3.1 Test platform

The validation test platform is based on the conformance validation framework [i.1] and extensions of it presented in TS 102 985-3 [i.8] and TS 102 797-3 [i.11] using the components presented in table 2.

Table 2: Validation test platform components

TTCN-3 Tool	Elvior TestCastT3 v6.7.2.1
TTCN-3 Tool	TestingTech TTworkbench v13 with ASN.1 support plugin
Test Adapter	Software: Implemented by STF424/STF455. ITS Test Adapter v1.1.2
Codec	Implemented by STF424/STF455. ITS Codec v1.1.2

4.3.2 Systems under test

The following SUTs have been used to validate the FNTTP, FSAP and IICP test suites:

Table 3: SUTs used for validation

Manufacturer	Product name	Version
Commsignia in Hungary	FNTTP, FSAP and IICP	0.5
Imtech in The Netherlands	FNTTP, FSAP	2.0

4.3.3 Validation status

4.3.3.1 FNTTP

Table 4 shows the validation status of each test case of the FNTTP abstract test suite.

Table 4: Testcase validation status (FNTTP)

TC identifier	Verdict	Log analysis	Validated
TC_FNTTP_TXP_BP_BV_01	PASS	OK	Yes
TC_FNTTP_TXP_BP_BV_02	PASS	OK	Yes
TC_FNTTP_TXP_EP_BV_01	PASS	OK	Yes
TC_FNTTP_TXP_EP_BI_01	PASS	OK	Yes
TC_FNTTP_RXP_BP_BV_01	PASS	OK	Yes
TC_FNTTP_RXP_BP_BV_02	PASS	OK	Yes
TC_FNTTP_RXP_BP_BV_03	PASS	OK	Yes
TC_FNTTP_RXP_BP_BI_01	PASS	OK	Yes
TC_FNTTP_RXP_BP_BI_02	PASS	OK	Yes

TC identifier	Verdict	Log analysis	Validated
TC_FNTP_RXP_BP_BI_03	PASS	OK	Yes
TC_FNTP_RXP_EP_BV_01	PASS	OK	Yes
TC_FNTP_RXP_EP_BV_02	PASS	OK	Yes
TC_FNTP_RXP_EP_BV_03	PASS	OK	Yes
TC_FNTP_RXP_EP_BV_04	PASS	OK	Yes
TC_FNTP_RXP_EP_BI_01	PASS	OK	Yes
TC_FNTP_RXP_EP_BI_02	PASS	OK	Yes
TC_FNTP_TXP_FP_BV_01	Tests not executed due to missing implementations of optional features		
TC_FNTP_TXP_FP_BV_02			
TC_FNTP_TXP_FP_BV_03			
TC_FNTP_TXP_FP_BI_01			
TC_FNTP_RXP_FP_BV_01			
TC_FNTP_RXP_FP_BV_02			
TC_FNTP_RXP_FP_BV_03			
TC_FNTP_RXP_FP_BV_04			
TC_FNTP_RXP_FP_BI_01			
TC_FNTP_CIP_EP_BV_01			
TC_FNTP_CIP_EP_BV_02			
TC_FNTP_CIP_EP_BV_03			
TC_FNTP_CIP_EP_BV_04			
TC_FNTP_CIP_FP_BV_01			
TC_FNTP_CIP_FP_BV_02			
TC_FNTP_CIP_FP_BV_03			
TC_FNTP_CIP_FP_BV_04			
TC_FNTP_CIP_FP_BV_05			
TC_FNTP_CIP_FP_BV_06			
TC_FNTP_CIP_FP_BV_07			
TC_FNTP_CIP_FP_BV_08			
TC_FNTP_CIP_FP_BV_01			
TC_FNTP_CIP_FP_BV_02			
TC_FNTP_CIP_FP_BV_03			

4.3.3.2 FSAP

Table 5 shows the validation status of each test case of the FNTP abstract test suite.

Table 5: Testcase validation status (FSAP)

TC identifier	Verdict	Log analysis	Validated
TC_FSAP_SP_HR_BV_01	PASS	OK	Yes
TC_FSAP_SP_HR_BV_02	PASS	OK	Yes
TC_FSAP_SP_HR_BV_03	PASS	OK	Yes
TC_FSAP_SP_HR_BV_04	PASS	OK	Yes
TC_FSAP_SP_HR_BV_05	PASS	OK	Yes
TC_FSAP_SP_HR_BI_01	PASS	OK	Yes
TC_FSAP_SP_HR_BI_02	PASS	OK	Yes
TC_FSAP_SU_HR_BV_01	PASS	OK	Yes
TC_FSAP_SU_HR_BV_02	PASS	OK	Yes
TC_FSAP_SU_HR_BV_04	PASS	OK	Yes
TC_FSAP_SP_HO_BV_01	Tests not executed due to missing implementations of the host-only role and router-only role of an ITS station unit. All vendors had ITS station units that implement both, the router role and the host role.		
TC_FSAP_SP_HO_BV_02			
TC_FSAP_SP_HO_BV_03			
TC_FSAP_SP_HO_BV_04			
TC_FSAP_SP_HO_BV_05			
TC_FSAP_SP_HO_BI_01			
TC_FSAP_SP_HO_BI_02			
TC_FSAP_SP_RO_BV_01			
TC_FSAP_SP_RO_BV_02			
TC_FSAP_SP_RO_BV_03			
TC_FSAP_SP_RO_BV_04			
TC_FSAP_SP_RO_BV_05			
TC_FSAP_SP_RO_BI_01			
TC_FSAP_SP_RO_BI_02			

TC identifier	Verdict	Log analysis	Validated
TC_FSAP_SU_HR_BV_03			
TC_FSAP_SU_HR_BV_05			
TC_FSAP_SU_HO_BV_01			
TC_FSAP_SU_HO_BV_02			
TC_FSAP_SU_RO_BV_01			
TC_FSAP_SU_RO_BV_02			
TC_FSAP_SU_RO_BV_03			

4.3.3.3 IICP

In a first step, IICP was implicitly tested with all tests performed on FNTP and FSAP, as IICP is used as transport mechanism between ITS test system and SUT.

Table 6 shows the validation status of each test case of the IICP abstract test suite executed explicitly in a second step.

Table 6: Testcase validation status (IICP)

TC identifier	Verdict	Log analysis	Validated
TC_IICP_MGM_BV_01	PASS	OK	Yes
TC_IICP_MGM_BV_02	PASS	OK	Yes
TC_IICP_MGM_BV_03	PASS	OK	Yes
TC_IICP_MGM_BV_04	PASS	OK	Yes
TC_IICP_MGM_BV_05	PASS	OK	Yes
TC_IICP_MGM_BV_06	PASS	OK	Yes
TC_IICP_MGM_BI_01	PASS	OK	Yes
TC_IICP_MGM_BI_02	PASS	OK	Yes
TC_IICP_MGM_BI_03	PASS	OK	Yes
TC_IICP_COMM_BV_01	PASS	OK	Yes
TC_IICP_COMM_BV_02	PASS	OK	Yes
TC_IICP_COMM_BV_03	PASS	OK	Yes
TC_IICP_COMM_BV_04	PASS	OK	Yes
TC_IICP_COMM_BV_05	PASS	OK	Yes
TC_IICP_COMM_BV_06	PASS	OK	Yes
TC_IICP_COMM_BV_07	PASS	OK	Yes
TC_IICP_COMM_BV_08	PASS	OK	Yes
TC_IICP_COMM_BV_09	PASS	OK	Yes
TC_IICP_COMM_BV_10	PASS	OK	Yes
TC_IICP_COMM_BV_11	PASS	OK	Yes
TC_IICP_COMM_BV_12	PASS	OK	Yes
TC_IICP_COMM_BV_13	PASS	OK	Yes
TC_IICP_COMM_BV_14	PASS	OK	Yes
TC_IICP_COMM_BV_15	PASS	OK	Yes
TC_IICP_COMM_BV_16	PASS	OK	Yes
TC_IICP_COMM_BV_17	PASS	OK	Yes
TC_IICP_COMM_BV_18	PASS	OK	Yes
TC_IICP_COMM_BV_19	PASS	OK	Yes
TC_IICP_COMM_BV_20	PASS	OK	Yes
TC_IICP_COMM_BV_21	PASS	OK	Yes
TC_IICP_COMM_BV_22	PASS	OK	Yes
TC_IICP_COMM_BV_23	PASS	OK	Yes
TC_IICP_COMM_BI_01	PASS	OK	Yes
TC_IICP_COMM_BI_02	PASS	OK	Yes
TC_IICP_COMM_BI_03	PASS	OK	Yes
TC_IICP_COMM_BI_04	PASS	OK	Yes
TC_IICP_COMM_BI_05	PASS	OK	Yes
TC_IICP_COMM_BI_06	PASS	OK	Yes
TC_IICP_COMM_BI_07	PASS	OK	Yes