TECHNICAL REPORT

ISO/TR 16401-2

First edition
2018-01

Electronic fee collection — Evaluation of equipment for conformity to ISO 17575-2 —

Part 2: Abstract test suite

Perception du télépéage — Évaluation de conformité de l'équipement à l'ISO 17575-2 —
Partie 2: Suite d'essai abstraite

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

This first edition of ISO/TR 16401-2 cancels and replaces ISO/TS 16401-2:2012, which has been technically revised.

The main changes compared to the previous edition are as follows:

— conversion from a Technical Specification to Technical Report has been made;

— the terms and definitions have been revised;

— editorial and formal corrections as well as changes to improve readability have been made.

A list of all parts in the ISO 16401 series can be found on the ISO website.

Introduction

This document is part of a set of standards that supports interoperability of autonomous electronic fee collection (EFC) systems. Autonomous systems use satellite positioning, often combined with additional sensor technologies such as gyroscopes, odometers, and accelerometers, to localize the vehicle and to find its position on a map containing the charged geographic objects, such as charged roads or charged areas. From the charged objects, the vehicle characteristics, the time of day and other data that are relevant for describing road use, the tariff and ultimately the road usage fee are determined.

The ISO/TR 16401 series provides tests to assess the Front End Communications API and Front End application behaviours compliancy towards the requirements listed in ISO 17575-2. ISO/TR 16401-1 contains the definition of such tests in the form of test purposes, listing the initial conditions, references and individual steps in a structured textual manner. This document contains the identical tests written in Testing and Test Control Notation version 3 (TTCN-3).

Autonomous on-board equipment (OBE) operates without relying on dedicated road-side infrastructure by employing wide-area technologies such as Global Navigation Satellite Systems (GNSS) and Cellular Communications Networks (CN). Therefore, autonomous systems may also be referred to as GNSS/CN systems.

Within the suite of EFC standards, this document defines tests for conformity evaluation of Front End and Back End that comply with the requirements towards the context data specified in ISO 17575-2.

This document is intended to

— assess Front End Communications API and Front End application capabilities,

— assess Front End Communications API and Front End application behaviour,

— serve as a guide for Front End Communications API and Front End application conformance evaluation and type approval,

— achieve comparability between the results of the corresponding tests applied in different places at different times, and

— facilitate communications between parties.

Electronic fee collection — Evaluation of equipment for conformity to ISO 17575-2 —

Part 2:
Abstract test suite

1 Scope

This document contains the definition of test cases, reflecting the individual steps listed in specific test purposes defined in ISO/TR 16401-1. The test cases are written in Testing and Test Control Notation version 3 (TTCN-3).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 17575-1, *Electronic fee collection — Application interface definition for autonomous systems — Part 1: Charging*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17575-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
conformance testing
testing the extent to which an IUT is a conforming implementation

[SOURCE: ISO/IEC 9646-1:1994, 3.3.23]

3.2
Front End application
part of the Front End above the API

[SOURCE: ISO/TR 16401-1:2017, 3.12]

3.3
implementation under test
IUT
implementation of one or more OSI protocols in an adjacent user/provider relationship, being that part of a real open system which is to be studied by testing

[SOURCE: ISO/IEC 9646-1:1994, 3.3.43]

3.4
system under test
SUT
real open system in which the IUT resides

[SOURCE: ISO/IEC 9646-1:1994, 3.3.103]

3.5
test case
abstract or executable test case

[SOURCE: ISO/IEC 9646-1:1994, 3.3.107]

3.6
toll service provider
entity providing toll services in one or more toll domains

[SOURCE: ISO 17573:2010, 3.23, modified — the definition has been revised.]

4 Abbreviated terms

ADU	application data unit
API	application programming interface
ASN.1	Abstract Syntax Notation One
ATM	abstract test method
ATS	abstract test suite
BE	Back End
BI	behaviour invalid
BV	behaviour valid
CN	cellular network
DUT	device under test
EFC	electronic fee collection
FE	Front End
GNSS	Global Navigation Satellite Systems
ID	identifier
IUT	implementation under test
OBE	on-board equipment
PICS	Protocol Implementation Conformance Statements
PIXIT	Protocol Implementation Extra Information for Testing
SCS	semiconductor characterization system
SUT	system under test

TC test case

TP test purposes

TSS test suite structure

TTCN Testing and Test Control Notation

5 Abstract test method (ATM)

This clause describes the ATM used to test the layers at the FE side and at the BE side.

5.1 Implementations under tests

5.1.1 Front End (FE)

FE refers to the part(s) of the toll system where usage data for an individual user are collected, processed and delivered to the Back End. The Front End comprises the on-board equipment and optionally a proxy.

5.1.2 Back End (BE)

BE is the generic name for the computing and communication facilities of the service provider and/or the toll charger.

5.2 Test architecture

The implementation under test is either the FE or the BE. The system under test comprises also the communication sub-layer, which is necessary to perform the IUT tests.

The tester executes the TTCN-3 test cases of this document, running on an emulated communication sub-layer.

Figure 1 describes the test architecture.

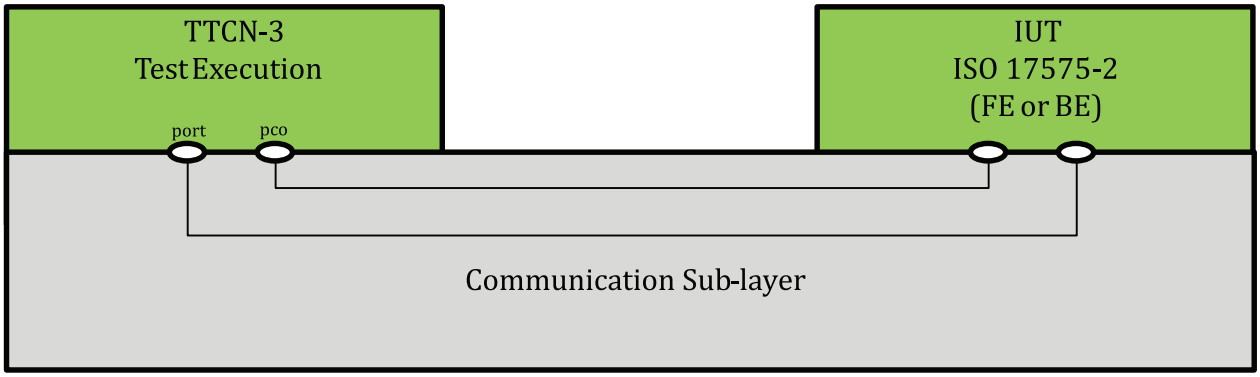

Figure 1 — Test system architecture

5.3 Protocol Implementation Extra Information for Testing (PIXIT)

The supplier of the Front End and Back End, respectively, should provide a Protocol Implementation Extra Information for Testing (PIXIT); see Annex B for the proforma.