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Electronic fee collection — Evaluation of equipment for conformity to ISO 17575-3 —

Part 1: Test suite structure and test purposes

Perception du télépéage — Évaluation de la conformité de l'équipement à l'ISO 17575-3 —

Partie 1: Structure de la suite d'essais et objectifs des essais

Reference number
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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.

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

This first edition of ISO 16410-1 cancels and replaces the first edition of ISO/TS 16410-1:2011, which has been technically revised.

The following changes have been made:

— this document has been converted from a Technical Specification to an International Standard;

— amendments have been made to reflect changes to the underlying base standards, especially ISO 17575 (all parts);

— major changes have been made regarding:

  — data element changes introduced by ISO 17575-1 and ISO 17575-3;

  — new test purposes related to:

    — protocol version handling;

    — toll context partitions;

    — fee calculation algorithm;

    — rounding rules;

    — alternative currency;

  — test purposes related to the following have been removed:

    — communications services;

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- rules with respect to support of context data which are no longer required by ISO 17575-3;
- the terms and definitions have been revised;
- editorial and formal corrections, as well as changes to improve readability, have been made.

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Introduction

This document is part of a series of standards that supports interoperability of autonomous 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 is determined.

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 series 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 17575-3.

This document is based on

— ISO 17575-3, and

— the ISO 9646 series on conformance test methodology.

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Electronic fee collection — Evaluation of equipment for conformity to ISO 17575-3 —

Part 1: Test suite structure and test purposes

1 Scope

The ISO 16410 series provides a suite of tests in order to assess compliance of the Front End and Back End behaviours in relation to the requirements in ISO 17575-3. This document contains the definition of such tests in the form of test purposes, listing the required initial conditions, references and individual steps in a structured textual manner. ISO 16410-2 contains the identical tests written in testing and test control notation version 3 (TTCN v3).

The test purposes defined in this document reflect the structural and semantic requirements stated in ISO 17575-3.

— Presence/absence of particular data elements (see ISO 17575-3:2016, 8.5.5);

— Semantics related to various data elements, e.g.:

  — Activation of context data and handling multiple contexts (see ISO 17575-3:2016, 8.3);

  — Handling the precedence and priority levels (see ISO 17575-3:2016, 8.5.2 to 8.5.4);

  — Uniqueness of relevant data elements (see ISO 17575-3:2016, 8.5.2 to 8.5.4);

  — Correct definition of the charge objects (see ISO 17575-3:2016, 8.5.4);

— Fee calculation algorithm (see ISO 17575-3:2016, 8.5.3.7);

— Security (see ISO 17575-3:2016, 7.2).

With regard to the individual data sets and EFC attributes defined in ISO 17575-3, the test purposes have been organized into the test suite groups, designated for the Front End and Back End respectively.

In addition to the test purposes, this document also provides proforma conformance test report templates for both the Front End and Back End test purposes and an informative statement on the usage of this document for the European electronic toll service (EETS).

For more information regarding the requirements against which the conformance is evaluated in this document, refer to ISO 17575-3.

Testing of the following behaviours and functionalities is outside the scope of this document:

— dynamic behaviour, i.e. sequence of messages and triggering events that must be exchanged/happen to fulfil certain charging scenarios;

— profiles and business logic built on top of particular pricing schemas;

— behaviour invalid of Front End and Back End, BI test purposes are not applicable for any test purpose group (as ISO 17575-3 does not specify behaviour invalid).

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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*

ISO 17575-3:2016, *Electronic fee collection — Application interface definition for autonomous systems — Part 3: Context data*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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
area charging
charging based on road usage within a given area

[SOURCE: ISO 17575-1:2016, 3.1]

3.2
attribute
addressable package of data consisting of a single data element or structured sequences of *data elements* (3.9)

[SOURCE: ISO 17575-1:2016, 3.2]

3.3
authenticator
data, possibly encrypted, that is used for authentication

[SOURCE: EN 15509:2014, 3.3]

3.4
Back End
part of a back office system interfacing to one or more *Front Ends* (3.11)

[SOURCE: ISO 17575-1:2016, 3.4]

3.5
charge object
geographic or road-related object for the use of which a charge is applied

[SOURCE: ISO 17575-1:2016, 3.5]

3.6
charge report
information containing road usage and related information originated at the *Front End* (3.11)

[SOURCE: ISO 17575-1:2016, 3.6]

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3.7
cordon
border line of an area

[SOURCE: ISO 17575-1:2016, 3.7]

3.8
cordon charging
charging for the crossing of a *cordon* (3.7)

[SOURCE: ISO 17575-1:2016, 3.8]

3.9
data element
coded information, which might itself consist of lower level information structures

[SOURCE: ISO 17575-1:2016, 3.9]

3.10
data set
logical set of *data elements* (3.9) with a semantic relation

[SOURCE: ISO 17575-3:2016, 3.10]

3.11
Front End
part of a tolling system consisting of an *OBE* (3.13) and possibly, a *proxy* (3.14) where road tolling information and usage data are collected and processed for delivery to the *Back End* (3.4)

[SOURCE: ISO/TS 19299:2015, 3.17]

Note 1 to entry: The Front End comprises the OBE and an optional proxy.

3.12
layout
technical description of the location of tolled objects including their borders

[SOURCE: ISO 17575-3:2016, 3.12]

3.13
on-board equipment
OBE
all required equipment on-board a vehicle for performing required EFC functions and communication services

[SOURCE: ISO 17575-3:2016, 3.13]

3.14
proxy
optional part of a *Front End* (3.11) that communicates with external equipment and processes the data received into an agreed format to be delivered to the *Back End* (3.4)

[SOURCE: ISO 17575-1:2016, 3.13]

3.15
road section charging
tolling principle where the fee is due if predefined sections of roads are used

[SOURCE: ISO 17575-1:2016, 3.14]

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3.16
toll
charge, tax or duty levied in connection to using a vehicle in a *toll domain* (3.20)

[SOURCE: ISO/TS 19299:2015, 3.42]

Note 1 to entry: The definition is the generalization of the classic definition of a toll as a charge, a tax or a duty for permission to pass a barrier or to proceed along a road, over a bridge, etc. The definition also includes fees regarded as an (administrative) obligation, e.g. a tax or a duty.

3.17
tolled area
geographic area where a *toll* (3.16) is charged for road usage

[SOURCE: ISO 17575-3:2016, 3.17]

3.18
toll context
logical view as defined by *attributes* (3.2) and functions of the basic elements of a *toll scheme* (3.22) consisting of a single basic tolling principle, a spatial distribution of the *charge objects* (3.5) and a single behaviour of the related *Front End* (3.11)

[SOURCE: ISO 17575-1:2016, 3.17]

3.19
toll context data
information defined by the responsible toll charger necessary to establish the *toll* (3.16) due for using a vehicle on a particular *toll context* (3.18) and to conclude the toll transaction

[SOURCE: ISO 12855:2015, 3.15]

3.20
toll domain
area or part of a road network where a certain *toll regime* (3.21) is applied

[SOURCE: ISO 17573:2010, 3.18]

3.21
toll regime
set of rules, including enforcement rules, governing the collection of *toll* (3.16) in a *toll domain* (3.20)

[SOURCE: ISO 17573:2010, 3.20]

3.22
toll scheme
organizational view of a *toll regime* (3.21), including the actors and their relationships

[SOURCE: ISO 17575-3:2016, 3.22]

4 Abbreviated terms

ADU	Application data unit
ASN.1	Abstract syntax notation one
ATS	Abstract test suite
BI	Behaviour invalid
BV	Behaviour valid (EN 15876-1)

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